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(A biannual peer-reviewed academic journal of the Nepal Ophthalmic Society)

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ISSN 2072-6805
E-ISSN 2091-0320

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## Contents

### Guest editorial
- **Infectious uveitis: Recent advances in diagnosis and treatment**  
  Pathanapitoon K, Stilma J S  
  Page No 215-216

### Original articles

1. **Outcome of phacoemulsification in eyes with cataract and corneal opacity partially obscuring the pupillary area**  
   Panda A, Krishna SN, Dada T  
   Page No 217-223

2. **Trypan blue staining of filtering bleb in eyes with operated trabeculectomy**  
   Dada T, Bali SJ, Mohan S, Bhartiya S, Sobti A, Panda A  
   Page No 224-229

3. **Efficacy of sutureless and glue free limbal conjunctival autograft for primary pterygium surgery**  
   Malik KPS, Goel R, Gupta A, Gupta SK, Kamal S, Malik VK, Singh S  
   Page No 230-235

4. **Ganglion cell complex scan in the early prediction of glaucoma**  
   Ganekal S  
   Page No 236-241

5. **Outcome of conjunctival autograft transplantation in pterygium surgery in a community based hospital in Nepal**  
   Sharma R, Marasini S, Nepal BP  
   Page No 242-247

6. **Phacoemulsification surgery by a nationally-trained cataract surgeon of Nepal**  
   Bajimaya S, Sharma BR, Shrestha JB, Maharjan IM, Matsushima H, Akura J  
   Page No 248-255

7. **Trends in idiopathic retinal vasculitis in a tertiary eye care centre of Nepal over a ten-year period**  
   Sitaula (Kharel) R, Aryal S, Joshi SN, Shrestha JK  
   Page No 256-262

8. **Visual outcome in open globe injuries**  
   Thevi T , Mimiwati Z , Reddy SC  
   Page No 263-270

9. **Expression of oxidative stress in metastatic retinoblastoma-a comparative study**  
   Mukhopadhyay S, Dutta J, Raut R, Datta H, Bhattacharyay AK  
   Page No 271-276

10. **Gender equity in eye health of Nepal: A hospital-based study**  
    Shrestha MK, Chan H, Gurung R  
    Page No 277-281

11. **Prevalence of blindness and visual impairment and its causes among people aged 50 years and above in Karnali Zone, Nepal**  
    Dulal S, Sapkota YD  
    Page No 282-287

12. **Hemodynamic effects of intraocular epinephrine during cataract surgery: a double blinded placebo controlled randomized clinical trial**  
    Seyed Ali Mohammad Miratashi, Shekoufeh Behdad, Vida Ayatollahi, Afsar Ahmadi  
    Page No 288-294
Review articles

Artificial drainage devices for glaucoma surgery: an overview
Chaudhary M, Grover S, Baisakhiya S, Bajaj A, Bhatia MS 295-302

Brief communication

Vision science literature of Nepal in the database “Web of Science”
Risal S, Prasad HN 303-308

Case reports

1. Repositioning of Ahmed glaucoma valve tube in the anterior chamber with prolene sutures to manage tube-endothelial touch

2. Prosthetic rehabilitation of a patient with enucleated eye - a case report
Garg P, Garg S, Bansal D, Suresh S 312-314

3. Ocular myocysticercosis: Favorable outcomes with early diagnosis and appropriate therapy
Chopra R, Kapoor H, Chopra A 315-318

4. Accommodative spasm with bilateral vision loss due to untreated intermittent exotropia in an adult
Shanker V, Ganesh S, Sethi S 319-322

5. Melanocytoma of the optic disc – a case report
Sharma H, Puri L R 323-325

6. Homocystinuria masquerading as vitamin B12 deficiency
326-328

7. Malignant transformation of kissing nevus- a rare entity
Kharel (Sitaula) R, Bhatta S, Shrestha GB, Shrestha JK 329-332

8. An unusual case of transient cortical blindness with sagittal sinus thrombosis in a case of Henoch-Schonlein purpura
Samanta SK, Mahapatra N, Aich B, Sarkar N, Chatterjee A 333-335

Puri L R, Sharma H, Aryal S 336-338

10. Choroidal metastases as the sole initial presentation of metastatic lung cancer: Case report and review of literature

Letters to editor

1. Surgically induced astigmatism of small incision cataract surgery
Ale JB 343

2. Trench, lollipop, lift and chop technique for mild to moderate cataracts
Vivekanand U, Kulkarni C 344-345

Waqar S, Holdstock C, Evans N 346-347

4. How should the ophthalmologists treat the methanol-induced toxic optic neuropathy?
Sanaei-Zadeh H, MD 348-350

Acknowledgement

351
Guest editorial

Infectious uveitis: Recent advances in diagnosis and treatment

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Uveitis can be caused by a number of different infectious agents, requiring a robust clinical experience and appropriate diagnostic tools for accurate diagnosis and treatment. A definitive diagnosis of infectious uveitis can be determined with laboratory investigations including polymerase chain reaction (PCR) analysis of intraocular fluids and the Goldmann-Witmer coefficient for local antibody production. However, in many eye care centers, these laboratory analyses are not available due to prohibitively high costs and accessibility. In these situations, a literature review of proven causes is essential to the ophthalmologist in order to make a diagnosis and devise the most effective treatment strategy for each case.

Over the past few decades, there has been growing awareness of cytomegalovirus (CMV)-associated anterior uveitis (AU), which represents a distinct clinical entity that occurs in immunocompetent patients and has primarily been reported in Asia. In a recent series from Northern Thailand, 10 out of 30 (33%) immunocompetent patients with a negative initial screening for AU were confirmed to have CMV by PCR (Kongyai et al, 2012). CMV-associated AU commonly presents as a recurrent unilateral hypertensive AU that is associated with typical keratic precipitates (KPs) (white, medium sized, nodular deposits), iris atrophy, and the absence of posterior synechiae. Some cases may present with corneal endotheliitis associated with KPs. The KPs are usually seen in the inferior half of the cornea and may be diffuse, linear, ring-shaped, or appear as a coin-like lesion. Additionally, they may be associated with immune ring formation. Fuch’s heterochromic iridocyclitis and Posner-Schlossman syndrome have also been associated with CMV. Fuch’s heterochromic iridocyclitis is a type of chronic uveitis associated with fine stellate KPs, iris atrophy, and cataract in the absence of synechiae. Posner-Schlossman syndrome is characterized by recurrent episodes of unilateral low-grade AU with acute onset of highly elevated intraocular pressure above 40 mm Hg without previous therapy. Currently, the treatment for CVM-associated AU includes systemic ganciclovir, intravitreal ganciclovir injections or topical ganciclovir gel for a minimum of three months. However, the overall recurrence rate is about 75.0% following antiviral therapy and do not greatly differ from eyes that did not receive antiviral treatment. Topical ganciclovir gel has a lower response rate, a lower relapse rate (25-50%) and fewer adverse effects (Jap & Chee, 2011).

Another common cause of infectious uveitis is ocular toxoplasmosis (OT). OT is characterized by necrotizing retinitis that is frequently located near a retinochoroidal scar and is associated with vitreous and anterior chamber inflammation. However, in primary OT, a chorioretinal scar may be absent. Atypical clinical features of OT that have been reported include isolated anterior uveitis, intraocular inflammatory reactions without focal necrotizing retinochoroiditis, serous retinal detachment, choroiditis without retinitis, occlusive...
retinal vasculitis, neuroretinitis and papillitis. Laboratory diagnosis of OT is determined by direct detection of *T gondii* DNA with PCR and/or indirect detection of infection by detection of *T gondii*-specific antibodies using the Goldmann-Witmer coefficient or serology for anti-*T gondii* IgG or IgM. The addition of an anti-*T gondii* IgA assay or IgG avidity increases the sensitivity of identification in cases of recently acquired toxoplasmosis. A thorough assessment requires multiple laboratory tests at different time points.

Treatment regimens include the following combinations:

1. pyrimethamine, sulfadiazine and leucovorin;
2. trimethoprim–sulfamethoxazole;
3. pyrimethamine, sulfadiazine, and clindamycin;
4. sulfadiazine and clindamycin;
5. pyrimethamine and clindamycin;
6. azithromycin alone or combined with either pyrimethamine or trimethoprim–sulfamethoxazole; and
7. intravitreal clindamycin, with a dosage ranging from 1.0 mg/0.1 mL to 1.5 mg/0.1 mL, given once or 3–4 times.

The effect of intravitreal clindamycin alone for ocular toxoplasmosis has not yet been evaluated.

Finally, human immunodeficiency virus (HIV) has been identified as another infectious agent associated with uveitis. Ocular manifestations in HIV-infected patients occur as a result of progressive immune dysfunction and are caused by opportunistic infections and malignancies. Since the introduction of highly active anti-retroviral therapy (HAART), the prevalence of immune recovery uveitis (IRU) has increased. However, HIV itself can also be a cause of intraocular inflammation, as several cases of HIV-associated uveitis have been recently reported. A HIV- infected patient with anterior uveitis had an intraocular HIV-1 RNA load largely exceeding that of the plasma, with no evidence of other intraocular infectious agents causing uveitis other than HIV itself. Positive intraocular HIV-1 RNA loads are associated with high HIV-1 RNA plasma loads and found in patients who are not undergoing HAART. Clinical features include anterior uveitis with KPs and/or vitritis without retinal lesions or scars that does not respond to topical corticosteroid therapy. Intraocular inflammation subsides after decreasing intraocular and plasma HIV loads following HAART (Pathanapitoon et al, 2011).

In conclusion, though many challenges remain, there has been marked progress in the proper diagnosis and treatment of infectious uveitis in recent years. Institutions with advanced laboratory facilities should pursue research endeavors that can help improve the quality of care provided to patients in ophthalmic clinics around the world.

**References**


Source of support: nil. Conflict of interest: none
Original article

Outcome of phacoemulsification in eyes with cataract and corneal opacity partially obscuring the pupillary area

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Abstract

Objective: To evaluate the intra-operative difficulties and postoperative visual outcome following phacoemulsification and intraocular lens (IOL) implantation in eyes with cataract and a coexisting corneal opacity partially obscuring the pupillary area.

Materials and methods: The study included 205 eyes of 205 patients with cataract, an extensive corneal opacity partially obscuring the pupillary area and a corrected distance visual acuity (CDVA) of less than 40/200 who had undergone phacoemulsification with IOL implantation by a single surgeon. The patients were followed up on day 1, day 7, 1 month and 3 months postoperatively. Intra-operative and post operative course and CDVA were evaluated.

Results: Seventy nine percent of the patients underwent phaco-emulsification via superior clear corneal approach while the rest were operated via temporal clear corneal approach. Trypan blue (0.06%) dye assisted capsulorrhexis was successfully completed in all eyes with additional maneuvers including posterior synechiolysis and sphincterotomy. Nucleotomy with primary chop technique and phacoemulsification were performed uneventfully in all but one eye, which was converted to an extra capsular cataract extraction (ECCE). A foldable intraocular lens was implanted in 76 eyes, rigid IOL in 128 eyes and 1 eye was left aphakic. The pre-operative CDVA of less than 40/200 improved to 20/60 at the end of 3 months follow up.

Conclusions: Phacoemulsification and intraocular lens implantation provides ambulatory and useful vision in eyes with coexisting cataract and corneal opacity.

Keywords: corneal opacity, cataract, phacoemulsification, iris hook, sphincterotomy

Introduction

The triple procedure with Penetrating Keratoplasty (PK) (Gong X ,1990; Panda A, 1999; Rao SK, 1999; Shimmura S, 2003; Baykara M, 2008) or Lamellar Keratoplasty (LK) (Senoo T, 2001; Muraine MC, 2002) is the conventional mean for visual rehabilitation of an eye with corneal opacity and a coexistent cataract. Because of the risk of graft rejection and infections, these patients require a meticulous post-operative follow up. However, this may not be possible for patients who come from rural background and live in remote hilly areas. In developing countries, the availability of a good quality
donor cornea is one of the greatest limitations. Ironically, the corneal problems usually require keratoplasty. Often, eyes with corneal opacities are associated with a co-existing cataract. Though a simple cataract surgery is not an alternative in these cases, it may be a good modality to provide ambulatory vision in one eyed patients, elderly patients with poor dexterity and those who are less likely to comply with a post-operative, meticulous follow up (Gupta AK, 1992; Panda A, 2007). With this in mind, we analyzed the results of our patients who were subjected to phacoemulsification and IOL implantation in eyes with cataracts and extensive corneal opacities partially sparing the pupil during the period from February 2000 - January 2010.

**Materials and methods**

A retrospective chart review was performed to evaluate the data of 205 consecutive eyes of 205 patients with cataracts and extensive corneal opacities partly obscuring the pupillary area and who were subjected to phacoemulsification with either foldable or rigid intraocular lens implantation by a single anterior segment surgeon (AP).

Only those cases in which the anterior capsule and the pupillary margin were visible with slit lamp biomicroscopy and the CDVA was less than 40/200 were enrolled.

A complete medical and ocular history was taken in all patients. A through ocular examination under a slit lamp was performed to obtain the details of the cornea and anterior chamber details. Intraocular pressure was recorded by applanation tonometer and fundus evaluation performed with an indirect ophthalmoscope. Laser interferometry, A- and B-scan ultrasonography for posterior segment evaluation and electrophysiological evaluations were carried out whenever required. The preoperative factors evaluated included etiology of the corneal opacification, the type of cataract and the preoperative CDVA.

All the surgeries were performed under peribulbar lidocaine (Xylocaine 2%, Astra-IDL) and bupivacaine (Sensoricaine 0.5%, Astra-IDL) (1:1) anaesthesia. Pre-operative preparation of the surgery included use of tropicamide 1% three times every ten minutes for maximum dilation. Depending upon the availability of maximum clear cornea either superior or temporal site was selected for the incision. Synechiolysis with viscoelastics or with fine iris repositor, and multiple sphincterotomies were performed whenever indicated. Trypan Blue (Vision Blue, Dorc Int., Netherlands) 0.1 mL of 0.06% was injected into the anterior chamber (AC), under air bubble to stain the anterior capsule for 10 seconds and then washed with balanced salt solution (BSS). High-viscosity viscoelastic (Sodium hyaluronate 14 mg/ml) was injected into the AC. Capsulorrhexis was initiated with a bent 26 G needle (Fig 1a, 1b) but completed with Utrata forceps. The anterior capsule was grasped with Utrata forceps at the junction adjacent to the corneal opacity margin to ensure an adequate flap and firm hold (Fig.1c & 1d). The tearing of the capsule was continued in a single motion until it was visible at the other end of the opacity margin (Fig 1e), then the rhexis was completed (1f). The viscoelastic was thoroughly washed from the AC followed by multiple quadrant hydrodissection in all until the edge of the nucleus tented in a clear area and was protruded outside the anterior capsule. Viscoelastic was injected behind and in front of the lens. A primary chop nucleotomy was performed (Fig 2a, 2b) followed by standard phacoemulsification. Care was taken to complete the phacoemulsification in the visible pupillary area by rotating the nucleus pieces to the maximum clear area (Fig 2c, 2d). Automated irrigation and aspiration of cortical materials was performed under retro-illumination at the visible area aided by posterior capsular trypan blue staining to complete the remaining cortex aspiration (3a).

In suspected cases of posterior capsule rupture either viscoelastic or 0.1 cc -4mg triamcinolone acetonide was injected into the AC to confirm the presence of any vitreous. An in-the-bag, foldable, single/three piece acrylic lens (Acrysof; Alcon Labs, Fort Worth, TX, USA)/ Acrifold (APPA, India) or
rigid PMMA lens (APPA, India), was chosen for implantation as dictated by the patient’s economic constraints (3b-3c). Remaining cortical matter, if any, was aspirated after dialing the lens in the bag. Viscoelastic was aspirated using automated irrigation and aspiration and the AC was formed with an air bubble. (3d-3e)

Post-operatively, the patients received Betametasone sodium phosphate eye drops (Betnesol, Glaxo) 0.1% 2 hourly and ciprofloxacin eye drops (Cifran, Ranbaxy) 0.3% four times a day. Cycloplegics were given to all and Timolol maleate (Iotim, FDC) 0.5% eye drops were added whenever required. The patients were followed up postoperatively on day 1, week 1, month 1 and month 6.

Main outcome measures

The parameters assessed during surgery included the completion of capsulorrhexis, phacoemulsification, irrigation and aspiration, intraocular lens implantation and the presence of complications, if any. Postoperative assessment included the record of corneal clarity, position of intraocular lens, CDVA and other complications, if any.

Results

The mean age of the patients was 52.85 ± 8.45 years (range 42-67 years, males- 112, females- 93). Most patients (138) had corneal opacity due to healed keratitis (Table 1).

![Image](https://example.com/table1.png)

<table>
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<tr>
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<td>13</td>
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<td>Trachoma sequelae</td>
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The main incision used was the superior approach in 162 eyes. The temporal approach was used in 43 eyes. Additional maneuvers to enlarge the pupillary area included posterior synechiolysis (159 eyes) and additional sphincterotomy (63 eyes). The capsulorrhexis was successfully completed in all cases. No extension of the capsulorrhexis occurred in any of the cases. A successful primary chop was possible in all cases. PC rent was suspected in fourteen eyes, which, however, were ruled out in five after injecting visco-elastic and five after injecting triamcinolone acetonide into the anterior chamber (AC) (Fig 4). In one eye, there was vitreous strand in AC, identified with triamcinolone acetonide and there was strong suspicion of nucleus instability in the bag. In this case, phacoemulsification technique was aborted and was converted to conventional extra capsular surgery (ECCE). The nucleus delivery was completed with wire vectis and the anterior vitrectomy was performed to clean the vitreous from the AC and wound, and the eye was left aphakic. In the remaining three cases, there was a small capsular tear. Rigid IOL was implanted successfully into the sulcus in those cases. The foldable intraocular lens (IOL) was implanted in 79, rigid IOL in 128 and one eye was left aphakic.

On postoperative day 1, there was residual cortical matter in the anterior chamber requiring re-aspiration in 5 eyes (Fig 5). Eleven eyes revealed grade II-III AC reaction which was controlled with intensive topical and systemic corticosteroid use (Fig 5). Post op CDVA of <40/200 in all eyes improved to 20/200 (11), 20/120 (39), 20/80 (140) and 20/60 (11) at the last follow up (Fig 6). CDVA was ≤ 20/200 in rest 4 eyes. No infection or melting of any form was observed in any of the eye.

Figure 1 a & b: Anterior capsulotomy was started with bent 26 G needle at least one-two clock hours away from corneal opacity margin and in relative clear area. 1a- diagrammatic representation, 1b- intraoperative photograph
Figure 1c, 1d: Re-grasp of the anterior capsule flap with Utrata forceps at the junction adjacent to the corneal opacity margin was done to ensure an adequate flap and firm hold.

Figure 1e & 1f: The tearing of the capsule was continued at a single motion till it is visible at the other end of the opacity margin. 1e- diagrammatic representation & 1f intra-operative photograph.

Figure 2a, 2b: Primary chop was performed in visible area.

Figure 2c & 2d: Phaco-emulsification is done in the visible pupillary area by rotating the nucleus pieces to the maximum clear area.

Figure 3a: Irrigation & aspiration.

Figure 3b & 3c: Foldable IOL implantation in the bag.

Figure 3d: Aspiration of the viscoelastic.

Figure 3e: Anterior chamber formation with the air bubble.

Figure 3f: Irrigation & aspiration.

Figure 4: Diagram showing frequency of posterior capsular tear and management.
Discussion

While modern cataract surgery is safe, effective and provides excellent visual outcome, this outcome may not necessarily be achieved in eyes with associated ocular problems or following complicated cataract surgery. In these cases, there is an increased risk of surgical complications and reduced visual outcome (Salem et al, 1987).

Meredith and Maumenee (1979) classified cataracts into 3 grades as determined by the surgical outcome. According to this classification, Salem and Ismail found 46.5% of patients belonged to group II and III in their study of which 41% had co-existent corneal lesions. Our experience is supported by their comments, which note a higher incidence of coexisting cataract and corneal opacity in developing countries. Thus, the triple procedure is required to rehabilitate these patients. Though the triple procedure (Gong X ,1990; Panda A, 1999; Rao SK, 1999; Shimmura S, 2003; Baykara M, 2008) is the method of choice to manage corneal lesions with a coexistent cataract, factors such as scarcity of good donor tissue, post keratoplasty graft rejection, glaucoma, and infection may impede the chances of successful penetrating keratoplasty (PK). This may be especially true in patients from rural areas in developing countries due to irregular follow up and poor ocular hygiene. Moreover, the patients with extensive corneal opacity are poor candidates for PK due to association of vascularisation and poor ocular surface as well as a high chance of developing post-operative suture related problems, which jeopardize the graft status. Thus, a simple technique is needed. Gupta et al (1992) and Panda et al (2007) advocate conventional ECCE to provide ambulatory vision in such eyes.

In modern era, phacoemulsification is the preferred technique of cataract surgery as it allows for early visual rehabilitation. However, a successful phacoemulsification may be difficult in eyes with corneal opacities because of poor visualization of intraocular morphology, and altered dynamics (Farjo AA, 2003; Czumbel N, 2009; Chang YS, 2008). Surgical modifications, such as multiple sphincterotomy and iris hook application have been used to enlarge the visible papillary area and to overcome visual limitations. Use of dye, endoscope and Chandler illumination aided phacoemulsification also enhances surgical ease (Gregory ME, 2007; Sinha R, 2004; Uka J, 2005; Bhartiya P, 2002; Singh D, 1996). In the present study, we desired to make these patients ambulatory with cataract surgery alone by modifying the vital steps of surgery. A fully dilated pupil allows visualizing the anterior capsule and capsular bag anatomy, so efforts are made to achieve this by breaking the posterior synechiae with additional sphincterotomies. This technique not only increases the visibility, but also helps improve post-operative visual outcome. The quality of peripheral vision may be expected to be sub-optimal when compared to central vision. However, Drew’s and Drew’s (1964) advocated optical iridectomy in eyes with obscured pupillary
zone. They argued that though the peripheral part of the human optical system does not form as sharp an image as the central part, the optical iridectomy improves visual prognosis because of the addition of peripheral bundle of rays. These peripheral rays help form a relatively clear image superimposed on the blurred image of the central part. However, in our study, we preferred multiple sphincterotomies instead of a complete iridectomy in order to preserve some functional anatomy of the iris. Although visual outcome in these eyes was suboptimal, all patients achieved ambulatory vision, enabling them to carry out daily activities. Anterior capsular staining was performed in all to demarcate the obscured capsular anatomy, to achieve a complete capsulorrhexis successfully and posterior capsular staining to enhance the safety of cortical aspiration in the presence of corneal opacities. Precision of capsulorrhexis by our technique enabled us to complete a successful circular capsulorrhexis. Making the nuclear border partially prolapsed from the bag by multiple site hydrodissection, helped us to perform a successful primary chop in all. Either viscoelastic or triamcinolone acetonide injection into the anterior chamber (AC) aided the identification of vitreous in AC which was a boon for the decision of IOL insertion.

Conclusion
Phacoemulsification in selected cases of corneal opacities with cataract is safe and feasible both as a primary therapeutic option in cases where PK is risky because of various limiting factors.

Acknowledgement
The authors would like to extend a word of thanks to Arvind Kumar, Anand Agarwal, Lalit Tejwani, Shikha and Sapna.

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Panda A, Kumar S, Das H, Badhu BP (2007). Striving for the perfect surgery in traumatic cataract following penetrating trauma in a tertiary care


Source of support: nil. Conflict of interest: none
Trypan blue staining of filtering bleb in eyes with operated trabeculectomy

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Abstract

Objective: To report the use of trypan blue staining of the filtering bleb to assess its functional status in eyes undergoing phacoemulsification after trabeculectomy.

Subjects and methods: This retrospective study was conducted at a tertiary eye care centre in North India and studied 33 eyes of 33 patients (with previously operated trabeculectomy), who underwent phacoemulsification. Trypan blue dye (0.06%) was used to stain the anterior capsule. After completion of phacoemulsification, the staining of the trabeculectomy bleb was noted as diffuse, patchy, minimal or no staining.

Results: Of the 33 eyes, 13 had diffuse staining (39.4%, mean IOP = 9.3 ± 2.2 mm Hg), 7 (21.2%, mean IOP= 15.5 ± 1.8 mm Hg) had patchy staining, 4 had minimal staining (12.1%, mean IOP= 17.5 ± 0.5 mm Hg) and nine (27.3%, mean IOP= 19.3 ± 1.6 mm Hg) had no staining. These staining patterns were labeled as groups 1-4 respectively. Statistical analysis showed that the difference between the IOPs in Group 1-2 and between Group 2-3 was not significant statistically (p=0.682 and 0.665 respectively). However the differences between the IOPs between Groups 1-3, 1-4, 2-4, and 3-4 were found to be highly significant statistically (p<0.0005).

Conclusions: Trypan blue dye can be used to test the amount of sub-conjunctival filtration in eyes undergoing phacoemulsification cataract surgery.

Key-words: trypan blue staining, phacoemulsification, trabeculectomy, bleb

Introduction

Trabeculectomy is the surgical procedure of choice for the treatment of glaucoma which does not respond to medical or laser therapy. Since the first description in 1968 by Cairns, the operation has survived challenges from procedures such as laser trabeculoplasty (Wise et al 1979), holmium laser sclerostomy (Hoskins et al 1991), artificial drainage devices (Molteno 1969, Coleman et al 1995, Lloyd et al 1994) and, more recently, deep sclerectomy (Federov et al 1982, Sanchez et al 1996) and viscocanalostomy (Stegmann et al 1999, Carassa et al 2003). The most important refinement of trabeculectomy surgery has been the use of antiproliferative agents to reduce postoperative

Knowing whether the bleb is patent and functional has important implications in the management of glaucoma cases. The aqueous drainage through the filtration bleb cannot be accurately quantified. Many authors (Pitch et al 1998, Clarke et al 2003) have investigated morphological criteria of these blebs to correlate clinical and functional aspects. Although some authors have described the evaluation of filtering bleb by thermography (Kawasaki et al 2009) and in vivo confocal microscopy (Messmer et al 2006, Labbe et al 2005), there is still a lack of clinical tests that can objectively delineate the functional status of the bleb.

The diffusion of trypan blue dye into the filtration bleb following its instillation into the anterior chamber has already been documented (Agrawal et al 2005). However to the best of our knowledge, no study in literature has classified the diffusion patterns of the dye during phacoemulsification surgery and correlated it with bleb function.

In this clinical study, patients with previously operated trabeculectomy undergoing cataract surgery were evaluated. The staining patterns of the blebs obtained after trypan blue injection into the anterior chamber were analyzed and correlated to the mean IOP recorded before the cataract surgery in order to evaluate the functioning of the bleb.

Subjects and methods

This retrospective charts review was carried out on 33 eyes of 33 patients recruited from the follow-up cases attending the glaucoma clinic at our centre between October 2007 and December 2009.

Patients with a previously operated trabeculectomy with mitomycin C, having a visually significant cataract with a best corrected visual acuity of 20/40 or less, and presenting at least 6 months or more after trabeculectomy were included in the study. Patients with corneal opacities, severe dry eye, uveitis, and previous ocular surgery other than trabeculectomy were excluded.

The pre-operative evaluation included a detailed ophthalmic history and clinical examination of all eyes. This included near and distant best corrected visual acuity, Goldmann applanation tonometry, slit lamp evaluation of the bleb, gonioscopy, optic nerve head evaluation with a +90 diopter lens, and ocular biometry. The study conformed to the Declaration of Helsinki, and informed written consent was obtained from all patients. All patients were assigned to undergo phacoemulsification with intraocular lens implantation by a single surgeon (TD). Maximum mydriasis was obtained by a combination of tropicamide 0.5% and phenylepherine 0.5% applied three times at ten minute intervals preoperatively.

All surgeries were performed under either topical anaesthesia using sterile 0.5% proparacaine drops (Paracain, Sunways, Mumbai, India).

All patients underwent a clear corneal phacoemulsification via a temporal incision of size 2.75 mm along with a superior side port incision. The anterior chamber was reformed with air and 0.1 ml of trypan blue dye (0.06%, Visiblue, Shah and Shah, India) was injected under the air bubble to stain the anterior capsule using a 27 G cannula. Capsulorrhexis was performed under viscoelastics cover (1% hydroxypropylmethylcellulose). Phacoemulsification was completed by the stop and chop technique followed by implantation of a hydrophobic acrylic foldable intraocular lens in the bag. The filtering bleb was observed for trypan blue staining and graded. The grading for the staining pattern of the bleb was as follows: Group 1 no staining, Group 2 minimal staining, Group 3 patchy staining, and Group 4 diffuse staining (Fig. 1-4).

Post operatively the patient received gatifloxacin 0.3%, prednisolone acetate 1% four times a day which were tapered over four weeks. If the patient was receiving ocular hypotensive medications in the pre-operative period, these were continued postoperatively.

Statistics: Statistical analyses were performed using SPSS (version 12.0, SPSS Inc, Chicago, IL). Fischer’s Analysis of Variation (one way ANOVA),
post hoc analysis using Bonferroni's test were used to determine the significance of the difference in the IOPs of the four groups.

Results
The study included 33 eyes of 33 patients. There were 17 males and 16 females. The mean age was 58.6 ± 12.4 years. The time interval between the trabeculectomy and cataract surgery varied from 7 to 23 months. All patients had undergone a trabeculectomy using a limbus based conjunctival flap. Mitomycin C (0.2 mg/ml for 3 minutes, subconjunctival) was used during trabeculectomy in all eyes.

Of the thirty three eyes, 13 eyes had diffuse staining (39.4%), 7 (21.2%) had patchy staining, 4 had minimal staining (12.1%) and 9 eyes (27.3%) had no staining (Figure 1-4). On correlating the staining with the IOP, it was found that eyes with diffuse staining had previously undergone trabeculectomy with Mitomycin C application and had the least IOP before cataract surgery (6-12 mm Hg) with a mean IOP of 9.3 ± 2.2 mm Hg. Morphologically, these blebs were elevated, polycystic and avascular. Eyes with patchy staining had a mean pre-cataract surgery IOP of 15.5 ± 1.8 mm of Hg (Range: 14 -18 mm of Hg) while eyes with minimal staining had a mean pre-cataract surgery IOP of 17.5 ± 0.5mm of Hg (Range: 17-18mm of Hg). Eyes with a failed filtering bleb showed no staining with the IOP in the range of 18-22 mm Hg, and a mean of 19.3 ± 1.6 mm of Hg on topical anti-glaucoma medications (Fig 5).

Figure 1: Diffuse staining of the bleb
Figure 2: Patchy staining of the bleb
Figure 3: Minimal staining of the bleb
Figure 4: No staining of the bleb
Figure 5: Box plot showing mean intraocular pressure in patients with different grades of staining
One-way analysis of variation (ANOVA), and Post Hoc Bonferroni’s test revealed that this difference in IOP was highly statistically significant (p<0.0005). Comparison of IOP by group showed that the difference between Group 1 and 2 and between Group 2 and 3 was not significant statistically (p=0.682 and 0.665 respectively). However the difference between the IOPs between Groups 1 and 3, 1 and 4, 2 and 4, and 3 and 4 were found to be highly significant statistically.

Discussion

Cataracts are a common cause of visual decline in patients undergoing treatment for glaucoma (Lichter et al 2001). The association of cataracts in operated glaucoma patients has become more frequent because of the increased risk of cataract development in these patients and increase in life expectancy, resulting in a great degree of visual morbidity with significant economic and social consequences.

Cataract surgery in operated trabeculectomy poses a unique challenge to the clinician. In view of the significant failure rate of trabeculectomy especially when the eye is subjected to another surgical procedure, it is critical to know the functioning capacity of the filtering bleb. The long term success of trabeculectomy is dependent on the development of a functioning bleb. Many authors have presented classifications of these blebs to correlate the morphological criteria observed biomicroscopically with outcome of these blebs. Pitch and Grehn (1998) classified the developing, filtering bleb, showing that favourable bleb development was characterized by microcysts of the conjunctiva, paucity of vessels, diffuse bleb and moderate elevation of the bleb. Clark et al (2003) published a guide to bleb appearances that helps quantify morphological outcomes of trabeculectomy. Addicks et al(1983) studied the histology of filtering blebs and showed that nonfunctioning blebs had dense collagenous connective tissue whereas functioning blebs had loose subepithelial tissues with histologically clear spaces corresponding to microcysts. When trypan blue is injected into the anterior chamber, the amount of dye entering the bleb is influenced by the scarring around the ostium and below the scleral flap. With more scarring, less dye will enter the bleb. Furthermore, the presence of loosely arranged subepithelial tissues allows diffusion of the dye, which manifests as staining of the bleb. In a poorly functioning or non-functioning bleb, the dense sub-epithelial scarring precludes the diffusion of the dye through the spaces, and hence the bleb fails to take up trypan blue staining. We also found that the staining pattern correlated well with the IOP post trabeculectomy, techniques such as confocal scan (Messmer et al 2006, Labbe et al, 2005) and ultrasound biomicroscopy (Yamamoto et al 1995) have also been used to evaluate the morphology of these blebs. However, no clinical studies have been performed in literature to evaluate bleb function intra-operatively during phacoemulsification.

Trypan blue is a vital dye which has been used in ophthalmology for decades (Norn 1973). It is most commonly used to stain the anterior capsule of the lens during cataract surgery (Melles et al 1999) and for epiretinal membrane peeling (Feron et al 2002). Healey et al(2005) showed that coloring with trypan blue helps delineate the area treated with the antimetabolite during surgery. The addition of 0.05% trypan blue to MMC or 5-FU did not alter MMC induced cell death or the number of viable fibroblast in vitro, thus ruling out trypan blue induced cytotoxicity.

In a well functioning bleb, the aqueous humour flows continuously out of the scleral flap to perfuse the subconjunctival space around the filtering bleb. In a poorly functioning bleb, on the other hand, the amount of aqueous flowing into the filtering bleb is small. This may be attributed to the scarring around the ostium and below the scleral flap. With more scarring, less dye will enter the bleb. Furthermore, the presence of loosely arranged subepithelial tissues allows diffusion of the dye, which manifests as staining of the bleb. In a poorly functioning or non-functioning bleb, the dense sub-epithelial scarring precludes the diffusion of the dye through the spaces, and hence the bleb fails to take up trypan blue staining. We also found that the staining pattern correlated well with the IOP post trabeculectomy,
with more diffuse staining corroborating with better IOP control.

**Conclusion**

During phacoemulsification in patients with a previously operated filtering bleb, vital staining of the sub-epithelial tissue by trypan blue dye delineates the loose sub-conjunctival spaces which assist filtration. The greater the staining, the greater is the bleb function, which correlates well with the post-trabeculectomy intraocular pressure. Noting the staining pattern of the bleb during phacoemulsification can help quantify the functional status of the bleb, and help the surgeon plan for bleb resuscitation measures.

**References**


Source of support: nil. Conflict of interest: none
Efficacy of sutureless and glue free limbal conjunctival autograft for primary pterygium surgery

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Abstract

Introduction: There are numerous adjunctive measures described to reduce the recurrence rates after pterygium excision.

Objective: To study the efficacy and complications of sutureless and glue free limbal conjunctival autograft for the management of primary pterygium over a period of one year.

Materials and methods: A prospective interventional case series was carried out in 40 consecutive eyes with primary nasal pterygium requiring surgical excision. Pterygium excision with limbal conjunctival autografting without using glue or sutures was performed in all the patients followed by bandaging for 48 hours. The patients were followed up post operatively on 2nd day, 1 week, 6 weeks, 6 months and 12 months. They were examined for haemorrhage, wound gape, graft shrinkage, chemosis, graft dehiscence, recurrence or any other complication.

Results: The mean age of the patients was 42.8 years (range 23-61), 75% of which were males. Total graft dehiscence occurred in 2 eyes (5%), graft retraction in 3 eyes (7.5%) and recurrence was seen in 1 eye (2.5%). At 6 weeks postoperatively, the gain in uncorrected visual acuity ranged from 0.18 to 0.5 log MAR in 7 eyes. No other complication was noted.

Conclusions: Sutureless and glue free limbal conjunctival autografting following pterygium excision is a safe, effective and economical option for the management of primary pterygium.

Keywords: Pterygium, conjunctiva, limbal-conjunctival autograft, fibrin glue, pterygium surgery

Introduction

Pterygium is a common disorder in many parts of the world, with reported prevalence rates ranging from 0.3 to 29% (Moran & Hollows, 1988; Taylor et al, 1984). In general, conservative therapy for pterygium is warranted as recurrences after pterygium excision are frequent and aggressive. Numerous adjunctive measures have been described to reduce the recurrence rates after its excision. These may be broadly classified as medical methods, beta-irradiation and surgical methods (Ang et al, 2007). Limbal-conjunctival autograft is currently the most popular surgical procedure as it has been suggested that including the limbal stem cells act as a barrier to the conjunctival cells migrating onto the corneal surface.

The most common method of autograft fixation is suturing, with drawbacks of prolonged operating time, postoperative discomfort, suture abcesses, buttonholes, and granuloma formation which usually requires a second operation for removal (Starck et al, 1991).
Replacing sutures with tissue adhesives may shorten the operating time, improve postoperative comfort, and avoid suture related complications. However, the major concern of the commercial fibrin glue is the cost and the potential risk of transmitted infection. Autologous fibrin glue has been used as an alternative method for graft fixation by some authors (Cohen & Donald, 1993; Foroutan et al, 2011). A recent cross-sectional study also describes successful outcome with sutureless and glue-free conjunctival autograft (Wit et al, 2010). We conducted this prospective interventional study in a larger number of patients to determine the outcome of sutureless glue-free limbal conjunctival autograft for primary pterygium surgery.

Materials and methods
This prospective interventional case series included consecutive 40 eyes with primary nasal pterygium requiring surgical excision from July 2010 to December 2010. The indication for surgical intervention was one or more of the following: diminution of vision either because of induced astigmatism or encroachment onto the pupillary area, marked cosmetic deformity, marked discomfort and irritation unrelieved by medical management, limitation of ocular motility secondary to restriction or documented progressive growth towards the visual axis so that ultimate visual loss could reasonably be assumed. An informed consent was taken from each patient.

The study was approved by the Institutional Research Ethics Committee at Subharti Medical College, Meerut, Uttar Pradesh, India.

The primary outcome measures included graft dislocation and pterygium recurrence. Graft success was defined as an intact graft by the end of 6 weeks after operation without need for sutures. Recurrence was defined as any growth of conjunctiva exceeding 1mm onto the cornea.

A detailed medical and ophthalmic history, including gender, age and previous eye surgery was taken. Exclusion criteria included recurrent pterygium, glaucoma, retinal pathology requiring surgical intervention, history of previous ocular surgery or trauma. Preoperative ophthalmic evaluation comprised of uncorrected and best corrected visual acuity (BCVA), digital anterior segment photography, slit lamp examination and funduscopy.

Surgical technique
All surgical procedures were performed by the same surgeon (KPSM) to ensure consistency. Operations were performed under peribulbar anaesthesia using 2% Xylocaine injection. The body of the pterygium was dissected 4 mm from the limbus, down to the bare sclera. Blunt and sharp dissection by Wescott scissors (Geuder, Germany) was done for separating the fibrovascular tissue from the surrounding conjunctiva. The pterygium was removed from the cornea (superficial keratectomy) using a crescent knife. Only the thickened portions of conjunctiva and the immediate adjacent and subjacent Tenon’s capsule showing tortuous vasculature were excised. Where possible, haemostasis was allowed to occur spontaneously without the use of cautery. The size of the defect was measured with Castoveijo callipers (Bausch & Lomb Storz; Storz instruments, St Louis, MO, USA).

For harvesting the donor limbal conjunctival autograft, 0.5ml of Xylocaine was injected using 30 G needle subconjunctivally to allow dissection between the conjunctiva and tenon’s layer in the superior bulbar conjunctiva. An oversized graft with an additional 2.0mm of length and width relative to the dimensions of the bare sclera was dissected including the superior limbal stem cells.

The graft was placed on the bare sclera in such a way so as to maintain the original orientation of the juxtalimbal border towards the cornea. The scleral bed was viewed through the transparent conjunctiva to ensure that residual bleeding does not lift the graft. Small central haemorrhages were tamponaded with direct compression. The free graft was held in position for 10 minutes by application of gentle pressure over it with a lens spatula. The stabilisation
of graft was tested with a Merocel spear centrally and on each free edge to ensure firm adherence to the sclera. The eye was bandaged for 48 hours.

Postoperative regimen

After removal of the patch, the patient was advised not to rub the eye and topical Loteprednol eye drops were administered four times a day which was tapered over 6 weeks. Chloramphenicol eye drops were instilled four times a day for 2 weeks.

The patients were followed up post operatively on 2nd day, 1 week, 6 weeks, 6 months and 12 months (Figure 1a and b). Refraction was performed at 6 weeks. The patients were examined for haemorrhage, wound gape, graft shrinkage, chemosis, graft dehiscence, recurrence or any other complication.

Results

The mean age of the patients was 42.8 years (range 23-61), 75% of which were males. All the patients were followed up for one year after surgery and there were no drop outs. Table 1 summarizes the patient profile and outcomes.

Total graft dehiscence occurred in 2 eyes (5%). In one patient, it developed following injury with a finger on the 4th postoperative day. In the other there was lack of adhesion due to accidental inclusion of Tenon’s in the free limbal conjunctival graft.

Figure 1(a). Preoperative photograph of pterygium causing cosmetic deformity. (b) Post operative photograph at 1 week showing satisfactory graft take up.

Figure 2. Post operative photograph on day 3 showing a thickened and congested graft where Tenon’s was accidentally included.

The removal of Tenon’s also caused delayed healing of the donor site. The graft appeared thickened and congested on the 3rd postoperative day (Figure 2) and the dehiscence was noticed on the 7th day. Both the patients were managed by securing the same graft using 8.0 vicryl suture.

Graft retraction occurred in 3 eyes (7.5%) on the conjunctival side. There was mild chemosis in all these patients. All the three patients were managed conservatively by bandaging for 48 hours. The chemosis disappeared by the end of 7th postoperative day.

At 6 weeks postoperatively, the gain in uncorrected visual acuity (UCVA) ranged from 0.18 to 0.5 log MAR in 7 eyes. There was no change in UCVA in rest of the patients. The BCVA showed no change following surgery.

Recurrence was seen in 1 eye (2.5%) at 6 months. None of the patients developed button hole of conjunctival graft, excessive bleeding, perforation of the globe with suture needle, injury to medial rectus, dellen, pyogenic granuloma, symblepharon formation or scleral necrosis.
Table 1

Patient characteristics, outcomes and complications of sutureless and glue free limbal conjunctival autograft for primary pterygium surgery

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</table>
Discussion

Recurrence after a successful excision continues to remain a challenge in pterygium surgery. Various adjunctive therapies like radiotherapy, antimetabolite or antineoplastic drugs, conjunctival flap, amniotic membrane, lamellar keratoplasty, conjunctival and limbal conjunctival grafts have been proposed to prevent recurrence. Ex-vivo expanded conjunctival epithelial sheet on an amniotic membrane substrate has been shown to achieve immediate epithelialisation of ocular surface, reduced postoperative inflammation and faster ocular rehabilitation. The procedure is especially useful for closing large surgical defects following excision of extensive pterygium (Ang et al., 2003). Generally, the pterygium recurrences occur during the first 6 months after surgery (Adamis et al., 1990). Conjunctival autografts are associated with recurrence rates of 2-39% that are comparable to that of Mitomycin-C and beta-irradiation, without the attendant risk of sight-threatening complications (Ang et al., 2003). The limbal conjunctival autograft has a recurrence rate ranging from 0-15% (Du et al., 2002; Al-Fayez, 2002). Though it has been suggested that limbal conjunctival grafts are more effective than conjunctival autografts, it is technically more demanding and there is added risk of limbal damage.

Fibrin glue has been used as an alternative to sutures for securing the conjunctival grafts. Koranyi et al (2004) demonstrated a recurrence rate of 5.3% with glue versus 13.5% with sutures and suggested that immediate adherence of the graft and lack of postoperative inflammation may inhibit fibroblast ingrowth and reduce the recurrence. The main issue in using commercial fibrin glue, despite viral inactivation techniques, is transmission of infectious agents like Human Infection of parvovirus B19 (HPV B19) and prions (Foroutan et al, 2011). In addition, three cases of anaphylactic reaction have been reported after use of TISSEEL fibrin sealant which was possibly due to bovine protein aprotinin, used as an antifibrinolytic agent (Oswald et al, 2003). Foroutan et al (2011) prepared autologous fibrin glue and used tranexamic acid as a antifibrinolytic agent to tide over the problem of disease transmission and anaphylaxis respectively. Autologous fibrin, though much safer, is yet to be used widely because of the time taken to procure the fibrin and lack of laboratory facilities at all centers. Fibrinogen compounds may be susceptible to inactivation by iodine preparations such as those used for conjunctival disinfection before pterygium surgery (Wit et al, 2010). In our series only one eye (2.5%) had a recurrence. Foroutan et al (2011) had a recurrence rate of 13.33% (2 eyes out of 15) in three year follow up with autologous fibrin. Using similar procedure as ours, Wit et al (2010) had no recurrence in 15 eyes with a mean follow up of 9.2 months. The authors suggested that apposition of the lids to the bulbar conjunctiva provides a natural biological dressing and confers a unique wound healing environment. The lids provide compression, a smooth frictionless surface, and a vascular bed with immune capability in close proximity to the injury site.

Graft retraction, was seen in 3 eyes (7.5%) in our series which disappeared once the chemosis was controlled. It did not affect the final position of the graft. Graft retraction occurred in 20% cases in Foroutan et al (2011) series. Tan (1999) advocated that risk of graft retraction could be minimised with meticulous dissection of subepithelial graft tissue. Wit et al (2010) postulated that sutureless and glue free graft resulted in an even tension across the whole of the graft interface and no direct tension on the free graft edges resulting in reduced stimulus for the formation of subconjunctival scar.

Graft dehiscence is a recognized complication of using tissue glue (Uy et al, 2005; Srinivasan & Slomovic, 2007). With autologous fibrin, dehiscence occurred in 13.33% cases and was attributed to a low concentration of thrombin and fibrinogen in the autologous glue as compared to commercial preparation.

Graft dehiscence occurred in two of our eyes of which one resulted following trauma and the other was the result of accidental inclusion of Tenon’s tissue in the free graft. The importance of a thin
graft with careful dissection from the Tenon’s capsule is mandatory for a successful graft take up.

The preference for the site of donor graft in our series was superior as this area gets covered by the upper lid enabling better cosmesis and healing. Some authors prefer inferior bulbar conjunctiva, considering that the superior conjunctiva may be required for a future filtration surgery (Broadway et al, 1998).

None of our patients developed corneal ulcer, scleral melting, conjunctivitis, dellen, symblepheron formation, excessive bleeding, injury to medial rectus muscle, secondary glaucoma, iritis, corneal perforation or corneal ulcer.

**Conclusion**

Sutureless and glue free limbal conjunctival autografting following pterygium excision is a safe, effective and economical option for the management of primary pterygium requiring surgical intervention.

**References**


**Source of support:** nil. Conflict of interest: none
**Ganglion cell complex scan in the early prediction of glaucoma**

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**Abstract**

**Objective:** To compare the macular ganglion cell complex (GCC) with peripapillary retinal fiber layer (RNFL) thickness map in glaucoma suspects and patients.

**Subjects and methods:** Forty participants (20 glaucoma suspects and 20 glaucoma patients) were enrolled. Macular GCC and RNFL thickness maps were performed in both eyes of each participant in the same visit. The sensitivity and specificity of a color code less than 5% (red or yellow) for glaucoma diagnosis were calculated. Standard Automated Perimetry was performed with the Octopus 3.1.1 Dynamic 24-2 program. **Statistics:** The statistical analysis was performed with the SPSS 10.1 (SPSS Inc. Chicago, IL, EUA). Results were expressed as mean ± standard deviation and a p value of 0.05 or less was considered significant.

**Results:** Provide absolute numbers of these findings with their units of measurement. There was a statistically significant difference in average RNFL thickness (p=0.004), superior RNFL thickness (p=0.006), inferior RNFL thickness (p=0.0005) and average GCC (p=0.03) between the suspects and glaucoma patients. There was no difference in optic disc area (p=0.35) and vertical cup/disc ratio (p=0.234) in both groups. While 38% eyes had an abnormal GCC and 13% had an abnormal RNFL thickness in the glaucoma suspect group, 98% had an abnormal GCC and 90% had an abnormal RNFL thickness in the glaucoma group.

**Conclusion:** The ability to diagnose glaucoma with macular GCC thickness is comparable to that with peripapillary RNFL thickness. Macular GCC thickness measurements may be a good alternative or a complementary measurement to RNFL thickness assessment in the clinical evaluation of glaucoma.

**Key-words:** FD- OCT, ganglion cell complex, retinal nerve fiber layer thickness

**Introduction**

Optical coherence tomography (OCT) has allowed in vivo quantitative analysis of the peripapillary retinal nerve fiber layer (RNFL), and measuring the RNFL has been useful for diagnosing glaucoma (Huang ML and Chen HY, 2005; Parikh RS et al 2007). However, the normal variation of the peripapillary RNFL and pathological peripapillary changes make the diagnosis of glaucoma difficult when interpreting OCT peripapillary RNFL measurements by comparing them with the normative database.

Retinal ganglion cells encompass three layers in the retina, 1) the retinal nerve fiber layer (RNFL) which is made up of the ganglion cell axons, 2) the ganglion...
cell layer (GCL) which is made up of the ganglion cell bodies, and 3) the inner-plexiform layer (IPL) which is made up of the ganglion cell dendrites. All three layers are collectively known as the ganglion cell complex (GCC) (Fig 1). Fourier Domain OCT can measure the thickness of the macular GCC, which extends from the internal limiting membrane to the inner nuclear layer including the ganglion cell layer and provides a unique analysis of the percent loss of these layers compared to an extensive normative database.

Glaucoma is characterized by the selective loss of retinal ganglion cells (RGC) (Garway-Heath DF et al 2000; Harwerth RS et al 1999; Zeimer R et al 1998). Because the macular region contains more than 50% of all the RGCs, assessing ganglion cell changes in the macular region may be more useful in diagnosing glaucoma than measuring peripapillary RNFL thickness (Ishikawa H et al 2005, Tan O et al 2008: Van Buren JM 1963). RTVue-100 (Optovue, Fremont, California) is a commercially available OCT device with Fourier-domain (FD) technology.

Although previous studies have shown the utility of peripapillary RNFL measurements in glaucoma patients, little is known about the comparison between RNFL thickness and macular GCC or the diagnostic ability of GCC using FD-OCT. In this study, we used FD-OCT to compare macular GCC and peripapillary RNFL thickness to aid in the early diagnosis of glaucoma.

Materials and methods
Forty participants [n=20 glaucoma suspects (GS; normal SAP, C/D ratio of more than 0.5 or asymmetry of more than 0.2 and/or ocular hypertension) and n=20 glaucoma patients (MD of less -12 dB, glaucomatous optic neuropathy)] were enrolled. The study was approved by our institutional review board (IRB) and complied with the tenets of the Declaration of Helsinki. Informed consent was obtained from all participants.

All eyes underwent applanation tonometry, dark room gonioscopy, stereoscopic optic disc photography, red-free RNFL photography and RTVue FD-OCT after pupillary dilation to a minimum diameter of 5 mm on the same day. Peripapillary RNFL and perifoveal GCC thickness measurements were obtained using RTVue-100 by the same operator in the same visit. Standard Automated Perimetry was performed with the Octopus 3.1.1 Dynamic 24-2 program.

OCT measurements
The average thickness of the GCC and RNFL was measured using RTVue-100 (software version: 4.0.5.39), which acquires 26,000 A scans per second and has a 5 μm depth resolution in tissue. The RNFL thickness was determined by the nerve head map 4 mm diameter (NHM4) mode, which measures RNFL thickness by recalculating data along a 3.45 mm diameter circle around the optic disc using a map created from en face imaging utilizing six circular scans ranging from 2.5 to 4.0 mm in diameter (587 or 775 A scans each) and 12 linear data inputs (3.4 mm length, 452 A scans each). Disc area measurements were also obtained using the NHM4 mode.

GCC parameters were obtained by the MM7 protocols, centered 1 mm temporal to the fovea. This protocol uses one horizontal line with a 7 mm scan length (934 A scans) followed by 15 vertical lines with a 7 mm scan length and 0.5 mm interval (800 A scans)(Fig 2A). The GCC thickness was measured from the internal limiting membrane to the inner plexiform layer boundary. The focal loss volume (FLV) as the integral of deviation in areas of significant focal GCC loss and global loss volume (GLV) as the sum of negative fractional deviation in the entire area were also computed. Images with a Signal Strength Index less than 35 with overt misalignment of the surface detection algorithm or with overt decentration of the measurement circle location were excluded.

RNFL and GCC thicknesses in the normal range were represented by green backgrounds, those that were abnormal at the 5% level were represented by yellow backgrounds, and those that were
abnormal at the 1% level were represented by red backgrounds.

The statistical analysis was performed with the SPSS 10.1 (SPSS Inc. Chicago, IL, EUA). Results were expressed as mean ± standard deviation and a p value of 0.05 or less was considered significant.

Results
Patients were categorized into two groups: the glaucoma suspects (n=20) and glaucoma (n=20) groups. The mean age of the participants was 50.69±15.90 years (range 22–77 in the glaucoma suspect group; 22–78 in the glaucoma group). There was no difference in optic disc area (p=0.35) and vertical cup/disc ratio (p=0.234) comparing both groups (Table 1). However, there was a statistically significant difference in average RNFL thickness (p=0.004), superior RNFL thickness (p=0.006), inferior RNFL thickness (p=0.0005) and average GCC (p=0.03) between the suspects and glaucoma patients (Table 2). The GCC thickness showed strong correlations with RNFL thickness (correlation coefficient = 0.763, p<0.001). Fifteen of 40 (38%) eyes had an abnormal GCC and five of 40 eyes (13%) had an abnormal RNFL thickness in the glaucoma suspect group. Thirty-nine of 40 eyes (98%) had an abnormal GCC and 36 of 40 eyes (90%) had an abnormal RNFL thickness in the glaucoma group.

Table 1
Shows the optic disc area and the vertical C/D ratio between two groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Optic disc Area</th>
<th>Vertical C/D ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glaucoma suspects</td>
<td>2.52±0.72</td>
<td>0.78±0.10</td>
</tr>
<tr>
<td>Glaucoma patients</td>
<td>2.33±0.46</td>
<td>0.83±0.09</td>
</tr>
</tbody>
</table>

Fig 1: Macular Scan showing three layers of GCC(FD-OCT)
Although glaucoma is clinically defined as optic disc cupping with corresponding visual field defects, the underlying disease process in glaucoma is the loss of RGC (Quigley HA et al 1989: Quigley HA et al 1980: Sommer A et al 1977). Approximately one-third of the RGC population resides within the posterior pole. In the macula, the RGC layer is more than one cell layer thick with the RGC body diameter being 10 to 20 times larger when compared to their axons. In addition, the central retina has less variability in cell density when compared to the peripheral retina (Glovinsky Y et al 1993). Thus, in some cases detecting RGC loss in the macula may allow for earlier detection of glaucoma.

The higher resolution RTVue system allows for more specific segmentation by allowing only the retinal layers associated with the ganglion cells to be analyzed. This method of segmenting out the ganglion cell complex targets the layers directly associated with the ganglion cells, whereas the stratus method can only analyze the entire retinal thickness.

In the past, most investigators have focused on comparing the measurements of the macula and the optic disc. At the time, most commercial imaging instruments yielded measurements of only one or the other. Now, many techniques are available for obtaining both measurements in one session. The perifoveal region yields information on the ganglion cells and their axons located at the centre of the macula, which are represented in perimetry by only a few points at the centre of the visual field, whereas the peripapillary region reflects the entire retina. The time course of the disease and treatment decisions may differ between eyes with a well-preserved central macula and damaged peripheral retina, and one with damage to both areas. By including both regions, it may be possible to gain new knowledge on the process of glaucomatous damage through an additional role for measuring GCC in glaucoma assessment.

Ishikawa H et al (2000) developed a software algorithm to perform automatic retinal layer segmentation in the macula for the commercially available Stratus TD-OCT and reported that macular inner retinal layer thickness measurements could indeed be used to discriminate normal from glaucomatous eyes. They found that the outer retinal layers were not affected in glaucoma. However, one of the limitations of the study was variable scan quality. Over one-third of the scans on glaucomatous eyes had to be excluded from segmentation analysis due to poor quality scans related to speckle noise and uneven tissue reflectivity. The authors suggested that higher resolution and improved signal quality (higher signal-to-noise ratio), as provided by FD-OCT, may be needed for better quality image acquisition to allow accurate retinal layer segmentation.

Greenfield et al (2003) reported that OCT-derived macular thickness was well correlated with changes in visual function and RNFL structure in moderately advanced glaucoma. They reported a strong correlation between mean macular thickness and visual field mean deviation (R^2=0.47, p<0.001), and suggested that reduced macular thickness could be a surrogate for loss of RGCs in glaucoma.

Tan O et al (2009) showed that the GCC average measured by the RTVue FD-OCT were significantly better at diagnosing glaucoma in the perimetric group, compared to the macular retinal thickness(MR) average measured by either FD-OCT or TD-OCT. Thus, isolating GCC from the

<table>
<thead>
<tr>
<th>Group</th>
<th>RNFL thickness</th>
<th>Superior</th>
<th>Inferior</th>
<th>GCC thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glaucoma suspects</td>
<td>112.41 ± 10.92</td>
<td>110.42 ± 9.91</td>
<td>114.38 ± 13.61</td>
<td>95.40 ± 8.11</td>
</tr>
<tr>
<td>Glaucoma patients</td>
<td>98.57 ± 13.68</td>
<td>100.45 ± 16.35</td>
<td>98.49 ± 15.79</td>
<td>86.06 ± 12.43</td>
</tr>
</tbody>
</table>

Discussion

Table 2

GCC vs RNFL thickness

<table>
<thead>
<tr>
<th>Group</th>
<th>RNFL thickness</th>
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outer retina improved the diagnostic power of the macular measurement. This could be explained by the fact that the outer retina, which is not much affected by glaucoma, takes up 65% to 70% of total retinal thickness and, therefore, could contribute variation in thickness that decreases discriminant power. The diagnostic power of GCC average was also higher than that of MR in the discrimination between pre-perimetric group (PPG) and normal eyes, but the advantage was not statistically significant.

Macular GCC measurement by OCT may detect pre-perimetric glaucoma earlier in those cases where the ganglion cell loss is more predominantly macular rather than peripheral (Tan O et al 2009). The addition of GCC data to NFL increased glaucoma detection rate from 78% to 87% in the perimetric group and from 45% to 56% in the pre-perimetric group (Tan O et al 2009).

Tan O et al (2009) in their study showed GCC detected an additional 9% of perimetric glaucoma cases and 11% of pre-perimetric glaucoma cases that were not detected by NFL. These results are consistent with our results, 38% eyes had an abnormal GCC and 13% had an abnormal RNFL thickness in the glaucoma suspect group, 98% had an abnormal GCC and 90% had an abnormal RNFL thickness in the glaucoma group. The reliability of the GCC increases in the glaucoma group than in the suspects or pre-perimetric group. Even though our results show that GCC imaging can detect glaucoma cases in spite of normal RNFL thickness (Fig 2B&2C), further prospective studies are needed before such a definitive conclusion is made due to a small sample size and also we did not compare the two groups (Glaucoma and Glaucoma suspects) with the normal group.

Conclusion
The ability to diagnose glaucoma with macular GCC thickness is comparable to peripapillary RNFL thickness. Macular GCC thickness measurements may be a good alternative or a complementary measurement to RNFL thickness and visual field test in the clinical evaluation and management of glaucoma.

References
of the retinal ganglion cell layer and its alterations with lesions of the visual pathways. Springfield, IL: Charles C Thomas. Details required?


Source of support: nil. Conflict of interest: none
Outcome of conjunctival autograft transplantation in pterygium surgery in a community based hospital in Nepal

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Abstract

Introduction: The mainstay of treatment for pterygium is surgical excision with or without a graft. The most common problem with this intervention is recurrence, for which a multitude of factors have been described.

Objective: To evaluate the recurrence rate of pterygium in conjunctival autologous graft transplantation after its excision in people living in a hilly region of Nepal

Materials and methods: A prospective interventional study was conducted in patients undergoing pterygium excision with conjunctival autologous graft transplantation. The patients were followed up for 20 months. Any recurrence of pterygium was noted during this period.

Results: Thirty four patients with an age range of 29 to 65 years (mean 43.88±9.19 years) were included. Female predominated (n=21, 61.8%) in the study. Service holders formed a majority of the cases (n=14, 41.2%) followed by farmers (n=10, 29.4%, OR 0.019, 95% CI = 0.002 to 0.209). Ocular discomfort was the main presenting complaint. Dry eye was seen in 30 patients (88.23%). Most of the patients (26, 76.5%) had a grade II pterygium. Graft displacement was the main complication in two (5.88%) patients and recurrence of pterygium was found in three (8.82%).

Conclusion: Conjunctival autologous transplantation is a safe and effective method for the treatment of pterygium with a minimal recurrence rate.

Key-words: Autologous graft, conjunctiva, pterygium, recurrence

Introduction

A pterygium is a fibrovascular, wing-shaped encroachment of conjunctiva onto the cornea. A multitude of factors are associated with the development of pterygium; the most common cause being UV type B radiation (Moran et al, 1984; Taylor et al, 1992). Recent studies have suggested that p53 genes, human papillomavirus, localized limbal stem cell deficiency and uncontrolled cell proliferation may be associated with the development of pterygium (Di Girolamo et al, 2004; Gallagher et al, 2001; Reisman et al, 2004; Tan et al, 2000). The currently accepted pathogenesis is the Ultraviolet light-induced damage to the limbal stem cell which leads to the subsequent conjunctivalisation of the cornea (Dushku et al, 1994).

The mainstay of pterygium treatment is surgical excision of the head, neck and body of the
pterygium. Indications for surgery include visual impairment, cosmetic disfigurement, ocular motility restriction, recurrent inflammation, interference with contact lens wear and, rarely, changes suggestive of neoplasia. The main histopathologic changes in primary pterygium is elastotic degeneration of the conjunctival collagen (Spencer, 1985). Meticulous surgical intervention is often combined with adjunctive measures to prevent recurrence of the disease (Leonard et al, 2007). Adjunctive measures include postoperative beta-irradiation, thiotepa drops, intraoperative and postoperative mitomycin-C, various techniques of conjunctival grafting and amniotic membrane transplantation (Singh et al, 1990; Kenyon et al, 1985; Sangwan et al, 2007).

Postoperative recurrence of pterygium is a universal problem, which is evident by the fact that operative techniques are constantly changing. In spite of great advances in the field of ophthalmic surgery, pterygium still presents a challenge to the ophthalmic surgeon. The success rate of pterygium surgery is marred by its high rate of recurrence. Though the pterygium has been incised, removed, split, excised, transplanted, coagulated and irradiated, there still is no single operation which permanently resolves it (Singh & Rana, 1982). The reported success rates of these techniques vary widely, from 5% for pterygium excision with conjunctival autografting to 89% for simple excision (Sebban et al, 1991).

Pterygium excision with a conjunctival-limbal autograft has gained worldwide acceptance as the most favorable technique because it has proven to be both safe and effective in reducing pterygium recurrence. Although studies have reported encouraging results and fewer side effects using low-dose intraoperative application of mitomycin-C, the optimal concentration and duration of application are still being refined (Helal et al, 1996).

We report our technique and results of pterygium excision with conjunctival-limbal auto grafting in the management of advanced primary pterygium occurring in a hilly region of Nepal (Kavrepalanchowk and surrounding districts).

Materials and methods
This prospective interventional study was conducted in patients attending the Ophthalmology Department of Kathmandu University Hospital, Dhulikhel. All patients with primary pterygium were included in the study. Recurrent pterygium, pseudopterygium and patients not willing to participate in the study were excluded. The study was approved by the local Institutional Research Committee. Visual acuity was assessed by Snellen Vision Box with multiple optotype; E-chart was used for illiterate patients. After informed consent was obtained, patient characteristics were collected on a predesigned pro forma. After taking the relevant history, the anterior segment was evaluated in detail using slit-lamp biomicroscopy (Topcon) under appropriate magnification and illumination. On slit-lamp examination with the slit beam focused on the nasal limbus, the pterygium was graded depending on the extent of corneal involvement as follows.

Grade I: between limbus and a point midway between limbus and pupillary margin
Grade II: head of pterygium present between a point midway between limbus and pupillary margin (nasal pupillary margin in case of nasal pterygium and temporal margin in case of temporal pterygium)
Grade III: crossing pupillary margin

Schirmer test-II was performed in all the patients to estimate the degree of dry eyes.

The cases with grade II and III were posted for pterygium surgery.

Surgical technique
After giving a peribulbar block, a wire speculum was used to separate the lids. A superior rectus bridle suture was inserted using 4-0 black silk. A small incision was made in the conjunctiva just medial to the head of the pterygium; the conjunctiva was progressively dissected from the body of the pterygium towards the caruncle. The process was completed towards the upper fornix, caruncle and lower fornix in the shape of a triangle with its apex...
at the limbus avoiding any conjunctival button-holing.

The corneal epithelium was scraped off 2 mm ahead of the head of the pterygium with a hockey-stick knife. Once this plane was defined, the pterygium head was easily avulsed using a combination of blunt dissection and traction. Residual fibrous tissue on the cornea was removed by sharp dissection with a No.15 Bard-Parker blade. The body of the pterygium with the involved Tenon’s capsule and cicatrix was then excised, taking care to ensure the safety of the underlying medial rectus muscle and the overlying conjunctiva. The abnormal tissue at the limbal end of the pterygium was aggressively resected, often extending 2-3 mm beyond the visible extent of the pterygium to avoid leaving behind any scaffold for a later recurrence and to have a good bed for placement of the graft.

The size of the conjunctival graft required to resurface the exposed sclera surface was determined using Castroviejo calipers in 3 directions. The size of the graft was calculated as 2 mm more than the size of the bare area of sclera in all directions. Careful hemostasis of the exposed scleral surface was done using wet-field cautery. The limbus was smoothened. About 2 ml of normal saline was injected into the conjunctiva to form chemosis and the graft was excised starting at the fornical end. Care was taken to obtain as thin a graft as possible without button-holing. Once the limbus was reached, the graft was flipped over onto the cornea and the tenon’s attachments at the limbus were meticulously dissected. The flap was then excised using a Vannas scissors, taking care to include the limbal tissue.

Without lifting the tissue off the cornea, it was rotated and moved onto its scleral bed with fine non-toothed forceps. A limbus-limbus orientation was maintained. The graft was smoothened out on its bed taking care to avoid any folding of the edges. The four corners of the graft were anchored with episcleral bites to maintain position. The additional 3 sutures were kept to hold the conjunctiva. Absorbable No 8/0 Vicryl suture was used for sutureing. No sutures were placed on the limbal side of the graft. The superior rectus bridle suture was removed and the donor area was covered by pulling the fornical conjunctiva forward. At the conclusion of the procedure the eye was patched firmly after the application of antibiotic eye ointment.

Postoperatively, topical chloramphenicical and betamethasone eye drops were used every 2 hours for the first post-operative week and then tapered over the next 5-6 weeks. Antibiotic ointment was used 3 times daily for the first 2 weeks. Any retained sutures were removed at 4 weeks.

Follow-up of the patient was done on first postoperative day at first week, fourth week, third month and then every six months. The patients were also advised to report immediately if any discomfort other than that described during counseling occurred. A recurrence was defined as fibrovascular tissue growing in a parallel direction towards the limbus crossing the corneoscleral limbus onto the clear cornea in the area of previous pterygium excision.

All data collected were entered into Statistical Package for Social Sciences version 11.5 and analyzed.

**Results**

Thirty four patients were evaluated. Their ages ranged from 29 to 65 years with a mean age of 43.88±9.19. Female gender predominated in the study (21, 61.8%). Service (14, 41.2%) and agriculture (10, 29.4%) related occupations dominated (Table 1). Twenty six (76.5%) persons had grade II pterygium of and 8 (23.5%) had grade III (Table 2) pterygium.

### Table 1

**Occupation of the patients**

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>10</td>
<td>29.4</td>
</tr>
<tr>
<td>Mason</td>
<td>3</td>
<td>8.8</td>
</tr>
<tr>
<td>Domestic affairs</td>
<td>4</td>
<td>11.8</td>
</tr>
<tr>
<td>Service</td>
<td>14</td>
<td>41.2</td>
</tr>
<tr>
<td>Business</td>
<td>3</td>
<td>8.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>34</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
Presenting complaint of the patients varied largely as follows: ocular discomfort (8, 23.5%), appearance of the fleshy growth in the white portion of the eye (7, 20.6%), ocular redness (5, 14.7%), foreign body sensation (4, 11.8%) and blurring of vision (1, 2.9%). However, few patients had multiple complaints (9, 26.5%) which included the cosmetic reasons. The duration since the development of pterygium varied largely from 2 years (16, 47.1%) to more than 5 years (4, 11.8%) (Table 3).

### Table 3
**Duration since the first appearance of pterygium**

<table>
<thead>
<tr>
<th>Duration in years</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2 years</td>
<td>16</td>
<td>47.1</td>
</tr>
<tr>
<td>3-5 years</td>
<td>14</td>
<td>41.2</td>
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<tr>
<td>&gt;5 years</td>
<td>4</td>
<td>11.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>34</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Inflammation of the pterygium occurred twice in 14 (41.2%), thrice in 5 (14.7%) and once in 4 (11.8%). The pterygium was inflamed multiple times in 11 patients (32.4%). Dry eye was seen in 30 (88.23%) patients. Eighteen (52.9%) patients had a history of using topical drugs in the past for the treatment of this fleshy growth. Ten patients (29.4%) had presenting visual acuity of 6/6 on their affected eye and only nine patients (26.4%) had visual acuity below 6/18 (Table 4).

### Table 4
**The presenting visual acuity**

<table>
<thead>
<tr>
<th>Visual acuity</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/6</td>
<td>10</td>
<td>29.4</td>
</tr>
<tr>
<td>6/9</td>
<td>8</td>
<td>23.5</td>
</tr>
<tr>
<td>6/12</td>
<td>7</td>
<td>20.6</td>
</tr>
<tr>
<td>6/18</td>
<td>6</td>
<td>17.6</td>
</tr>
<tr>
<td>6/24</td>
<td>2</td>
<td>5.9</td>
</tr>
<tr>
<td>6/60</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>34</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Two patients had displaced grafts, one in the third and the other in the seventh post operative follow up visit. One patient had a sutural granuloma present at the two week postoperative period which improved with suture removal and topical steroid treatment. Only three subjects (8.82%) had a recurrence of pterygium: one in two months, and the other two in six months post-operatively. No major complications were noticed in any of these patients.

### Discussion

In spite of numerous techniques and improvements in microsurgery, recurrence of pterygium is still a major concern for ophthalmic surgeons. While the definitive management of a pterygium is surgical, the ideal adjunctive procedure is still to be determined. A wide range of recurrence rates reported has been attributed to various study differences including methodology (prospective/retrospective), patient characteristics (race, age), nature of pterygium advanced/inflamed/recurrent/progressive/atrophic), geographic area of domicile, number of patients studied, definition of recurrence, duration of follow up and loss of follow up, surgical technique and surgeon’s experience.

In our study, service holders and farmers were mostly involved, which could be due to increased computer use in service holders and exposure to dust and UV rays in farmers. Exposure to dryness, hot weather and ultraviolet rays causes the primary thickening of a limbal mass, leading to limbal elevation. This in turn causes irritation and further elevation which causes exposure of the cornea due to improper apposition of the lids. Thus, a dellen forms and prevents a smooth tear film from covering the cornea. In a study done by Pandey et al (1984) males were predominant (males 1051, 75.1%; females, 349; 24.9%). It suggests that males have more exposure to external atmosphere than females, indicating that the environment plays a predominant role in pterygium formation.

However, in our study there is female preponderance, which could be due to a high
prevalence of dry eyes in women, particularly in menopausal women, in which the main cause for dry eyes is the fluctuations in estrogen and androgen hormones.

The primary aim of the surgical intervention in pterygium is to excise the pterygium and prevent recurrence. As bare sclera excision is associated with a high recurrence rate, pterygium excision is often combined with conjunctival autograft, mitomycin C, beta-irradiation or other adjunctive therapies to reduce recurrence rates. There is currently, however, no consensus on the ideal treatment of the disease (Ang et al, 2007). Rao (1998) highlighted that the surgical technique could probably be the single most important factor influencing recurrence. He emphasized that the meticulousness with which the limbal tissue was included in the autograft, determines the success of the procedure. We also followed the surgical technique described by him which involved conjunctival limbal stem cells to treat the pterygium of patients in Kavrepalanchowk and surrounding districts of Nepal.

Koch et al (1992) described that a pterygium also exhibits features seen in limbal stem cell deficiency (SCD) states, stromal inflammation and corneal vascularisation and conjunctivalization. Thus, the importance of limbal transplantation in ensuring low recurrence rates has also been stressed by Figueiredo et al (1997) and Dushku et al (1994).

Fernandes et al (2005) has compared the outcome of various surgical techniques following primary and recurrent unilateral pterygium excision respectively. Recurrences were noted in 46 (19.4%) and one (33.3%) eyes after bare sclera technique; in five (16.7%) and 0 after primary closure; in 28 (26.7%) and 0 with Amniotic membrane graft (AMG); in 42 (12.2%) and five (31.3%) with conjunctival autologous graft (CAG) and in nine (17.3%) and two (40%) with conjunctival limbal autograft (CLAG).

Solomon et al (2001) reported in a non-comparative study that double-layered AMG combined with the intraoperative injection of triamcinolone significantly reduced the recurrence rates to 3% for primary pterygium; a result that is comparable with that after CAG.

Conclusion

Pterygium excision combined with conjunctival autograft surgery is the safe and effective method for treating pterygium. However, additional large randomized clinical trials need to be performed to evaluate the relative efficacy and long-term safety of the various treatment options to define a suitable treatment option for people living with pterygium in hilly regions of Nepal.

Acknowledgement

Surgical team (Mr Utsav Khoju and Ganga Thapa) and all the colleagues of our department are highly acknowledged for their help and support.

References


Source of support: nil. Conflict of interest: none
Phacoemulsification surgery by a nationally-trained cataract surgeon of Nepal

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Abstract

Introduction: A one month phacoemulsification training course had been implemented by the Nepal Netra Jyoti Sangh (NNJS) in collaboration with Association for Ophthalmic Cooperation to Asia, Japan (AOCA).

Objective: To evaluate the visual outcomes of phacoemulsification surgery by a nationally trained surgeon in Nepal.

Materials and methods: A retrospective study of patients that underwent phacoemulsification with foldable intraocular lens implantation during a period of 18 months was carried out. Cases that had a six-week follow-up period were included. Effective phaco time (EPT), intra-operative and postoperative complications were noted. Uncorrected visual acuity (UCVA) at day 1 and best corrected visual acuity (BCVA) at week 6 were noted. The data were analyzed using SPSS 11.5.

Results: A total of 172 patients that had completed a 6 week follow-up evaluation were included in the study. The mean age of patients was 57.12±10.19 years. The mean effective phaco time (EPT) was 9.74±7.41 seconds. Posterior capsule rupture (PCR) with vitreous loss occurred in 2 eyes (1.2%), Descemet’s membrane detachment in 1 eye (0.6%), capsulorhexis extension in 1 eye (0.6%) and wound site thermal injury (WSTI) occurred in 3 eyes (1.7%). Postoperative complications were mild to moderate striate keratopathy (9/172), corneal edema (1/172), corneal epithelial defect (1/172), corneal epithelial defect (1/172) and uveitis (1/172). At 6 weeks post-operatively, 165 eyes (95.9%) had a BCVA better than 6/18 and 7 eyes (4.1%) had a BCVA of 6/18 to 6/60.

Conclusion: Patients undergoing phacoemulsification had a good visual outcome as a result of the procedure performed by cataract surgeon trained from AOCA/NNJS national phacoemulsification training program of Nepal.

Key-words: phacoemulsification, training program, Nepal
Introduction

The ultimate goal of a cataract surgery is to restore and maintain the pre-cataract vision and to alleviate other cataract-related symptoms. Phacoemulsification permits removal of the cataractous lens through a smaller incision, a quicker visual recovery and a faster physical rehabilitation. The first phacoemulsification was performed by Charles Kelman in 1967 (Kelman et al 1967). The techniques and results of cataract surgery have changed over the last three decades and phacoemulsification has become the preferred technique in developed countries (Seibel et al 1999; Linebarger et al 2000; Lundstrom et al 2002). In a survey on the practice styles of American Society of Cataract and Refractive Surgeons (ASCRS) members, it was found that only 3% of the cataract surgeons did not use the phacoemulsification technique at all (Leaming et al 2002). Similarly, 93% of the members of Japanese Society of Cataract and Refractive Surgery preferred phacoemulsification (Oshika et al 2000). The scenario in South Asian countries a decade before was opposite; less than 5% of the eye surgeons in India performed phacoemulsification (Basti et al 1999). Despite the rapid development in technology-driven cataract surgery in the developed world, it is still in its infancy in developing countries.

Cataract surgery is the most common intraocular surgery performed worldwide. Over the past two decades, extra-capsular cataract extraction (ECCE) has become a more commonly performed procedure than intra-capsular cataract extraction (ICCE), which is now performed less often in Nepal. In developing countries, manual sutureless small incision cataract surgery (SICS) has been accepted as a low cost cataract surgery and the best option for addressing high volume cataract backlog (Ruit et al 2000; Chang DF 2005). In recent years, phacoemulsification technique has brought cataract surgery results as close to anatomical perfection as possible. However, implementation of phacoemulsification is limited by the startup and training cost. As a result, ophthalmologists in developing countries such as Nepal, have limited opportunity to acquire the skill of phacoemulsification. To address this problem, the Association for Ophthalmic Cooperation in Asia (AOCA) in joint collaboration with the Nepal Netra Jyoti Sangh (NNJS) started the first bi-annual national phacoemulsification training program in Nepal from December 2007, with the financial support of the Japan International Cooperation Agency (JICA). The author (BS), after completing a one-month phaco training program, started performing phacoemulsification independently. The objective of this study was to analyze the surgical outcome of phacoemulsification by a young ophthalmologist after receiving training in Nepal.

Materials and methods

This study was a hospital-based retrospective one that included data from 172 patients that underwent phacoemulsification with foldable intraocular lens implantation by a single surgeon (BS) during a period of 18 months (1st July, 2008 to 31st December, 2009) and who had also completed a 6-week follow-up. Diabetics and hypertensives were included. Cataract grading was classified under Lens Opacity Classification System (Chylac et al 1989). Nuclear sclerosis grades 1 and 2 were included in one group and Grades 3 and 4 were included in a second group. Posterior sub-capsular cataracts (PSCC), posterior polar cataracts, traumatic cataracts without subluxation, and myopic patients were also included. Preoperative visual acuity, slit lamp biomicroscopy findings with 90D examination, corneal astigmatism and IOL power calculations were recorded. Under peribulbar anesthesia, phacoemulsification was performed by a clear corneal incision (CCI). The CCI of 2.8 mm was placed at the 12’O clock position in cases of with-the-rule (WTR) astigmatism and a superior temporal CCI was performed in cases of against-the-rule (ATR) astigmatism. The anterior chamber was refilled with hydroxypropyl methyl cellulose 2%. Continuous curvilinear capsulorrhexis (CCC) was then

249
performed with a 26 G bent cystotome through empty 1 ml disposable syringe. In case of difficulty, capsulorrhexis forceps were used for completion of the CCC. Four quadrant cortical - cleaving hydrodissection was performed with a 24 gauze cannula in a 3 ml disposable syringe, and rotation was done with a blunt chopper via a side port. The AMO sovereign compact (White Star) phaco machine was used, and the stop and chop technique was the preferred method for nucleotomy.

After central sculpting, the nucleus was fractured into two hemi-sections and chopping was performed. The parameters of phacoemulsification used in cases of grade 1 and 2 nuclear sclerosis were: US energy of 20-30%, vacuum of 150-250 mmHg and aspiration flow rate (AFR) 18-22 cc/min. The parameters used in grade 3 and 4 cataracts: US energy was 30-50%, vacuum 250-350 mmHg and AFR 22-28 cc/min. The phaco machine had its own program setting for above parameters, and the surgeon could switch to different phaco modes by using a foot pedal. Care was taken to perform the entire emulsification and aspiration at the posterior plane as much as possible. A single piece foldable acrylic intraocular lens (Tecsoft, The Fred Hollows IOL Laboratory, Tilganga Eye Center, Nepal) was implanted via a hydraulic injector. Irrigation and aspiration were performed with a single piece coaxial hand piece. At the end of the surgery, sub-conjunctival injection of gentamicin and dexamethasone was given in all cases. Effective phaco time (EPT), intra-operative and postoperative complications were noted.

Effective phaco time (EPT) was 9.74±7.41 seconds. The mean EPT for nuclear sclerosis (NS) 1 and NS 2 was 7.92±4.97 seconds, the mean EPT for NS 3 and NS 4 was 15.75±9.45 seconds; and the mean EPT for hypermature senile cataracts (HMSC - white and brown cataracts) was 11.92±5.88 seconds. Two eyes (1.2%) had posterior capsule rupture (PCR) with vitreous loss, 1 eye (0.6%) had a Descemet’s membrane detachment; 1 eye (0.6%) had a CCC extension and 3 eyes (1.7%) had wound site thermal injury (WSTI) (Table 1).
Table 1
Effective phaco time in different types of cataract and intra-operative complications

<table>
<thead>
<tr>
<th>Cataract types</th>
<th>EPT Mean (SD)</th>
<th>PCR</th>
<th>Iris Injury</th>
<th>Corneal burn</th>
<th>Dm Strip</th>
<th>Radial extension of CCC</th>
<th>No complications</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS 1 – NS 2</td>
<td>7.92(4.97)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>100</td>
<td>101</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NS 3 – NS 4</td>
<td>15.75(9.45)</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>38</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>only PSCC</td>
<td>2.96(3.06)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Posterior polar</td>
<td>6.25(8.27)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>HMSC, White/Brown</td>
<td>11.92(5.88)</td>
<td></td>
<td></td>
<td>1</td>
<td>11</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traumatic cataract</td>
<td>2.70(0.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total (%)</td>
<td></td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>164</td>
<td>172 (100%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2
Visual acuity of eyes that underwent phacoemulsification

<table>
<thead>
<tr>
<th>Visual acuity</th>
<th>Pre-operative UCVA</th>
<th>Post-operative Day 1 UCVA</th>
<th>Follow-up week 6 BCVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better than 6/18</td>
<td>5 (2.9%)</td>
<td>136 (79.1%)</td>
<td>165 (95.9%)</td>
</tr>
<tr>
<td>6/18 to 6/60</td>
<td>39 (22.6%)</td>
<td>34 (19.7%)</td>
<td>7 (4.1%)</td>
</tr>
<tr>
<td>5/60 to 1/60</td>
<td>88 (51.2%)</td>
<td>2 (1.2%)</td>
<td>0</td>
</tr>
<tr>
<td>&lt;1/60</td>
<td>40 (23.3%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>172 (100%)</td>
<td>172 (100%)</td>
<td>172 (100%)</td>
</tr>
</tbody>
</table>

Table 3
Post-operative complications

<table>
<thead>
<tr>
<th>Cataract types</th>
<th>Striate Keratopathy</th>
<th>Corneal Edema</th>
<th>Uveitis</th>
<th>Corneal Epithelial Defect</th>
<th>None</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS1 - NS2</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td>98</td>
<td>101</td>
</tr>
<tr>
<td>NS 3 - NS4</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>34</td>
<td>43</td>
</tr>
<tr>
<td>only PSCC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Posterior polar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>HMSC, White/Brown</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Traumatic cataract</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total (%)</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>160 (93%)</td>
<td>172 (100%)</td>
</tr>
</tbody>
</table>
On the first postoperative day, 136 eyes (79.1%) had an UCVA of better than 6/18, 34 eyes (19.7%) had an UCVA of 6/18 to 6/60 and 2 eyes (1.2%) had an UCVA of less than 6/60 (Table 2). Table 3 shows postoperative complications which included mild to moderate striate keratopathy (9/172), corneal edema (1/172), corneal epithelial defect (1/172) and uveitis with grade 3 cells in anterior chamber (1/172). Striate keratopathy was higher in the grade 3 and 4 nuclear sclerosis group (7/43) than in the grade 1 and 2 nuclear sclerosis group (2/101). Complications were not present in 160 eyes (93%) on the first post-operative day. After 6 weeks, 143 eyes (83.2%) had a BCVA of 6/18-6/9, 22 eyes (12.7%), had a BCVA of 6/12 to 6/18 and 7 eyes (4.1%) had a BCVA of 6/24 to 6/60 (Table 2). PCR in 2 eyes achieved a BCVA of better than 6/18 on the last follow up. Eyes with striate keratopathy (SK) achieved BCVA better than 6/18 in 8 cases and 6/18 to 6/60 in one case (Table 4).

**Discussion**

The learning curve for phacoemulsification cataract surgery is generally accepted to be quite steep (Prasad et al, 1998). It is vital that young surgeons learn this procedure in a manner that is safe and time efficient. The author (BS) had performed nearly one thousand cases of manual sutureless extra-capsular cataract surgery before starting phacoemulsification training. Since 2007, the Nepal Netra Jyoti Sangh (NNJS) and Association for Ophthalmic Cooperation to Asia, Japan (AOCA) have been conducting a one month bi-annual phacoemulsification training program. During the first two weeks of training (May 2008), the author (BS) was taught in stages to perform a single part of the procedure several times in succession under direct supervision of an experienced surgeon (SJB & MIM) at the Himalaya Eye Hospital (Ghari Patan, Pokhara, Nepal). After each step had been mastered on dummy eyes (pig’s eye) in the wet lab, trainees had to ask to learn the next step of the procedure. During the last two weeks, hands on training in the operation theatre setting led to acceptable surgical outcomes including reasonably low complication rates. After completing the training, the author (BS) began performing phacoemulsification in Lumbini Eye Institute (Bhairahawa, Western Nepal) under the guidance of an experienced phaco surgeon (SBR) for one month (June 2008) and then transitioned to independently performing phacoemulsification starting in July 2008 onwards.

Two hundred and fifty-three eyes had undergone phacoemulsification over an 18 months period. However, only two thirds (172/253, 67.9%) of cases had presented for a 6 week evaluation. The

### Table 4

**Visual outcomes in eyes with intra-operative and postoperative complications**

<table>
<thead>
<tr>
<th>Surgical Complications</th>
<th>UCVA at Day 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Better than 6/18</td>
</tr>
<tr>
<td></td>
<td>Better than 6/18</td>
</tr>
<tr>
<td><strong>Intraoperative</strong></td>
<td></td>
</tr>
<tr>
<td>PCR</td>
<td>2</td>
</tr>
<tr>
<td>Corneal burn</td>
<td>1</td>
</tr>
<tr>
<td>DM detachment</td>
<td>1</td>
</tr>
<tr>
<td><strong>Postoperative</strong></td>
<td></td>
</tr>
<tr>
<td>SK</td>
<td>2</td>
</tr>
<tr>
<td>Corneal Edema</td>
<td>1</td>
</tr>
<tr>
<td>Corneal epithelial defect</td>
<td>1</td>
</tr>
<tr>
<td>Uveitis</td>
<td>1</td>
</tr>
</tbody>
</table>

PCR= Posterior capsule rupture; DM= Descemet membrane; SK= Striate keratopathy
lost to follow up could be due to long distance, as 3/4th of the patients were required to travel from India. Additionally, we can speculate that the patients who achieved better working vision did not come for follow-up after surgery. The results of this study show that harder cataracts (nuclear sclerosis grade 3 and 4) were associated with high occurrence of intra-operative and postoperative complications (Table 1 and 3). Posterior capsule rupture (PCR) occurred in 2 eyes (1.2%): one eye had undergone a closed chamber anterior vitrectomy with a 3-piece foldable posterior chamber intraocular lens (PCIOL) implanted in the sulcus. The other case of PCR was converted to a conventional ECCE and a PMMA PCIOL was implanted in sulcus as well. It has been reported that experienced surgeons have a 0-5% incidence of PCR with vitreous loss (Chan et al 2003; Kothari et al 2003; Dholakia et al 2004) compared to 10.0-19.7% in learning surgeons (Cotlierat al 1976; Thomas et al 1997; Hennig et al 2004). In one of the studies, author’s first 1000 cases of phacoemulsification surgery (Ng et al, 1998) were studied prospectively and consecutively, and the major complication rate was compared between the first 150 cases and the last 850 cases. The rate was 9.3% in the first 150 cases, but improved to 0.9% in the final 850 cases. In another prospective analysis of the first 3000 cases of phacoemulsification (Martin et al 2000), the rate of vitreous loss in the first 300 and the last 300 cases was 4.0% and 0.7%, respectively.

In our study, intra-operative corneal complications were found in 3 eyes (1.7%) with wound site thermal injury (WSTI) and 1 eye (0.6%) with a Descemét’s membrane detachment. Postoperative corneal complications included mild to moderate striate keratopathy (9/172), corneal edema (1/172), and epithelial defect (1/172). Corneal complications were more common with grade III and IV nuclear sclerosis. None of the cases required suturing of the corneal incision. These results can be compared to those of a retrospective study of 100 cases by a beginner phaco surgeon (Ali et al 2007), which showed intra-operative corneal complications including corneal abrasion (40%), corneal hydration (3%) and Descemét’s membrane detachment (3%). Postoperative corneal complications included mild (18%), moderate (22%) and severe (13%) striate keratopathy with corneal edema. A study by Hennig et al (2004) showed that postoperative corneal complications which resulted in reduced visual acuity were more common in cases performed by surgeons who had no formal training (11/100 eyes) when compared to surgeons who had learnt phacoemulsification in a stepwise manner and had been taught by an experienced phaco-surgeon (3/100 eyes). In this retrospective study, none of the eyes developed post-operative endophthalmitis. Our preoperative prophylaxis was topical Chloramphenicol drops once every 2 hours one day prior to surgery. A single dose of tablet Ciprofloxacin 750 mg was prescribed on the day of surgery. After the completion of surgery, sub-conjunctival injection of Dexamethasone (2mg) and Gentamycin (20mg) was given in all cases. Post-operative topical medications were a combination of Chloramphenicol and Dexamethasone 6 times daily for 2 weeks and 4 times daily till 6 weeks.

The mean effective phaco time (EPT) in our study was 7.92 seconds (SD ±4.97) for nuclear sclerosis I and II, whereas EPT was 15.75 seconds (SD ±9.45) for nuclear sclerosis III and IV. As stop-and-chop technique was preferred for above cataracts, the low EPT in our study can be attributed to the use of an AMO Sovereign phaco machine with white star technology. One of the studies from northern India (Vajpayee et al 2000) has shown an EPT of 28±16 seconds for immature senile cataract done by Storz Protégé phaco machine by stop and chop technique, and had concluded that the phaco-chop and the stop-and-chop nucleotomy techniques were equally efficacious for nuclear management during phacoemulsification. Izzet Can et al (2004) showed an EPT of 22±14 seconds in stop-and-chop technique done with the Series 2000 Legacy Phacoemulsification unit (Alcon), and had concluded that the phaco-chop was superior to the
stop-and-chop nucleotomy. A comparative clinical trial on White Star system (Fishkind W et al 2006), has concluded that the Sovereign with White Star power modulation system provides effective lens removal at lower levels of phaco power and ultrasound energy (Mean EPT= 6.67 ±8.2 seconds) than the Sovereign 4.0 system (Mean EPT =8.59±9.3 seconds).

On the first post-operative day, uncorrected visual acuity (UCVA) was better than 6/18 in 136 eyes (79.1%) and on the sixth week, best corrected visual acuity (BCVA) was better than 6/18 in 165 eyes (95.9%). The major cause of reduced visual acuity on day 1 was corneal complications; whereas reduced BCVA at the sixth week in 7 eyes was due to high astigmatism and posterior segment pathology. Two patients had dry age-related macular degeneration (AMD), one diabetic patient had a severe NPDR with macular edema in one eye and another patient was found to have myopic fundus degeneration. A prospective study of 173 patients by Dholakia SA et al (2004), followed their patients for 3 years, and showed that a BCVA of better than 6/18 was achieved in 146 eyes (88.89%) at last follow up (Dholakia SA et al 2004). A prospective randomized comparative study (Ruit et al 2007) on phacoemulsification by phaco-chop technique done by experienced surgeon has reported a BCVA of equal to or better than 6/18 in 98% of patients at six months follow up period. Gogate et al have reported a BCVA of better that 6/18 in 98.5% of eyes at 6 week postoperatively that had undergone phacoemulsification by stop- and- chop technique (Gogate P et al 2010).

The limitation of this retrospective study was a short period of follow up and the post-operative corneal astigmatism, which was not included in the study. A study with at least a 6 month follow up period and calculation of surgically induced astigmatism (SIA) would have added more insight into the outcome of phacoemulsification.

Conclusion
Bi-annual national phacoemulsification training program has provided an opportunity to cataract surgeons of Nepal to perform effective phaco surgery in their own nation. Patients undergoing phacoemulsification by a nationally-trained phaco surgeon had a good visual outcome with minimum pre-operative and post-operative complications.

References


Source of support: nil. Conflict of interest: none
Changing trends in idiopathic retinal vasculitis in a tertiary eye care centre of Nepal over a ten-year period

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Abstract

Objectives: To study the demographic profile, clinical presentations, management and visual outcome of retinal vasculitis in a tertiary eye care center of Nepal

Materials and methods: A retrospective, record based study of retinal vasculitis cases in the retina clinic of a tertiary care centre in Nepal from January 2009 to January 2011 was carried out. Results of the study were compared to those from the study conducted in a similar set-up between 1998 and 2000.

Results: Sixty-nine eyes of 51 affected patients were evaluated in the study. The male/female ratio was 2.64:1 vs 19:1 a decade ago (p=0.0027). The mean age of the patients was 33.53 ± 12.29 years in the present study. Bilateral ocular involvement was present in 18 cases (35.3%) vs 56.14% in the past decade (p=0.044). The common symptoms were dimness of vision (29.4%), floaters (25.5%) and flashes of light (3.92%). Seventy-one eyes (69.6%) had the best corrected visual acuity of 6/18 or better. Four eyes (3.92%) had no light perception. Vascular sheathing was the most common finding (32.3%), followed by vitritis (30.39%). Corticosteroids were primarily used to manage retinal vasculitis (39.21%). No association of retinal vasculitis with tuberculosis was found.

Conclusion: The demographic pattern and clinical presentation of idiopathic retinal vasculitis has changed over a decade period in Nepal.

Key-words: Eales’ disease, steroid, tuberculosis, vitreous haemorrhage

Introduction

Eales’ disease is named after Henry Eales, a British ophthalmologist, who described the clinical picture of recurrent retinal haemorrhages in young adults aged 14 to 29 years in 1880 (Eales et al,1882). The disease affects healthy young adults with male predominance in up to 97.6% of cases (Biswas et al, 2002). After diabetes, it is one of the major causes of visual impairment and blindness in patients attending the vitreo-retina clinic at BP Koirala Lions Centre for Ophthalmic Studies, Kathmandu (Shrestha et al, 2009).

To date, the exact etiology of Eales’ disease is unknown. Recent studies have revealed no definite association between this disease and tuberculosis, hypersensitivity reaction to tuberculoprotein, thrombangitis obliterens, multiple sclerosis and various neurological and haematological disorders. Immunological, molecular biological and
biochemical studies have indicated the role of human leukocyte antigen, retinal autoimmunity, mycobacterium tuberculosis genome, and free radical mediated damage in the etiopathogenesis of this disease (Biswas et al 2002).

Clinical manifestation of this disease is due to three basic pathological changes: inflammation (peripheral retinal perivasculitis), ischemic changes (peripheral retinal capillary non-perfusion); and neovascularisation of the retina or disc, which often leads to vitreous hemorrhage (Biswas et al 2002). Based on the clinic-pathological features, Eales’ disease is classified into four stages (Charmis et al, 1965). Stage I (inflammation) is characterized by mild periphlebitis of small peripheral retinal capillaries with localized areas of peripheral retinal edema. Perivasculitis of the venous capillary system is widespread and associated with retinal haemorrhages in stage II (ischemia). New vessel formation with abundant haemorrhage in the retina and vitreous is seen in stage III (neovascularisation) and the stage IV (complications) is the end result of massive and recurrent vitreous haemorrhages with retinitis proliferans and tractional retinal detachment.

Prognosis for patients with Eales’ disease may vary depending on the availability of medical care. Many patients in Nepal live in the areas that are underserved by medical care. In locations where specialized medical care is available, the outcomes tend to be better with treatment. This study was carried out to assess the demographic pattern, clinical presentation and treatment outcome of idiopathic retinal vasculitis in Nepal and compare these parameters with those of a similar study conducted roughly a decade ago in the same centre.

Materials and methods

A retrospective review of medical records was conducted on patients presenting between January 2009 and January 2011 at the retina clinic of BP Koirala Centre for Ophthalnic Studies, a tertiary eye centre of Nepal. Informed written consent was obtained from the patients. The study was conducted adhering to the principles of the Declaration of Helsinki and was approved by the Institutional Review Board. Diagnosis of the retinal vasculitis was done based on retinal findings and supporting fundus fluorescein angiography findings. Diabetes mellitus, tuberculosis, sickle cell hemoglobinopathy, blood dyscrasias, sarcoidosis and collagen vascular disorders were ruled out after proper history, examination and investigations. All the eyes were staged according to the Charmis classification (1965).

A total of 51 patients were enrolled in the study. Each patient received a comprehensive eye examination as per the pro forma. Detailed scrutiny of each patient’s systemic history, drug history and laboratory findings was performed.

Presenting, best-corrected and final visual acuity was measured using the Snellen’s acuity chart. Slit-lamp bio-microscopy and indirect ophthalmoscopy was used for ocular examination. Cellular grading was performed according to Hogan’s classification system. Fundus examination of every patient was performed under mydriasis. Fluorescein angiography was used to note the presence of capillary non-perfusion, collaterals, neovascularization and status of the macula. Details of the treatment provided were noted for each subject.

The findings of the present study were compared to a similar study performed at the same centre between 1998 and 2000. The previous study included 89 eyes of 57 cases of Eales’ disease. All data were recorded in a pro forma and analyzed using SPSS statistics software version 17 (SPSS Inc., Chicago, IL, USA).

Results

Among 51 cases, 18(35.3%) were inhabitants of the Kathmandu valley and 33(64.7%) were from outside the valley. Of them, 37 (72.5%) were males and 14(27.5%) were females, the male to female ratio being 2.64:1. The mean age of the patients was 33.53 ± 12.29 years with the range of 18 -74 years. Twenty-one patients (41.1%) were of the
age 21-30 years. Fifteen were in the age group of 31-40 years (29.3%, Table 1).

Bilateral ocular involvement was present in 18 cases (35.3%) and unilateral in 33 (64.7%). Of the unilateral cases right eye was involved in 22 and left eye in 11 cases. A total of 69 eyes in 51 patients were involved.

The mean duration of the ocular symptoms was 578 ± 89 days. Of the 102 eyes, the three most common symptoms were dimness of vision (30; 29.4%), floaters (26; 25.5%) and flashes (4; 3.92%). Other symptoms noted were redness, ocular discomfort and foreign body sensation.

Of the 102 eyes, 71 eyes (69.6%) had a best-corrected visual acuity of 6/18 or better. Thirteen eyes (12.74%) had the visual acuity between 6/24 and 3/60; and fourteen eyes (13.72%) had less than 3/60. Four eyes (3.92%) had no light perception.

The lens was clear in 88 eyes (86.27%), posterior sub-capsular cataract was present in 3 eyes (2.94%), Senile cataract in 5 eyes (4.90%), 3 eyes were pseudophakic (2.94%) and 1 eye (0.98%) was aphakic. Vascular sheathing (Figure-1) was noted in 33 eyes (32.35%) and vitritis in 31 (30.39%) making these two the most common findings in retinal vasculitis. Vitreous haemorrhage was the most common type of haemorrhage noted. Of the 23 (22.54%) eyes affected by vitreous haemorrhage, 15 eyes (14.7%) had a fresh haemorrhage and 8 eyes (7.84%) had old haemorrhage.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Gender</th>
<th>Total</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td></td>
</tr>
<tr>
<td>0-10 years</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>0</td>
</tr>
<tr>
<td>11-20 years</td>
<td>5(9.8%)</td>
<td>0(0%)</td>
<td>5</td>
</tr>
<tr>
<td>21-30 years</td>
<td>17(33.3%)</td>
<td>4(7.8%)</td>
<td>21</td>
</tr>
<tr>
<td>31-40 years</td>
<td>9(17.6%)</td>
<td>6(11.7%)</td>
<td>15</td>
</tr>
<tr>
<td>41-50 years</td>
<td>2(3.9%)</td>
<td>3(5.8%)</td>
<td>5</td>
</tr>
<tr>
<td>51-60 years</td>
<td>2(3.9%)</td>
<td>0(0%)</td>
<td>2</td>
</tr>
<tr>
<td>61-70 years</td>
<td>1(1.9%)</td>
<td>1(1.9%)</td>
<td>2</td>
</tr>
<tr>
<td>71-80 years</td>
<td>1(1.9%)</td>
<td>0(0%)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>37(72.54%)</td>
<td>14(27.45%)</td>
<td>51</td>
</tr>
</tbody>
</table>

Retinal neovascularization at the disc and elsewhere was present in 18 eyes (17.64%). Macular involvement was also observed in the form of epiretinal membrane with tractional retinal detachment (6.86%), macular branch venous occlusion (3.92%) and cystoid macular oedema (1.96%).

The most common stage of presentation was the stage of resolution (41.17%), followed by the stage of ischemia (13.72%), the stage of neovascularization (9.8%) and finally the stage of inflammation (5.88%).

The mean IOP was 14.10 ± 2.4 mmHg. Capillary non-perfusion (12.74%) was the most common angiographic finding followed by collaterals (7.84%).

Corticosteroids were the mainstay of management of retinal vasculitis. Oral steroids were administered in 20 cases (39.21%) and intravenous methylprednisolone in 1 individual (1.96%). No immunosuppressive agents were used. But intravitreal bevacizumab was given to 1 individual (1.96%) with active neovascularisation.
Retinal laser photocoagulation therapy was the modality of treatment in 22 eyes (21.56%). Six eyes (5.88%) underwent pars plana vitrectomy for vitreous haemorrhage. Though the Mantoux test was positive in 18 cases (35.3%), tuberculosis was confirmed with X-ray chest and sputum examination for acid fast bacilli in only 1 individual (1.96%) who was commenced on anti-tubercular therapy.

Thirty-four (66.7%) patients had history of treatment for retinal vasculitis for the past episode or for a recent attack before visiting our centre. Only 17(33.3%) cases were new.

Twenty eyes (19.6%) gained one or more lines on Snellen’s distant visual acuity chart, 7 eyes (6.86%) lost one or more lines and 4 eyes (3.92%) had no perception of light. However, 71 eyes (69.60%) maintained their initial visual acuity through the available follow-up period.

The above results were compared with the results of the study conducted a decade ago among the patients in the same clinic (Table-2).

**Table 2**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>57</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>Male/Female ratio</td>
<td>19:1</td>
<td>2.64:1</td>
<td>p = 0.0027</td>
</tr>
<tr>
<td>Age group affected</td>
<td>31 – 40 years (54.43%)</td>
<td>21 – 30 years (43.13%)</td>
<td></td>
</tr>
<tr>
<td>Laterality of involvement</td>
<td>Bilateral (56.14%); Unilateral (43.86%)</td>
<td>Bilateral (35.3%); Unilateral (64.7%)</td>
<td>p = 0.0044</td>
</tr>
<tr>
<td>Presenting visual acuity</td>
<td>Normal: 48.24%; Blindness: 27.19%</td>
<td>Normal: 69.6%; Blindness: 17.64%</td>
<td></td>
</tr>
<tr>
<td>Final visual acuity</td>
<td>Normal: 50.27%; Blindness: 22.80%</td>
<td>Normal: 71.8%; Blindness: 12.64%</td>
<td></td>
</tr>
<tr>
<td>Stage of presentation</td>
<td>Stage I: 40.44%; Stage II: 28.08%; Stage IV: 20.22%; Stage II: 11.23%</td>
<td>Stage IV: 41.17%; Stage III: 13.72%; Stage II: 9.8%; Stage I: 5.88%</td>
<td></td>
</tr>
<tr>
<td>Association with pulmonary tuberculosis</td>
<td>2 cases (3.5%)</td>
<td>1 case (1.96%)</td>
<td></td>
</tr>
<tr>
<td>Mean IOP</td>
<td>13.54± 1.875mmHg</td>
<td>14.10 ± 2.375mmHg</td>
<td></td>
</tr>
</tbody>
</table>

**Discussion**

Eales’ disease, observed more commonly in the Indian subcontinent than in the rest of the world, occurs in young healthy adult males, initially presenting as retinal periphlebitis and later as retinal ischemia that may lead to vascular alterations and neovascularization (reference required).

In the previous study from this centre, bilateral involvement was found in 56.14%. In the present study, unilateral (64.7%) presentation was more than bilateral (35.3%), which is statistically significant (p = 0.0044). This disparity could be due to an increased awareness among the symptomatic patients to seek care at a tertiary centre. It could also be due to the duration of the study. Clustering of cases in second to fourth decade of life is similar to the reports from India. Kumar et al (year of...
publication and listing in the references) found that the range of age of the patients was 12-62 years and mean age was 32.9±11.4 years. The means of age of male and female cases were 33±11.1 and 32.4±13.6 years respectively. In the present study, the mean age of patients was 33.53 ± 12.29 years with the range of 18-74years. The previous study from our centre had an age range from 16-60 years with male to female ratio of 19:1 which is in sharp contradiction to 2.64:1 in the present study. Higher prevalence of Eales’ disease in female may be the result of an increased female literacy rate and increasing awareness of the need for eye exams in this population. According to Graham (Graham et al, 1989) idiopathic retinal vasculitis usually occurs in young people with equal male to female ratio. He also reported that 75% cases of Eales’ disease were present before 50 years of age. Our study is comparable as 82.7% presented before 40 years of age.

In the present study, most of the cases (69.6%) had a best corrected visual acuity of 6/18 or better at presentation. However fourteen eyes (13.72%) had vision less than 3/60 and four eyes (3.92 %) had no light perception of light. The study of Kumar et al (poor vision was present in 10.6% and no light perception in 1.8%) is very comparable to the present study. Over the past decade, there has been a decrease in the number of patients with poor vision, from 27.19% to 10.6%. This could be due to the increased awareness of the disease and eye health care, improved treatment modality, earlier presentation and fewer economic constraints.

The most common ocular manifestation of idiopathic retinal vasculitis was vascular sheathing (32.35%) which is comparable with the study done previously in this centre (47.19%). This lower percentage, when compared to the studies of Kumar (68.1%), Graham (64%) and Abraham (84%), may be due to the prior treatment in other centres and or late presentation of the disease. Saxena et al (year of publication and listing in references) reported vitreous haemorrhage as the most common presenting sign and this difference might be due to the fact that all cases of primary retinal vasculitis are not Eales’ disease, which is considered a specific disease entity.

Tuberculosis is a prevalent disease in Nepal. A positive Mantoux test was found in 18cases (35.3%) in our study group but radiological and microbiological confirmation was found in only 1case (1.96%). The previous study at our centre revealed 16 cases (28.07%) with a positive Mantoux test, but only two confirmed cases of tuberculosis. Kumar et al reported a positive Mantoux test in 21(30%) individuals, but only four (5.71%) individuals with confirmed tuberculosis. Habibullah et al (Year of publication and listing) found no statistically significant association between Mantoux positivity and tuberculous retinal vasculitis. In a case-control study of Eales disease in India, no statistically significant difference in Mantoux positivity was seen between cases and controls (Biswas et al 1997). This trend could apply to our study population as well.

In another study, 11 of 23 epiretinal membranes removed from eyes with Eales disease showed mycobacterium tuberculosis genome106 by nested PCR technique. However, culture of vitreous specimen did not show any growth of mycobacterium tuberculosis (Madhavan et al, 2000). Thus, the role of mycobacterium tuberculosis genome in the pathogenesis of Eales disease is yet to be ascertained.

Despite the available therapeutic measures, vitreous haemorrhages are still the primary cause for impaired vision in Eales’ disease. The first episode of vitreous hemorrhage usually clears but recurrent vitreous haemorrhages may lead to formation of traction bands and membranes in the vitreous and subsequent complications. In a study from Nepal (Malla et al, 1999), 40 eyes of forty patients with vitreous hemorrhage due to Eales’ disease underwent simple vitrectomy. In the previous similar study of a decade ago, vitreous haemorrhage was present in 29 eyes (32.5%) and vitrectomy was
done in 9 eyes (10.11%) with better and earlier visual outcomes. In the present study, vitreous haemorrhage was present in 23 eyes (22.54%) out of which 6 eyes (5.88%) underwent pars plana vitrectomy, the results of which are comparable to the study by Kumar and Abraham et al (proper citation required). Early vitrectomy has better prognosis as it gives early visual recovery and probably removes the noxious stimuli from the vitreous and the inflammatory debris.

Usually patients with Eales’ disease have extensive antero-peripheral non-perfusion with spare macula, but in our study, macular ischemia was also present leading to profound loss of vision. Capillary non-perfusion (12.74 %) was the most common angiographic finding followed by collaterals (7.84%) which is comparable to the previous study from this institute.

The most common stage of presentation in the 1998-2000 study was the stage of ischemia (40.44%) followed by stage of inflammation (28.08%). The results of the study done decade later show the stage of resolution (41.17%) and stage of ischemia (13.72%) as the two most common stages of presentation. Late presentation in our facility may be due to the improved treatment facility in the peripheral hospitals.

Howe et al (1994) believed that high doses of oral steroids should be used for the initial management of patients with idiopathic retinal vasculitis. Similarly in our study, patients presenting at the stage of inflammation, received oral corticosteroids (39.21%) and intravenous methylprednisolone (1.96%). Those presenting at the stage of ischemia, underwent retinal photocoagulation (21.56%). Intra-vitreal bevacizumab was given in 1 individual (1.96%) with active neovascularisation.

Among our study population, 66.7% cases had received treatment for retinal vasculitis prior to visiting our centre. This result is comparable to the previous study from this centre (64.9%).

Conclusion

Over the past decade, the profiles of Eales’ disease in a tertiary eye hospital in Nepal seem to be changing. Earlier, the disease showed significant male predominance but now the trend has changed, and females affected with Eales’ disease are emerging. Unilateral presentation has become more common than bilateral. Though vitreous hemorrhage is still the most common cause of visual loss, visual prognosis is usually good due to the advent of sophisticated vitrectomy instruments, laser photocoagulation techniques and early vitrectomy.

As the aetiopathogenesis of Eales’ disease still remains to be ascertained, it is essential that a multidisciplinary and multicentre collaborative approach would unravel the exact pathogenic mechanism.

References


Malla OK, Shrestha J, Dhital S, Miller S.D (1999). A retrospective study of vitrectomy on 40 eyes with vitreous haemorrhage due to Eales’ Disease. JNMA 38;14-17.


Source of support: nil. Conflict of interest: none
Visual outcome in open globe injuries

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Abstract

Objective: To determine the factors affecting the visual outcome in patients with open globe injuries of eye.

Materials and methods: In a prospective interventional study of consecutive patients with open globe injuries, the age, gender, place of injury, object causing injury and safety precautions taken were recorded. A detailed examination of the eye was done with a slit-lamp. X-rays of the orbits were taken in order to determine the presence of a foreign body. The injuries were classified as simple or complicated depending on the involvement of the pupil/iris, lens and retina. Finally, post operative best-corrected visual acuity at last follow up was noted.

Results: Fifty-two patients (52 eyes) were included in the study. The mean age of patients was 27.25±12.62 years (range 9-73 years). The majority of injuries occurred in the workplace (36.5%); nail (15.4%) and glass (15.4%) were the most common objects causing injury. Of those with good initial visual acuity, 90% maintained good visual outcome. Patients with corneal lacerations of less than 5 mm had significant good visual outcome. The number of corneal lacerations and visual axis involvement did not affect the visual outcome. Those with corneoscleral lacerations had significantly poor visual outcomes compared to those with corneal or scleral lacerations alone.

Conclusion: Predictors of good visual outcome are good initial visual acuity, a corneal laceration wound of less than 5mm, a deep anterior chamber, and simple lacerations. Age, gender, place of injury, object causing injury, presence of hyphema or intraocular foreign body, and the use of safety precautions did not affect the visual outcome.

Key-words: Penetrating eye injury, corneal laceration, sclera laceration, corneoscleral laceration, visual outcome.
mandatory regulations designed to reduce the incidence of eye trauma, such as protective glasses in the workplace, many people do not take these precautions. Ocular trauma due to accidents cannot be prevented. However, with increased public awareness about eye injuries, measures can be taken to prevent and avoid eye trauma.

The Pubmed literature search revealed only two published reports on perforating injuries of eye from Malaysia (Lai and Moussa 1992; Zainal and Goh 1997). Therefore, this study was undertaken to determine the visual outcome and factors which may affect the visual outcome after surgery in patients with penetrating eye injuries. It is expected that this study will inspire healthcare workers to develop strategies to educate the public about prevention of such injuries.

**Materials and methods**

A three-year prospective observational study of consecutive patients with penetrating injuries admitted to Tengku Ampuan Rahimah Hospital, Klang, Malaysia, was conducted. The age, gender of the patients, place of injury, object causing injury and safety precautions taken were recorded. After recording visual acuity, detailed examination of both anterior and posterior segments of the eye was done with a slit lamp. The ocular findings noted were initial visual acuity, length of corneal/sclera/corneoscleral laceration, anterior chamber depth, presence or absence of hyphaema, pupil shape and other irregularities such as iris prolapse, iridodialysis, sphincter tears, cataract and subluxation or dislocation of the lens. The fundus was examined for vitreous haemorrhage, commotio retinae or retinal detachment. An X-ray of the orbits was taken for all patients to determine the presence of intraocular foreign bodies. The injuries were classified as simple or complicated depending on the involvement of the pupil/iris, lens and retina. Extracapsular cataract extraction was done in the same sitting after repair of the laceration wound; and secondary posterior chamber intraocular lens implantation was done six weeks later. Following the primary repair of the laceration in the eye, the intraocular foreign body was localized using CT scan imaging as early as possible and then removed successfully. Patients were followed up for at least 3 months. Post-operatively, all patients were given broad spectrum antibiotic eye drops (ciprofloxacin) and corticosteroid eye drops (dexamethasone) for six weeks in tapering frequency. The corneal sutures were removed after six weeks. At eight weeks postoperatively, the best corrected visual acuity was noted. Taking into account the WHO criteria for vision categorization (WHO 1992), the visual outcome was classified into 3 categories: good vision (6/6-6/12), impaired vision (6/18-6/36) and poor vision (6/60-NPL).

**Statistics**: The data was analyzed with Statistical Package for Social Sciences (SPSS) program. The global chi-square test and Fisher’s exact test were used to determine the possible relation between two categorical variables. The Mc Nemar chi-square test was performed to determine change in vision between pre- and post-treatment. The independent t-test or the Mann-Whitney test was performed to determine difference of quantitative variables between two groups of categorical variables. A P value of < 0.05 was considered statistically significant.

**Results**

A total of 67 patients were admitted with penetrating eye injuries during the study period, of which 15 were excluded due to insufficient data in the case records; thus, the data from 52 patients were analyzed. Males (46, 88.5%) were more predominant than females (6, 11.5%), the male to female ratio being 7.6:1. The mean age of the patients was 27.25±12.62 years (range 9-73 years). Corneal laceration (32, 61.5%) was the most common clinical finding seen in our study (Table 1). Retinal detachment was not found in any patient. A single eye could present with more than one finding, hence, the number of clinical findings was greater than the number of eyes studied.
Table 1
Clinical findings in 52 patients with penetrating eye injuries

<table>
<thead>
<tr>
<th>Clinical finding</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corneal laceration</td>
<td>32</td>
<td>61.5%</td>
</tr>
<tr>
<td>Scleral laceration</td>
<td>6</td>
<td>11.5%</td>
</tr>
<tr>
<td>Corneoscleral laceration</td>
<td>14</td>
<td>26.9%</td>
</tr>
<tr>
<td>Flat anterior chamber</td>
<td>15</td>
<td>28.8%</td>
</tr>
<tr>
<td>Hyphema</td>
<td>15</td>
<td>28.8%</td>
</tr>
<tr>
<td>Pupillary sphincter tears</td>
<td>4</td>
<td>7.7%</td>
</tr>
<tr>
<td>Iridodialysis</td>
<td>4</td>
<td>7.7%</td>
</tr>
<tr>
<td>Iris prolapsed</td>
<td>5</td>
<td>9.6%</td>
</tr>
<tr>
<td>Cataract</td>
<td>11</td>
<td>21.1%</td>
</tr>
<tr>
<td>Intraocular foreign body</td>
<td>8</td>
<td>15.4%</td>
</tr>
<tr>
<td>Vitreous hemorrhage</td>
<td>2</td>
<td>3.8%</td>
</tr>
</tbody>
</table>

At the time of admission the initial vision was good in 11 (21.1%) patients, impaired in 15 (28.8%) and was poor in 26 (50%). Following surgery, many patients had an improvement in visual acuity, which was good in 36 (69.2%), impaired in 3 (5.8%) and poor in 13 (25%) patients (Table 2). There was a significant (p<0.0001) difference between initial visual acuity and visual outcome after surgery.

Table 2
Initial visual acuity and visual outcome after surgery

<table>
<thead>
<tr>
<th>Initial vision</th>
<th>Visual outcome after surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good vision</td>
</tr>
<tr>
<td>Good Vision</td>
<td>10</td>
</tr>
<tr>
<td>Impaired vision</td>
<td>13</td>
</tr>
<tr>
<td>Poor Vision</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>36 (69.2%)</td>
</tr>
</tbody>
</table>

(McNemar test p<0.0001)

The time interval from the accident to the surgery was less than 6 hours in 39 (75%) patients. The time interval from trauma to surgery did not affect significantly (p=0.720) the visual outcome after surgery (Table 3).

Table 3
Time interval from the accident to surgery and visual outcome after surgery

<table>
<thead>
<tr>
<th>Time interval (hours)</th>
<th>Good vision</th>
<th>Impaired vision</th>
<th>Poor vision</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>12</td>
<td>0</td>
<td>7</td>
<td>19</td>
</tr>
<tr>
<td>3-6</td>
<td>14</td>
<td>2</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>6-12</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>12-24</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>&gt;24</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>3</td>
<td>13</td>
<td>52</td>
</tr>
</tbody>
</table>

(Chi-square=5.345, df=8, p=0.720)

The most common place of injury was found to be the workplace (n=19, 36.5%), followed by road accidents (n=17, 32.7%). The place of accident did not significantly affect (p=0.592) the visual outcome after surgery (Table 4).

Table 4
Place of injury and visual outcome after surgery

<table>
<thead>
<tr>
<th>Place of injury</th>
<th>Good vision</th>
<th>Impaired vision</th>
<th>Poor vision</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>13</td>
<td>0</td>
<td>2</td>
<td>15 (28.8%)</td>
</tr>
<tr>
<td>Road</td>
<td>10</td>
<td>1</td>
<td>6</td>
<td>17 (32.7%)</td>
</tr>
<tr>
<td>Work</td>
<td>12</td>
<td>2</td>
<td>5</td>
<td>19 (36.5%)</td>
</tr>
<tr>
<td>School</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1 (1.9%)</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>3</td>
<td>13</td>
<td>52 (100.0%)</td>
</tr>
</tbody>
</table>

(Chi-square=4.632, df=63, p=0.592)

The object causing injury was only known in 75% of the cases, which are summarized in the table below (Table 5). There was no significant association (p=0.730) between the object causing injury and visual outcome after surgery.
Safety precautions were taken in only 6 cases (11.5%), of which 5 (9.6%) used seatbelts and 1 (1.9%) had used goggles. The rest of the patients did not take any safety precautions (Table 6). The use of safety precautions did not significantly affect (p=0.395) postoperative visual outcome.

### Table 6

<table>
<thead>
<tr>
<th>Safety precaution taken</th>
<th>Good vision</th>
<th>Impaired vision</th>
<th>Poor Vision</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seatbelt</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Goggles</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Nil</td>
<td>33</td>
<td>3</td>
<td>10</td>
<td>46</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>3</td>
<td>13</td>
<td>52</td>
</tr>
</tbody>
</table>

(Chi-square=6.948, df=10, p=0.730)

Corneal lacerations were present in 32 (61.5%) patients. After surgery, 27 (84.4%) had good vision (Table 7). Corneal lacerations were significantly (p<0.001) associated with good postoperative visual outcome.

### Table 7

<table>
<thead>
<tr>
<th>Corneal laceration wound and visual outcome after surgery</th>
<th>Good vision</th>
<th>Impaired vision</th>
<th>Poor Vision</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td>9</td>
<td>1</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Present</td>
<td>27</td>
<td>2</td>
<td>3</td>
<td>32</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>3</td>
<td>13</td>
<td>52</td>
</tr>
</tbody>
</table>

(Chi-square=10.83, df=1, p<0.001)

There was visual axis involvement in only 7 of 32 (21.9%) patients with corneal lacerations, and 5 of them had good vision post-operatively. Multiple lacerations were seen in 3 (9.3%) of the 32 patients and in all cases the post-operative improvement of vision was good (6/6-6/12). Of 32 patients with corneal lacerations, 27 had good visual outcome with a mean corneal laceration length of 4.48±2.47 mm (range 1-12 mm); 2 had impaired visual outcome with a mean corneal laceration length of 6.00±2.83 mm (range 4-8 mm); and 3 had poor visual outcome with a mean corneal laceration length of 8.67±1.53 mm (range 7-10 mm). The visual outcome was significantly (p=0.037) associated with corneal laceration length of less than 5 mm.

Scleral laceration alone was present in 6 (11.5%) of 52 patients. After surgery, 3 (50.0%) had good vision (Table 8). Scleral lacerations were not significantly (p=0.378) associated with visual outcome after surgery.

### Table 8

<table>
<thead>
<tr>
<th>Scleral laceration wound and visual outcome after surgery</th>
<th>Good vision</th>
<th>Impaired vision</th>
<th>Poor Vision</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td>33</td>
<td>2</td>
<td>11</td>
<td>46</td>
</tr>
<tr>
<td>Present</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>3</td>
<td>13</td>
<td>52</td>
</tr>
</tbody>
</table>

(Chi-square=1.92, df=2, p=0.378)

Only 1 patient had multiple scleral lacerations. The remaining 5 had lacerations of 7.3±4.65mm with a range of 3.5 to 15mm. In our study, mean scleral
Laceration length was not significantly associated with post-operative vision improvement (p=0.089).

Corneo-scleral lacerations were seen in 14 (26.9%) of the 52 patients of whom 6 (42.8%) had good vision after surgery (Table 9). Corneo-scleral lacerations were significantly (p=0.003) associated with poor visual outcome in our study.

**Table 9**
Corneo-scleral laceration wound and visual outcome after surgery

<table>
<thead>
<tr>
<th>Corneo-scleral laceration</th>
<th>Good vision</th>
<th>Impaired vision</th>
<th>Poor vision</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td>30</td>
<td>3</td>
<td>5</td>
<td>38</td>
</tr>
<tr>
<td>Present</td>
<td>6</td>
<td>0</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>3</td>
<td>13</td>
<td>52</td>
</tr>
</tbody>
</table>

(Fisher Exact Test: p=0.003)

A deep anterior chamber was noted in 21 (40.4%) patients (Table 10); and was significantly associated with good postoperative visual outcome (p=0.012).

**Table 10**
Anterior chamber depth and visual outcome after surgery

<table>
<thead>
<tr>
<th>Anterior chamber</th>
<th>Good vision</th>
<th>Impaired vision</th>
<th>Poor vision</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat</td>
<td>6</td>
<td>0</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Shallow</td>
<td>12</td>
<td>1</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Deep</td>
<td>18</td>
<td>2</td>
<td>1</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>3</td>
<td>13</td>
<td>52</td>
</tr>
</tbody>
</table>

(Chi-square=16.331, df=6, p=0.012)

Hyphema was present in 15 (28.8%) of patients (Table 11) and its presence did not significantly affect the visual outcome after surgery (p=0.051).

**Table 11**
Hyphema and visual outcome after surgery

<table>
<thead>
<tr>
<th>Hyphema</th>
<th>Good vision</th>
<th>Impaired vision</th>
<th>Poor vision</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td>28</td>
<td>3</td>
<td>6</td>
<td>37</td>
</tr>
<tr>
<td>Present</td>
<td>8</td>
<td>0</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>3</td>
<td>13</td>
<td>52</td>
</tr>
</tbody>
</table>

(Chi-square=5.994, df=2, p=0.051)

Intraocular foreign body (IOFB) was present in 8 (15.4%) patients (Table 12), of which 1 was glass and the rest were metallic. Presence of IOFB did not significantly affect the postoperative visual outcome (p=0.549).

**Table 12**
Intraocular foreign body and visual outcome after surgery

<table>
<thead>
<tr>
<th>Intraocular foreign body</th>
<th>Good vision</th>
<th>Impaired vision</th>
<th>Poor vision</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td>31</td>
<td>3</td>
<td>10</td>
<td>44</td>
</tr>
<tr>
<td>Present</td>
<td>5</td>
<td>0</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>3</td>
<td>13</td>
<td>52</td>
</tr>
</tbody>
</table>

(Chi-square=1.198, df=2, p=0.549)

Penetrating injuries with irregular pupils, sphincter tears, iris prolapse, anterior synechiae, iridodialysis, cataract, commotio retinae, retinal detachment, vitreous haemorrhage and macular scar were considered to be complicated injuries. Lacerations without the above findings were considered simple lacerations. Thirty-five out of 52 cases (67.3%) had complicated lacerations in our study (Table 13); and they were significantly (p=0.014) associated with poor vision.

**Table 13**
Simple vs complicated lacerations and visual outcome after surgery

<table>
<thead>
<tr>
<th>Type of laceration</th>
<th>Good vision</th>
<th>Impaired vision</th>
<th>Poor vision</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple</td>
<td>16</td>
<td>1</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Complicated</td>
<td>20</td>
<td>2</td>
<td>13</td>
<td>35</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>3</td>
<td>13</td>
<td>52</td>
</tr>
</tbody>
</table>

(Chi-square=16.331, df=2, p=0.012)

**Discussion**

Tengku Ampuan Rahimah Hospital, Klang is located 25 km from Kuala Lumpur, the capital city of Malaysia. It is a referral center for the state of Selangor, which has a population of 4.2 million. There are three more government tertiary medical
centers, one private eye hospital and many private eye specialists in Kuala Lumpur. Therefore, all patients with ocular injuries might not have come exclusively to the Klang hospital, which could be the reason for the small number of patients in our study.

Penetrating eye injuries are one of the important causes of severe visual impairment. In spite of new microsurgical techniques, the visual prognosis following surgery depends on the severity of the primary injury. Work-related penetrating eye injuries are an important cause of visual disability and blindness. The loss of a skilled worker is expensive for the employer, because they must not only pay compensation, but also train another person or acquire another equally skilled person to replace the injured person. When the person cannot earn regular wages following an eye injury due to blindness, he/she becomes dependent on family. Therefore, the prevention of ocular injuries is a worthwhile investment for both employees and the company.

In our study of open globe injuries, accidents in the workplace were the most common (36.5%). The US National Eye Trauma Registry investigated the characteristics of various types of eye injuries in the workplace and found that 22% of all penetrating injuries between 1985 and 1991 were work-related (Dannenberg 1992). A 10-year study in Gwent from 1976 to 1985 reported that in adults, industrial accidents (53%) were the most common cause of penetrating eye injuries (Wykes 1988).

Glass (15.4%) and nails (15.4%) were the most common objects responsible for ocular injury in our study (Table 5). Broken glass pieces, knives and hammering or drilling nails were the most common objects causing ocular injury in the USA (Dunn et al 1992).

Ocular trauma remains an important cause of avoidable and predominantly monocular visual morbidity; and the majority of patients did not take proper safety precautions (Desai et al 1996). Even though the use of safety precautions did not affect the final visual acuity, for all practical purposes safety precautions are advised to prevent injuries, be it ocular or otherwise.

It is well known that although provided, protective eye goggles are not widely used in the industrial setting (Macewen 1989). However, there has been a change in attitudes of employees working in manufacturing industries towards the use of protective measures as reported by Parvinen (1984).

Victims of road traffic accidents are susceptible to eye damage as their heads move downwards onto the jagged, lower remnants of a shattered windshield. Australia led the way in countering road traffic accidents by introducing seat belt legislation in 1971 (Keightley 1983). Hall et al (1985) showed that an abrupt drop in eye perforations coincided with the introduction of seatbelt legislation in Wessex.

The importance of laminated rather than toughened windshield in the prevention of eye injuries in road traffic accidents was emphasized by Mackay et al (1980). The use of improper spectacles can potentially convert blunt trauma into penetrating ocular trauma. Feigelman et al (1983) found that polycarbonate or plastic lenses never break into small pieces, therefore, the use of polycarbonate protective glasses can prevent ocular injuries. Desai et al (1996) found that home was the most frequent place for blinding injuries to occur; and they recommend that health education and safety strategies should target the home.

The majority of patients were treated within 24 hours in our study. Timing of surgical intervention did not significantly affect the visual outcome in our study, and the same was reported by Zainal et al (1997).

Initial visual acuity has been reported as an important indicator of visual outcome in ocular trauma (Punnonen and Laatikainen 1989) and penetrating eye injuries (Hunt 1996). The same was found to be true in our study (Table 2).

We found that the patients with corneal lacerations, regardless of the number or visual axis involvement
tended to have good visual outcomes, when compared to those with scleral lacerations. Thompson et al (1997) and Zainal et al (1997) had similar findings.

In our study, visual outcome was good in patients with corneal lacerations of less than 5mm. Hunt (1996) found good visual outcome with corneal lacerations of less than 10 mm, while Snell (1943) did not observe such a correlation between corneal laceration length and visual outcome.

The presence of hyphema did not affect the visual outcome in our study. Barr (1983) has reported the absence of hyphema as a prognostic factor in corneo-scleral lacerations.

The presence of IOFB did not affect the visual outcome in our study. Canavan(1980), Punnonen (1989), Hunt(1996) and Brinton (1982) share the same opinion that IOFB does not affect the visual outcome. Chisholm (1964) concluded that sterile IOFBs had a better prognosis when the presence compared to contaminated ones.

In our study, 13 out of 35 patients with complicated laceration had poor visual outcome while 2 had impaired visual outcome (Table 13). Hunt (1996), Snell (1943) and Patel (1991) have reported that injuries without prolapse of intraocular tissues have the best prognosis. Punonen et al (1989) found that 64% of eyes with uveal and/or vitreous prolapse remained blind as compared to 19% of eyes without vitreous prolapse.

**Conclusions**

Penetrating eye injuries are potentially dangerous to vision, but with modern surgical techniques, patients are likely to achieve reasonably good visual outcomes. Predictors of good visual outcome are good initial visual acuity, corneal lacerations of less than 5mm, deep anterior chamber, and simple lacerations. Age, gender, place of injury, object causing injury, number of corneal lacerations, visual axis involvement, presence of hyphema or intraocular foreign body and the use of safety precautions did not affect the visual outcome in our study. Knowing the predictors of visual outcome will aid in counseling eye trauma patients and their families. The number of patients was small in our study. Therefore, we recommend a multi center study with a large number of patients to confirm the above predictors for good visual outcome in cases of penetrating ocular injuries.

**References**


Source of support: nil. Conflict of interest: none
Expression of oxidative stress in metastatic retinoblastoma- a comparative study

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2Department of Biochemistry, Calcutta University, India

Abstract

Objective: To compare oxidative stress between primary retinoblastoma and retinoblastoma with distant metastasis.

Patients and methods: Forty consecutive patients presented with primary retinoblastoma and the same number of patients presented with distant metastasis, attending the outpatient department of our hospital between August 2002 and April 2005. All the patients with retinoblastoma underwent a standard metastasis workup and were subsequently categorized into two groups (without metastasis and with metastasis). Venous blood samples were drawn from each patient. After proper centrifugation, serum was collected and antioxidant enzymes and reactive oxygen species (ROS) were assayed.

Main outcome measures: Serum collected from the patients was subjected to biochemical assay of the antioxidant enzymes (superoxide dismutase, catalase and peroxidise) and ROS to determine any difference in enzyme activity between the two groups.

Results: Antioxidant levels were found to be less in the metastasis group as compared to the primary intraocular retinoblastoma group (p<0.05). Mean ROS activity was found to be increased in metastatic group (p<0.05).

Conclusion: The decreased antioxidant enzymes level along with increased ROS activity in patients with metastatic retinoblastoma reflect increased oxidative stress as compared to primary intraocular retinoblastoma patients.

Key-words: Retinoblastoma, antioxidant enzymes, reactive oxidant species, oxidative stress

Introduction

Oxidants are chemical products that help in oxidation. Oxidative damage to a cell may lead to loss of barrier function, which in turn will lead to oedema, electrolyte imbalance and eventually, cellular dysfunction. All of them will eventually lead to cellular dysfunction (Tolbert, 1981). Oxidants are not only implicated in the pathogenesis of chronic diseases like malignancy, age related macular degeneration and cataracts, but also in a variety of acute conditions like acute myocardial infarction, acute renal failure, adult respiratory distress syndrome and even in acquired immunodeficiency syndrome (AIDS).
Oxidant burden in the tissue can be measured by electron spin resonance spectroscopy, gas-liquid chromatography, mass spectrometry, high performance liquid chromatography and other enzymatic and immuno-reactive procedures. Additionally, by estimating the levels of antioxidants such as superoxide dismutase, catalase and peroxidase in serum, cell culture and tissue mass, we can assess levels of oxidative stress. Oxidative stress in the human body is a delicate balance between activities of antioxidant enzymes and reactive oxidant species (ROS). We conducted this study to compare the burden of oxidative stress as reflected in the sera of two groups of retinoblastoma patients.

**Patients and methods**

In this study, 80 consecutive patients with a clinical diagnosis of retinoblastoma who presented at the pediatric and general ophthalmology outpatient departments of our institute between August 2002 and April 2005 were recruited for the study. Each of the patients underwent standard examination protocol as described below. Based on clinical and investigational data, the total patient pool was divided into two groups:

**Group A**: Patients with primary intraocular retinoblastoma

**Group B**: Retinoblastoma with metastasis

Blood samples were collected from each of the patients and estimation of three antioxidant enzymes (superoxide dismutase, catalase and peroxidase) and ROS were performed at the Department of Biochemistry, Calcutta University.

Clinical and investigational workup included: 1. Complete ocular examination including indirect ophthalmoscopy, 2. Routine complete haemogram, stool examination, 3. CT scan of brain and orbit, 4. Whole abdomen Ultrasonography, 5. Chest X-ray, 6. CSF cytology in selected cases, and 7. Serum assay of superoxide dismutase, catalase, peroxidase and ROS.

Informed consent was taken from the legal guardian of each patient. Institutional ethical committee approval was obtained before recruitment of the first patient.

**Collection of blood**: Using a disposable syringe, 2-3 ml of blood was collected by venepuncture in plastic tubes without any anticoagulant. The tubes were centrifuged for 10 minutes at 2800 rpm. Supernatant serum was pipetted out with a micropipette, transferred to an Eppendorf tube, and stored in deep freeze. Biochemical estimation was performed from these sera in the following methods.

**Estimation of superoxide dismutase**: Superoxide dismutase activity was measured by the method employed by Marklund and Marklund (1974).

**Reagents**:  
(i) Tris cacodylate buffer (50 mM, pH 8.2 with 1 mM diethylene triamine pentaacetic acid) 20 ml of 50 mM tris (mol wt 121.14) and 8 ml of 50 mM cacodylic acid (mol wt 137.88) gave a pH of 8.2.

(ii) Pyrogallol solution: Dissolve 0.00757 grams of pyrogallol in 20 mL water.

Procedure: 10 – 50 mL of serum was taken and buffer was added to make a total volume of 0.95 mL in 12 x 100 mm tubes. This was mixed thoroughly. The solutions were incubated at room temperature for 1 hour during which time the increasing optic density (OD) due to turbidity reached a steady state in all samples. 0.05 mL of 4 mM pyrogallol solution was added, mixed 6 times, and the change in O.D. was recorded at 420 nm at room temperature in order to attain 60-80% inhibition of pyrogallol auto-oxidation in alkaline solution (pH 8.2).

**Catalase estimation**: Catalase activity was assayed by measuring the rate of breakdown of H$_2$O$_2$ at 240 nm according to the method of Luck (1965).

1 mL reaction mixture contained 0.05 M potassium phosphate buffer (pH 7), 11.6 mM H$_2$O$_2$ and 50 mL of enzyme. Catalase activity was calculated
based on an extinction coefficient 43.1 M$^{-1}$ cm$^{-1}$ for H$_2$O$_2$ at 240nm and expressed as nmols of H$_2$O$_2$ consumed/min/mg of protein.

<table>
<thead>
<tr>
<th>Buffer</th>
<th>H$_2$O$_2$</th>
<th>Enzyme</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.9</td>
<td>1 ml</td>
<td>100 mL</td>
</tr>
</tbody>
</table>

**Peroxidase assay:** Peroxidase activity was estimated according to Chen and Asada (1989). The assay mixture (3mL) contained 50 mM potassium phosphate buffer (pH6), 20 mM O-dianisidine, 0.1 mM H$_2$O$_2$ and 10µL of enzyme extract. The peroxidase activity was calculated using an extinction coefficient of O-dianisidine (11.3m M$^{-1}$ cm$^{-1}$) at 460nm and expressed as µmol O-dianisidine oxidized/min/mg of protein.

<table>
<thead>
<tr>
<th>Buffer/H$_2$O$_2$</th>
<th>O-dianisidine</th>
<th>Enzyme</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.9</td>
<td>50 µL</td>
<td>50 µL</td>
</tr>
</tbody>
</table>

**Estimation of ROS:** The ROS activity was measured using the method employed by Aitken (1992). 400µL of sera was mixed with luminal (5-amino2,3-dihydro1,4-phthalazinedione) prepared as a 25mM stock in DMSO(Dimethyl sulphoxide) together with 8µL of horse-radish peroxide. Levels of ROS were determined by measuring chemiluminescence for 15 minutes and results were expressed in counted photons per minute (c.p.m).

Data obtained were documented and analysed. The Student’s t-test was used to ascertain the level of significance between two groups. A p-value of less than 0.05 was considered statistically significant.

**Results**

Out of total 40 cases of primary intraocular retinoblastoma 25 are male patients (62.5%) and 15 are female patients (37.5%). The sex ratio is 1.67. Slight male predominance in this study is probably due to selection bias. According to Apple and Rabb (2000), no sexual predilection has been reported. Most numbers of cases (total 19, 23%) belong to 1.5 to 2-year age group.

The mean serum superoxide dismutase level in cases with metastatic retinoblastoma was 25.232 (SEM= ± 0.527), whereas the same in the primary intraocular retinoblastoma group was 16.638 (SEM= ± 0.633). Since these data were in terms of unit of O.D. change at 420 nm per 50% inhibition of pyrogallol auto-oxidation in alkaline media, higher the value lower was the serum SOD activity. So it was readily apparent that in each of the cases value of serum superoxide dismutase was lower in patients of metastatic retinoblastoma when compared to the same level in intraocular group[p<0.05].

The mean serum catalase level in cases with metastatic retinoblastoma was 0.516 (SEM= ± 0.0077). The mean serum catalase level in the other group was 0.623 (SEM= ± 0.0046). It was apparent that the mean serum catalase level in patients of metastatic retinoblastoma was lower than the same level in primary group [p<0.05].

The mean serum peroxidase level in primary group was 0.145 and the standard error of mean was ±0.0030. The mean serum peroxidase level in cases with metastatic retinoblastoma was 0.115 and the standard error of mean was ± 0.0018 (p<0.05).

Mean serum ROS activity in metastatic group was 4346662±2886889 and the same activity in primary tumor group was 1832010±1798019 (p<0.05).

**Discussion**

A free radical is any species that contains one or more unpaired electrons (Halliwell 1989). Though some oxidizing agents such as hydrogen peroxide (H$_2$O$_2$), hypochlorous acid (HOCl) are not radicals, they still can become involved in free radical reactions. The term reactive oxidant species (ROS) includes not only the oxygen radicals (O$_2^\cdot$, OH), but also the compounds such as H$_2$O$_2$ and HOCl (Southorn, 1988). Antioxidants are compounds that remove or prevent the formation of reactive oxygen species as therapeutic agents (Curnutte and Baboir, 1987). When generated at a low (physiological) level, ROS can perform useful functions in human body, but at a higher concentration, they are cytotoxic (Maly 1990).
If a radical reacts with a non-radical, another free radical is produced. This property enables free radicals to participate in chain reactions. Radicals may also serve as oxidants and reductants. Peroxidation of membrane lipid produces malonaldehyde as a by-product. As previously mentioned, the conditions such as photochemical reactions, radiation injury, drugs, hypoxia, inflammatory conditions, viral infections (including H.I.V), and carcinogenic process produce abundant reactive oxygen species in human body resulting in a state of oxidative stress.

Our body has antioxidant defence mechanisms to handle this oxidative burden. Hence, direct and indirect evidence of oxidant stress may be ascertained by either detection of radicals themselves or by detection of biological damage caused by these radicals (like malonaldehyde, thymine glycol, 5-hydroxymethyluracil etc.) or by assessing the antioxidant defence mechanism (like SOD, catalase, peroxidase, ceruloplasmin and transferring).

Antioxidants are the chemical products nullifying the effects of oxidants in the body. Depending upon their location, they are classified into extracellular and intracellular components. The major extracellular antioxidant components are ceruloplasmin, uric acid, glucose, alpha tocopherol and albumin.

Most of the intracellular defence mechanisms in the body are in the form of enzymes like superoxide dismutase, peroxidase and catalase. Superoxide dismutase protects cells against reactive free radicals produced by ionizing radiation or other mechanisms, such as carcinogenesis. This enzyme catalyzes the dismutation of the superoxide anion into O₂ and H₂O₂ (Weisiger and Fridovich, 1973). There are three types of SOD found in mammals. CuZn-SOD is present in cytosol (Tyler 1975). Mn-SOD is present in mitochondrial matrix (Southorn and Powis, 1988).

Two antioxidant enzymes in the body, glutathione peroxidase and catalase mediate the catalytic breakdown of hydrogen peroxide. These two enzymes act at two different concentrations of hydrogen peroxide in the body. At low hydrogen peroxide concentration, the role of enzyme glutathioneperoxidase (GPO) is activated ( Paller et al,1984). At high concentration of hydrogen peroxide, the enzyme catalase is activated to remove it (Salim 1993).

Malignant conversion of a normal cell occurs in three stages - initiation, promotion and progression. Oxidation may involved in all the three stages of carcinogenesis process. Oxidants may produce genetic lesions, which are toxic to the cell itself. Rearrangement of promoter regions, deletions and inactivation or loss of tumor suppressor gene may lead to initiation of the carcinogenic process. In retinoblastoma, tumor suppressor gene is inactivated by structural alteration of a vital base pair, commonly C-G (Cytosine-Guanine) in retinoblastoma. When cellular genes are converted to oncogenes, G-C and A-T base pairs present two vulnerable targets for attack by oxidants. Copper ion bound to DNA may augment the oxidative DNA damage. Oxidative stress may also produce 5hydroxy cytosine. Thymine glycol is toxic to DNA if not excised by a DNA-glycosylate prior to replication. The cleavage of this base can give rise to abnormal sites, which in turn may enhance the mutagenesis (Albeno et al, 1991).

Out of total 40 cases of primary intraocular retinoblastoma 25 are male patients (62.5%) and 15 are female patients (37.5%). The sex ratio is 1.67. Slight male predominance in this study is probably due to selection bias. According to Apple and Rabb (2000), no sexual predilection has been reported. Most numbers of cases (total 19, 23%) belong to 1.5 to 2-year age group. This was supported by Abramson (1985).

In all 40 cases of metastatic retinoblastoma the serum SOD level was low when compared to the primary intraocular retinoblastoma group [p<0.05]. This finding tallies with that of Oberley (1979) and Weis (1980), who found a low CuZnSOD activity.
in tumor cells as well as a low MnSOD level in malignant cell-lines. In the metastatic retinoblastoma group, serum peroxidase and catalase activity is lower than those in the primary intraocular retinoblastoma group \[p<0.05\]. These observations are identical to the findings reported by Batko et al (1996) who found a low catalase activity in neoplastic tissue. Asano et al (1985) also reported an identical reduction of catalase activity in carcinomatous tissues. However, the findings of the present study did not tally with that produced by Asano et al (1985) who reported a higher peroxidase level in tumor tissues.

Cytotoxicity and growth stimulation are intimately related in oxidant induced carcinogenesis process. By stimulating terminal differentiation, promoters may induce compensatory proliferation. Here, the initiated cells proliferate to fill the void left by the removal of their normal counterpart. Gupta et al (1984) and Vallyathan (1998) demonstrated increased ROS activity associated with carcinogenesis. Cellular defences may alter the level of toxicity caused by ROS and play a preventative role against carcinogenesis, according to Kemsler et al (1984) and Oberley et al (1997).

**Conclusion**

Our study highlights the increased level of oxidative stress in patients with the metastatic retinoblastoma. Increased ROS activity coupled with decreased level of antioxidant enzymes support the oxidative stress mediated injury to cellular structures in these patients.

**References**


Source of support: nil. Conflict of interest: none
Gender equity in eye health of Nepal: A hospital-based study

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Abstract

Introduction: There is a lack of literature examining the impact of gender on access to eye care in developing countries.

Objective: To assess the differences in access to eye care between females and males, in the urban hospital setting and in rural outreach clinics.

Materials and methods: A retrospective study was designed to review the patients who sought eye care at a tertiary level eye care institute and its rural outreach clinics from 2006 to 2009 in Nepal. Data were retrieved from clinical records.

Results: In the hospital, females accounted for 50.8% of patients receiving outpatient care and 48.3% of patients receiving surgical care. In rural outreach clinics, females accounted for 56.1% of clinic patients and 51.5% of patients undergoing surgery. Fewer girls than boys aged 0-14 years (44.3%) sought clinical care at the hospital.

Conclusion: Females account for approximately half of the hospital eye care services in Nepal. More females seek care at rural outreach clinics than at the urban hospital. However, given the female burden of disease in Nepal, there is still much improvement to be made in this area of care.

Key words: access, blindness, gender, equity, eye health, Nepal

Introduction

Globally, women account for two of every three blind people (Abou-Gareeb et al, 2001). In many low- and middle-income countries around the world, women have less access to eye care, particularly cataract surgical coverage (Lewallen et al., 2009). Inequality between the genders also appears to affect children, with lower rates of access to eye care documented in girls compared to boys in some African countries (Bronsard & Shirima, 2009).

The impact of gender on access to eye care in the Nepalese setting has not been extensively described in existing literature. Thus, it is important to detect and characterize any differences in access to eye care between the sexes in order to inform public health strategy in the interests of equitable care for all. The Nepal Gender and Eye Health Group (NGEHG) conducted a study reviewing the status of the gender and eye health in Nepal. They found that the gender disparity was profound in utilization of services and pervasive in all regions of Nepal (Upadhyay, 2010).

The British Columbia EIO (Epidemiologic and International Ophthalmology) was the first...
organization to undertake a project focused on reducing gender inequity in healthcare in 2000. Gender focus service especially gender and blindness was initiated by British Columbia Centre for in 2000. Since then, various organizations have committed to improving the gender gap in the world, including Nepal. In Nepal, Eye health care is mainly supported by non-government or private organizations. Community based interventions have been implemented in some parts of the country to reduce the gender gap (SEVA foundation, Report 2005). A change in the prevalence of female blindness in the Lumbini Zone, as recorded in a rapid assessment of avoidable blindness survey, suggests that these interventions are having an effect on female populations.

In a country where 80% of its land is inaccessible by road, it is important to look for differences in access for men and women across urban and rural settings.

The Tilganga Institute of Ophthalmology (TIO) is a tertiary eye care centre in Kathmandu, the urban capital city of Nepal. It also provides eye care to rural areas outside the Kathmandu Valley through its community eye hospital, community eye centres, satellite clinics, outreach microsurgical eye clinics (OMECs) and screening eye clinics. It is a not-for-profit organization that treats all patients regardless of their ability to pay.

Subjects and methods
A retrospective study was conducted of all 631,981 patients accessing eye care at the TIO and its outreach clinics, from 2006 to 2009.

Age and gender data were collected from the electronic records of the TIO. Data were collected in special sheet designed for this purpose. Descriptive analysis was performed using a Microsoft Excel 2007.

Ethical approval was granted by the Institutional Review Committee of Tilganga Institute of Ophthalmology and researchers agreed to uphold all ethical aspects of the Helsinki declaration.

Results
At the TIO site in Kathmandu, 279,392 of the 549,490 patients (50.8%) accessing outpatient care were female. 25,138 of the 52,188 patients (48.2%) receiving surgical care were female. The proportion of the presentation at the outpatient department and operation was nearly comparable in all years between 2006 and 2009 at the TIO (Table 1).

<table>
<thead>
<tr>
<th>Year</th>
<th>Clinic Male</th>
<th>Clinic Female</th>
<th>Clinic Total</th>
<th>Surgery Male</th>
<th>Surgery Female</th>
<th>Surgery Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>N</td>
<td>Total</td>
<td>N</td>
<td>N</td>
<td>Total</td>
</tr>
<tr>
<td>2006</td>
<td>60557</td>
<td>62018</td>
<td>122575</td>
<td>4384</td>
<td>4325</td>
<td>8709</td>
</tr>
<tr>
<td>2007</td>
<td>68501</td>
<td>69111</td>
<td>137612</td>
<td>6901</td>
<td>6350</td>
<td>13257</td>
</tr>
<tr>
<td>2008</td>
<td>67000</td>
<td>70092</td>
<td>137092</td>
<td>7470</td>
<td>6768</td>
<td>14238</td>
</tr>
<tr>
<td>2009</td>
<td>74040</td>
<td>78171</td>
<td>152211</td>
<td>8289</td>
<td>7695</td>
<td>18984</td>
</tr>
<tr>
<td>Total</td>
<td>270,098</td>
<td>279,392</td>
<td>549,490</td>
<td>27,050</td>
<td>25,138</td>
<td>52,188</td>
</tr>
</tbody>
</table>

In rural areas, 19,838 of 35,331 patients presenting to outreach clinics (56.1%) were female. Gender disaggregated data were not available for outreach clinics from 2006-07. Instead, analysis was based on available data from 2008-09. 6,278 of 12,182 patients presenting for outreach surgical procedures were female (51.5%), the majority of which were cataract removal procedures. Female accounted for roughly one-half of clinical and surgical services provided at out-reach clinics, except in 2007, when they accounted for 54.1% of all surgeries (Table 2).
Table 2

Utilization of service in outreach clinics (rural setting)

<table>
<thead>
<tr>
<th>Year</th>
<th>Clinic</th>
<th></th>
<th></th>
<th>Surgery</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>2006</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2007</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2008</td>
<td>6986</td>
<td>42.8</td>
<td>9341</td>
<td>57.2</td>
<td>16327</td>
<td>1226</td>
</tr>
<tr>
<td>2009</td>
<td>8507</td>
<td>40.1</td>
<td>10497</td>
<td>49.5</td>
<td>19004</td>
<td>1189</td>
</tr>
<tr>
<td>Total</td>
<td>15,493</td>
<td>43.9</td>
<td>19,838</td>
<td>56.1</td>
<td>35,331</td>
<td>5,904</td>
</tr>
</tbody>
</table>

In the urban setting, females accounted for approximately half of all presentations to clinical and surgical eye care, as well as for surgical care at outreach programs (Figure 1). Females (56.1%) accounted for more presentations to clinical care at rural outreach clinics than males (43.9%).

Figure 1

Utilization of eye care in different settings by gender

When disaggregated by age, females slightly outnumbered males in presentations to urban clinics in all age groups except for 0-14 years. In this youngest age group, fewer girls (44.3%) presented to clinical care than boys (55.7%) (Table 3 and Figure 2).

Table 3

Utilization of service at TIO by age and gender

<table>
<thead>
<tr>
<th>Age group</th>
<th>2006</th>
<th></th>
<th></th>
<th>2007</th>
<th></th>
<th></th>
<th>2008</th>
<th></th>
<th></th>
<th>2009</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (%)</td>
<td>F (%)</td>
<td>T (%)</td>
<td>M (%)</td>
<td>F (%)</td>
<td>T (%)</td>
<td>M (%)</td>
<td>F (%)</td>
<td>T (%)</td>
<td>M (%)</td>
<td>F (%)</td>
</tr>
<tr>
<td>0-14</td>
<td>55.8</td>
<td>44.2</td>
<td>14.7</td>
<td>55.4</td>
<td>44.7</td>
<td>13.7</td>
<td>55.7</td>
<td>44.3</td>
<td>13.8</td>
<td>55.9</td>
<td>44.1</td>
</tr>
<tr>
<td>15-29</td>
<td>50.0</td>
<td>50.0</td>
<td>27.9</td>
<td>50.2</td>
<td>49.8</td>
<td>26.6</td>
<td>48.9</td>
<td>51.1</td>
<td>26.2</td>
<td>48.9</td>
<td>51.1</td>
</tr>
<tr>
<td>30-39</td>
<td>49.0</td>
<td>51.0</td>
<td>12.3</td>
<td>48.9</td>
<td>51.1</td>
<td>12.5</td>
<td>47.4</td>
<td>52.6</td>
<td>12.3</td>
<td>47.7</td>
<td>52.3</td>
</tr>
<tr>
<td>40-49</td>
<td>49.1</td>
<td>50.9</td>
<td>11.0</td>
<td>50.2</td>
<td>49.8</td>
<td>11.7</td>
<td>48.1</td>
<td>51.9</td>
<td>11.9</td>
<td>47.7</td>
<td>52.3</td>
</tr>
<tr>
<td>50-59</td>
<td>47.1</td>
<td>52.9</td>
<td>10.7</td>
<td>46.4</td>
<td>53.6</td>
<td>11.4</td>
<td>47.3</td>
<td>52.7</td>
<td>11.5</td>
<td>46.5</td>
<td>53.5</td>
</tr>
<tr>
<td>60-69</td>
<td>44.4</td>
<td>55.6</td>
<td>12.1</td>
<td>46.8</td>
<td>53.2</td>
<td>12.5</td>
<td>45.4</td>
<td>54.6</td>
<td>12.7</td>
<td>44.7</td>
<td>55.3</td>
</tr>
<tr>
<td>70+</td>
<td>48.0</td>
<td>52.0</td>
<td>11.3</td>
<td>49.3</td>
<td>50.7</td>
<td>11.6</td>
<td>48.3</td>
<td>51.7</td>
<td>11.7</td>
<td>47.2</td>
<td>52.9</td>
</tr>
<tr>
<td>Total</td>
<td>49.4</td>
<td>50.6</td>
<td>100.0</td>
<td>49.8</td>
<td>50.2</td>
<td>100.0</td>
<td>48.9</td>
<td>51.1</td>
<td>100.0</td>
<td>48.6</td>
<td>51.4</td>
</tr>
</tbody>
</table>
Discussion

This study is important when considering the impact of gender on access to eye care in Nepal. The most striking finding is that, at face-value, access to eye care in Nepal appears equal for males and females – it may even appear that women in rural areas have greater access to clinical care than men. However, it is likely that females still do not have adequate access to eye care services. It has recently been shown that the prevalence of blindness is higher in Nepali females than in males. The higher prevalence rates in females can be explained in two ways. Firstly, given an equal incidence of disease between the genders, there are more females than males in Nepal, though this is not reflected by data from the Central Bureau of Statistics in the 2001 census. Secondly, given equal numbers of females and males, females have a higher incidence of ocular disease. One possible biological mechanism is the longer female lifespan, given that pathology such as cataracts, glaucoma and macular degeneration are more common with advancing age and barriers to proper eye care services.

In light of the increased prevalence of blindness in females, representing the end-stage of eye pathology, access to eye care can only be considered equal if women consistently outnumber men in presentations. If, as the RAAB study suggests, the prevalence in females is up to 2.5 times higher, there must be a 2.5:1 female-to-male ratio in presentations to care in order to achieve gender parity.

It is interesting that in the outreach clinics to rural areas, females accounted for more presentations than males (56.1% compared to 43.9%). It is possible that when services are provided in the community setting, rather than in the hospital setting, women are more likely to seek care because they are normally by social restrictions on mobility and, preventing them from seeking care at the hospital. In light of this, rural outreach clinics should be encouraged and strategies should be implemented to increase female awareness of such programs, for example, reaching mothers through local school and other community networks.

With regards to children, girls aged 0-14 years presented to clinics at TIO less commonly than boys (44.3% compared to 55.7%). It may be possible that this is related to a higher incidence of disease in boys. Ocular trauma as a result of risk-taking behaviours, is known to be more common in young men than women (May et al., 2000). However, it is also possible that girls are discouraged from or denied access to health care due to their lack of social status – in effect, the ‘double disadvantage’ of being female and young which has been documented in other health care settings (Bronsard & Shirima, 2009).

This study provides information on the impact of gender on access to eye care in Nepal. It is of great importance as gender inequity is a possible contributing factor to the continuing high prevalence of blindness in Nepal, in spite of dramatic improvements in eye health infrastructure in recent years.

Conclusion

Utilization of eye health care service by females accounts for approximately half of presentations to hospital eye care in Nepal. Girls aged 0-14 years presented to clinical care less commonly than boys. If the higher prevalence of ocular disease and blindness in women is taken into account, it is likely
that women in Nepal are underserved. Encouragingly, a higher female access to care is seen at rural outreach clinics, when services are taken from the hospital into the community setting.

**Acknowledgements**

We would like to thank the staff of the TIO research department, especially Nhukesh Maharjan, Research Assistant, who helped us with data management and analysis, Andreas Muller, Research Coordinator of Fred Hallows Foundation (FHF), Australia and Anil Subedi, Partnership Manager, FHF Nepal, who gave valuable comments and suggestions during the study and report writing, the Fred Hollows Foundation for funding this research work, and the Nepal Gender and Eye Health Group for initiating the concept and generating the gender-based data in Nepal.

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**Source of support: acknowledged. Conflict of interest: none**
Prevalence of blindness and visual impairment and its causes among people aged 50 years and above in Karnali Zone, Nepal

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Abstract

Objective: To estimate the prevalence of blindness and visual impairment and its causes among those aged 50 years and above in Karnali Zone.

Materials and methods: Stratified cluster sampling method was used. Twenty four clusters of 50 people aged 50 years and above were selected for the study. Visual acuity was recorded with simplified vision testing card with one optotype “E” of size 60 on one side and size 18 on the other side. Examination by ophthalmologist under mydriasis was done for those with a pinhole visual acuity of less than 6/18.

Results: Of 1200 enumerated persons 1,174 were examined (97.8% response rate). The prevalence of blindness (VA <3/60 in better eye) with available correction was 3.4% (40), (95% CI=2.36-4.44); 2.3% (15) for male and 4.8% (25) for female; with best correction it was 1.6% (19), (95% CI=0.9-2.34), 1.1% (7) for male and 2.3% (12) for female. Untreated cataract was the cause of blindness in 67.5%. Severe visual impairment (<6/60 - 3/60 BCVA in better eye) was seen in 2.1% (1.1% male and 3.4% female). Refractive error was the cause of visual impairment in 36.8% and untreated cataract in 58.8%.

Conclusion: Cataract and refractive error are the commonest cause of blindness and visual impairment. Females are 3 times more prone to blindness than their male counterpart. Accessible and equitable services are necessary for blindness prevention.

Key Words: Blindness, cataract, visual impairment, avoidable blindness

Introduction

Karnali is the biggest but most remote and poorest zone of Nepal. Five districts that make up this zone, all come at the bottom of Nepal’s district-wise human development index. The Karnali people suffer from widespread hunger, illiteracy, poor health, unemployment, and very low incomes (Karnali Integrated Rural Development and Research Center Report, 2002). The prevalence of blindness in Karnali according to Nepal Blindness Survey of 1981 was 1.63% (best corrected visual acuity of less than 3/60 in better eye) for all ages, 3.7% for people 50 years or above and surgical coverage of less than 30% (Brilliant GE, 1988).

The health facilities in Karnali are very pathetic. Most of the hospitals are not operational due to the absence of doctors and other mid level health personnel. People of Karnali zone are facing problem posed even by the diseases that can
otherwise be checked through simple preventive measures (Shangrila Sustainable Development Programs).

There are District Eye Centres (DECs) in all 5 districts of Karnali where the Ophthalmic Assistants (OAs) provide eye care service throughout the year. Ophthalmologist and surgical team from base hospital visit the DEC once a year and provide surgical services at a fixed time. This practice has been effective in Karnali for last 25 years. No studies have been done to know the efficacy of these surgical eye camps in terms of coverage, quality and blindness reduction. This study was done to find out the prevalence of blindness and visual impairment and its causes in Karnali Zone.

Materials and methods
Twenty four clusters of 50 people aged 50 years and above were selected by stratified cluster sampling. In each cluster, after a random start 50 individuals aged 50 years or above were enumerated by door to door visits and examined sequentially in each cluster at their homes. Each cluster was confined to a ward of the VDC. When 50 persons were enumerated, further enumeration was stopped and if the number of sample was not enough in the particular cluster, next adjoining ward was picked up and enumerated until the number reached to 50. The study was carried out using the RAAB protocol designed by Dr Hans Limburg which has been approved by the WHO (Limburg, 2007). Visual acuity was recorded with simplified vision testing card of 15 x 15 cm (6x6 inch) size with one optotype “E” of size 60 on one side and size of 18 on the other side. Those with presenting vision of less than 6/18 were given a pinhole for vision recording and dilated by using 1% tropicamide for detailed examination by an ophthalmologist using a handheld slit-lamp and a direct ophthalmoscope. An informed consent was taken from all the participants of the study.

Results
Out of the 1,200 enumerated people aged 50 years or above, 1,174 were examined (response rate of 97.8%). The cause for all absentee was unavailable for examination in 3 visits. Among the examined, 545 (46.6%) were between 50-59 years, 417 (35.6%) between 60-69 years, 171 (14.6%) between 70-79 and 38 (3.2%) were above 80 years of age. The number of male and female was 646 (55.2%) and 525 (44.8%) respectively. The prevalence of blindness (VA <3/60 in better eye) with available correction was 3.4% (95% CI 2.36-4.44) and with best correction it was 1.6% (95% CI=0.9-2.34). The prevalence of blindness in female for available and best correction was 4.8% and 2.3% respectively and for males it was 2.3% and 1.1%. The prevalence of blindness increased with the age, being highest at 70-79 years (37.5%). The detail of the prevalence of blindness in different age and sex group with available and best corrected vision is given on table 1.

Table 1
Prevalence of blindness; (VA <3/60 with available and best correction in better eye) according to age and sex group (%)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Male (n=646)</th>
<th>Female (n=525)</th>
<th>Total (n=1171)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-59</td>
<td>4 (0.6)</td>
<td>4 (0.6)</td>
<td>8 (0.7)</td>
</tr>
<tr>
<td>60-69</td>
<td>4 (0.6)</td>
<td>1 (0.2)</td>
<td>5 (0.4)</td>
</tr>
<tr>
<td>70-79</td>
<td>6 (0.9)</td>
<td>2 (0.3)</td>
<td>8 (0.7)</td>
</tr>
<tr>
<td>80+</td>
<td>1 (0.2)</td>
<td>3 (0.5)</td>
<td>4 (0.3)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15 (2.3)</strong></td>
<td><strong>25 (4.8)</strong></td>
<td><strong>40 (3.4)</strong></td>
</tr>
</tbody>
</table>

Prevalence of blindness, SVI and VI (all causes): When considering the blind eyes, 57 (4.4%) of eyes in male and 69 (6.6%) in female were having VA of less than 3/60 after best correction (WHO definition of
blindness) which was 126 (5.4%) for both the sexes. Similarly available VA of less than 3/60 was seen in 83 (6.4%) male and 100 (9.5%) female eyes. Severe visual impairment; VA<6/60-3/60 in better eye with available correction among all bilateral cases was 7 (1.1%) for male and 18 (3.4%) for female and for all SVI eyes it was 30 (2.3%) and 55 (5.2%) respectively. Visual Impairment (VI), VA <6/18-6/60 in better eye with available correction for all bilateral VI was 45 (6.9%) for male and 69 (13.1%) for female (table 2).

Table 2
Prevalence of blindness, severe visual impairment (SVI) and visual impairment (VI) - all causes (%)

<table>
<thead>
<tr>
<th>Level of VA</th>
<th>Male n=646</th>
<th>Female n=525</th>
<th>Total n=1171</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blindness - VA&lt;3/60 in the better eye, with best correction or pinhole (WHO definition)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All bilateral blindness</td>
<td>7 (1.1)</td>
<td>12 (2.3)</td>
<td>19 (1.6)</td>
</tr>
<tr>
<td>All blind eyes</td>
<td>57 (4.4)</td>
<td>69 (6.6)</td>
<td>126 (5.4)</td>
</tr>
<tr>
<td>Blindness - VA&lt;3/60 in the better eye, with available correction (presenting VA)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All bilateral blindness</td>
<td>15 (2.3)</td>
<td>25 (4.8)</td>
<td>40 (3.4)</td>
</tr>
<tr>
<td>All blind eyes</td>
<td>83 (6.4)</td>
<td>100 (9.5)</td>
<td>183 (7.8)</td>
</tr>
<tr>
<td>Severe Visual Impairment (SVI) - VA&lt;6/60 - 3/60 in the better eye, with available correction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All bilateral SVI</td>
<td>7 (1.1)</td>
<td>18 (3.4)</td>
<td>25 (2.1)</td>
</tr>
<tr>
<td>All SVI eyes</td>
<td>30 (2.3)</td>
<td>55 (5.2)</td>
<td>85 (3.6)</td>
</tr>
<tr>
<td>Visual Impairment (VI) - VA&lt;6/18 - 6/60 in the better eye, with available correction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All bilateral VI</td>
<td>45 (6.9)</td>
<td>69 (13.1)</td>
<td>114 (9.7)</td>
</tr>
<tr>
<td>All VI eyes</td>
<td>126 (9.8)</td>
<td>137 (3.1)</td>
<td>263 (11.2)</td>
</tr>
</tbody>
</table>

Causes of blindness (VA <3/60 in better eye with available correction); Sixty percent male and 72% female were blind due to cataract, 13.3% male and 4% female were blind due to uncorrected aphakia, 6.7% male and 2.5% female were blind due to surgical complications, 6.7% male had phthisis bulbi, 4% female were blind due to corneal scar, 6.7% male and 8% female had glaucoma, 6.7% male and 8% female had blindness due to posterior segment disease

Causes of severe visual impairment, SVI (VA <6/60-3/60 in better eye with available correction); the commonest cause of SVI among both the sexes was untreated cataract, 85.7% and 100% for the male and female respectively.

Causes of Visual impairment VI (VA <6/18-6/60 in better eye with available correction); Refractive error was the cause of VI for 35.6% male and 37.7% female. Similarly untreated cataract was the cause for VI among 57.8% males and 59.4% females respectively. Posterior segment disease was responsible for VI in 2.2% males and 2.9% females.
Table 3
Principal cause of blindness in persons; VA<3/60 in better eye with available correction, severe visual impairment; VA <6/60-3/60 with available correction and visual impairment; VA<6/18-6/60 with available correction. (%)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
</tr>
<tr>
<td>Refractive error</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(35.6)</td>
<td></td>
</tr>
<tr>
<td>Cataract untreated</td>
<td>9</td>
<td>18</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>(60.0)</td>
<td>(72.0)</td>
<td>(67.5)</td>
</tr>
<tr>
<td>Aphakia uncorrected</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>(13.3)</td>
<td>(4.0)</td>
<td>(7.5)</td>
</tr>
<tr>
<td>Total curable</td>
<td>11</td>
<td>19</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>(73.3)</td>
<td>(76.0)</td>
<td>(75.0)</td>
</tr>
<tr>
<td>Surgical complications</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(6.7)</td>
<td></td>
<td>(2.5)</td>
</tr>
<tr>
<td>Trachoma</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Phthisis bulbi</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(6.7)</td>
<td></td>
<td>(2.5)</td>
</tr>
<tr>
<td>Corneal scar</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total preventable</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>(13.3)</td>
<td>(8.0)</td>
<td>(10.0)</td>
</tr>
<tr>
<td>Total avoidable</td>
<td>13</td>
<td>21</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>(86.7)</td>
<td>(84.0)</td>
<td>(85.0)</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>(6.7)</td>
<td>(8.0)</td>
<td>(7.5)</td>
</tr>
<tr>
<td>Diabetic retinopathy</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Potentially preventable</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>(6.7)</td>
<td>(8.0)</td>
<td>(7.5)</td>
</tr>
<tr>
<td>ARMID</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Other post segment</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>(6.7)</td>
<td>(8.0)</td>
<td>(7.5)</td>
</tr>
<tr>
<td>Total post segment</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>(13.3)</td>
<td>(16.0)</td>
<td>(15.0)</td>
</tr>
<tr>
<td>Total blindness</td>
<td>15</td>
<td>25</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
</tr>
</tbody>
</table>

Discussion
In this study out of the 1,200 enumerated people aged 50 years or above; 1,174 were examined (response rate 97.8%). The prevalence of blindness (VA<3/60 in better eye with available correction) among the people aged 50 years or above was 3.4% (95% CI=2.36-4.44). For male and female it was 2.32% and 4.76% respectively. This figure is slightly less than the one reported by Pokharel GP et al (1998) where they observed 3.9%. This figure is slightly more than the similar study done by Wadud et al (2006) in Bangladesh where they have reported the prevalence of blindness to be 2.9%. Women bear approximately two-thirds of the global burden of Blindness (Lewallen S, 2002). But in our study the females were two times more prone for being blind compared to their male counterpart (Odds Ratio=2.1, 95% Confidence Interval (CI)=1.01-4.0 and p value <0.005). The cause for more females to be blind can be explained in terms that females have less access to eye care service. Men were twice as likely as women to attend the eye camp as reported by Fletcher AE (1999). With
correction the prevalence of blindness dropped to 1.1%, 2.3% and 1.6% for the male, female and both sexes respectively. It is worthy to note here that blindness can be reduced to half simply by providing spectacles.

The estimates of severe bilateral visual impairment (VA <3/60-6/60 in better eyes with available correction) was 2.1% (1.1% for male and 3.4% for female). The females were more than 3 times prone to suffer from severe visual impairment than their counterpart male (Odds ratio OR= 3.2). These estimates are less than reported by Wadud Z (2006) where it is reported to be 4.4% (3.7% for the male and 5.1% for female) and more than Neena J (2008) estimates where this figure is reported to be 1.6% (1.4% for male and 1.7% for female. The estimates for visual impairment (VA <6/18-6/60 in the better eye, with available correction) was 9.7% (7.0% for male and 13.1% female).

Among the causes of blindness and visual impairment (table 3), untreated cataract was the main cause of blindness; responsible for 60%, 72% and 67.5% blindness for male, female and for both sexes respectively. Uncorrected aphakia was responsible for 13.3% and 4% blindness in male and female respectively. Thus 73% and 76% blindness in male and female respectively is curable. Preventable cause of blindness like surgical complication and phthisis bulbi was responsible for blindness in male in 6.7% each and trachoma and other corneal scar was the cause of blindness for female by 4% each. Thus 86.7% blindness in male and 84% blindness in female was avoidable.

Untreated cataract and uncorrected aphakia were the causes of severe visual impairment (SVI) in 85.7% and 14.3% males respectively. Similarly, untreated cataract was the cause of SVI by 100% in female. Thus 100% cause of SVI was curable (avoidable) for both the sexes. Similarly, refractive error (35.6%), untreated cataract (57.8%) and uncorrected aphakia (4.4%) were responsible for 97.8% curable cause of visual impairment for male. For female refractive error was responsible for 37.7% and untreated cataract for 59.4% of visual impairment contributing to the 97.1% of curable blindness. Posterior segment disease was responsible for visual impairment in 2.2% in male and 2.9% in female.

**Conclusion**

The prevalence of blindness among people aged 50 years and above in Karnali has declined from 3.7% in 1981 to 1.6% by 2010. Females are 3 times more likely to be blind in this age group than the males. Seventy five percent of the blindness is curable and 10% preventable. Cataract is the cause of blindness in 67.5% (60% male and 72% female). All cases of severe visual impairment are curable and 42% of visual impairment can be just treated by spectacles.

**Acknowledgement**

We express our thanks to the Eye Care Foundation (ECF) for providing financial support for this study. Similarly, we wish to express our thanks to Himalaya Eye Hospital for the logistics and other support during this survey. We acknowledge Dr Margreet Hogweg, the “mother of Karnali” for her relentless efforts to initiate the Karnali Eye Care Program in Nepal.

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Karnali Integrated Rural Development and Research Center, Jumla, August 2002. An exploratory study, link: http://www.kirdarc.org/docs/publicationManagement/fd7cd9379f9f02c6b31bfa0e0e46c0a0.pdf


Shangrila Sustainable Development Programs; Appendix I, Facts on Karnali Region/ Western Nepal link: http://www.ask.com web?q=karnali+zone&qsrc=2871&o=14670cr&l=dis&qid=D81296306F8F88538A754F4E92379680&frstpgoy=&page=2&jss=


Source of support: acknowledged. Conflict of interest: none
Hemodynamic effects of intraocular epinephrine during cataract surgery: a double blinded placebo controlled randomized clinical trial

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Shahid Sadoughi University of Medical Sciences and Health Services, Yazd –Iran

Abstract

Objective: To evaluate hemodynamic effects of intraocular epinephrine irrigation in patients undergoing cataract surgery.

Materials and methods: This study was conducted as a prospective double blinded clinical trial at the Shahid Sadoughi University of Medical Sciences, Yazd, Iran.

Eighty-eight patients of age 38-90 years undergoing were randomly allocated into two groups: Group E received intraocular irrigation fluid (balanced salt solution) with epinephrine 1:1000,000, and group C received intraocular irrigation fluid (balanced salt solution) without epinephrine. Heart rate (HR), systolic and diastolic blood pressure (SBP, DBP) were measured before and at 5, 10, 15 minutes after starting intraocular infusion of epinephrine 1:1000,000 in both groups.

Results: HR and SBP were similar in the two groups at different time intervals. DBP was decreased at 5 minutes after epinephrine administration in the epinephrine group and increased at 10 and 15 minutes but there was no significant differences between the two groups.

Conclusion: Intraocular infusion of epinephrine 1:1,000,000 can be used during cataract surgery without hemodynamic side effects and so is a safe and effective method for this purpose.

Key-words: hemodynamic, intraocular, epinephrine

Introduction

Cataract surgery is the most commonly performed intraocular procedure (McCormic etal 2006). It requires a satisfactory degree of mydriasis throughout the entire operation (Mouly et al 2006). Failure to maintain mydriasis during surgery can increase the risk of damage to the iris, incomplete clearance of soft lens matter or more importantly, rupture of the posterior capsule (Corbett et al 1994). For this purpose, many studies suggest different drugs, such as phenylephrine, tropicamide, and epinephrine (Duffin et al 1982; Liou et al 1998; Schlichtenbrede et al 2001). On the other hand, eye surgery patients are a high-risk group. Because of increased age in adult patients, they are likely to have other risk factors, such as diabetes, hypertension, and...
atherosclerosis (Kubitz et al, 2003). In a study by Hu et al (2001), cataracts have been indicated as a marker for increased mortality.

Epinephrine (also known as adrenaline) is a hormone and a neurotransmitter (Berecek, 1982). Adverse reactions to adrenaline include palpitations, tachycardia, arrhythmia, anxiety, headache, tremor, hypertension, and acute pulmonary edema (Elliot et al, 1989). Because of the potential hemodynamic adverse effects of epinephrine (Elliot et al, 1989; Gimbel, 1989), those effects in patients undergoing cataract surgery with intraocular epinephrine irrigation were assessed in this prospective clinical trial study.

Materials and methods

Study duration and location

After approval from the university institutional ethics committee, this double blinded placebo controlled randomized clinical trial was carried out between October 2007 and April 2008 in the Shahid Sadoughi General Hospital, Yazd, Iran.

Study population and method

Eighty-eight patients (32 men and 56 women) aged between the ages of 38-90 years undergoing routine extra capsular cataract extractions were randomly allocated into two groups by simple sampling. Patients were chosen for each group (with consideration of following parameters: p<0.05 as significance, test power of 80%, d=1.5 and based on previous studies S=2). Written consent was obtained from all patients. All patients were in ASA class I and II, without any airway, the systemic and psychological problems. Patients did not use any drugs during 24 hours prior to the procedure. All patients had no history of sensitivity to anaesthesia or the study drug. Group E received intraocular irrigation fluid (balanced salt solution) with epinephrine 1:1,000, 000, and Group P (Placebo) received intraocular irrigation fluid (balanced salt solution) without epinephrine. All operations were performed by the same surgeon with the same technique. The patients gave informed consent before inclusion in the trial. Exclusion criteria included patients with an allergy to any of the drugs used and those undergoing any therapy interfering with hemodynamic parameters. The patients received fentanyl (1µg/kg) as premedication. Induction and maintenance of anesthesia were the same for all the patients using a laryngeal mask airway and controlled ventilation. The patients received propofol(1.5 mg/kg) and atracurium (0.4 mg/kg) at induction of anesthesia, and maintenance of anesthesia was with isoflurane 0.5 MAC. Ventilation was controlled with laryngeal mask ventilation. At the end of the surgery, muscle relaxant was reversed by intravenous atropine and prostigmine.

Age, sex, history of any disease, especially diabetes, hypertension, ischemic heart disease, and any medication use in the patients were noted. Hemodynamic parameters (heart rate, systolic and diastolic blood pressure) were measured by the anesthesia resident (who was blind to the study groups) before (baseline) and 5, 10, 15 minutes time intervals after starting intraocular infusion of epinephrine1:1,000, 000. Any form of arrhythmia was registered during this period. The study flow is described in figure 1.

Study analysis

The Student’s t-test was used for analysis of the patient’s age .The X² test was used for the sex of the patients and history of diabetes, hypertension, and Fisher’s exact test was used for history of IHD in the patients. The paired –t-test was used in statistical analyses of heart rates, systolic and diastolic blood pressure of the patients 5, 10, and 15 minutes after infusion comparing with the baseline in each group and one way ANOVA was used for comparing HR ,DBP, and SBP in different times in two groups.

The data were analyzed with Statistical Package for the Social Sciences (SPSS) Version 16 for Windows (SPSS Inc.USA). P values less than 0.05 were considered significant.
Results

Demographic data of study population is given in table 1. There were no significant differences between the two groups with regards to sex, age, history of diabetes, hypertension and IHD.

Also, there was no significant difference between the two groups with regard to baseline HR, SBP and DBP (P>0.05) before starting infusion of epinephrine (Table 2). Overtime, HR increased in each group when compared with baseline rates, but this change was not significant (P>0.05). The data showed that there were significant differences between two groups according to HR (P>0.05, Table 2). There was a statistically significant decrease in SBP after 5 and 10 minutes and a slight increase after 15 minutes when compared with baseline pressures in each group, but there were no significant differences between two groups at any measure times (p>0.05) (Table 2).

In Group E (Epinephrine), DBP was decreased significantly at 5th minute (P<0.05), but the differences between values were not significant after 10 and 15 minutes compared with data on baselines (p>0.05). In Group P there was no significant change comparing with baseline pressure at any study times (p>0.05). Also, there were no significant differences between the two groups at any time measured in the study (p>0.05, Table 2).

Table 1

<table>
<thead>
<tr>
<th>Group Epinephrine (n=45)</th>
<th>Group Placebo (n=43)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>68.32 ± 9.9</td>
<td>67± 11.7</td>
</tr>
<tr>
<td>Sex (male/ Female)</td>
<td>16/29</td>
<td>16/27</td>
</tr>
<tr>
<td>Diabetes</td>
<td>9(20%)</td>
<td>10(23.26%)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>4(8.9%)</td>
<td>9(20.93%)</td>
</tr>
<tr>
<td>IHD</td>
<td>2(4.44%)</td>
<td>7(16.28%)</td>
</tr>
</tbody>
</table>

Age is shown as mean ± standard deviation. Diabetes, Hypertension and IHD are shown as frequency (%). There were no significant differences in baseline characteristics between two groups.

Table 2

<table>
<thead>
<tr>
<th>HR (beat/minute)</th>
<th>Baseline</th>
<th>T5</th>
<th>T10</th>
<th>T15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epinephrine</td>
<td>77.60±13.1</td>
<td>87.95±13.59</td>
<td>85.40±12.79</td>
<td>84.79±13.37</td>
</tr>
<tr>
<td>Placebo</td>
<td>80.22±15</td>
<td>88.36±12.99</td>
<td>87.64±13.24</td>
<td>86.51±13.69</td>
</tr>
<tr>
<td>P value</td>
<td>0.386</td>
<td>0.887</td>
<td>0.420</td>
<td>0.553</td>
</tr>
<tr>
<td>SBP (mmHg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Epinephrine</td>
<td>136.6 ±22.3</td>
<td>110.76±24.71</td>
<td>118.35±26.92</td>
<td>120.49±28.69</td>
</tr>
<tr>
<td>Placebo</td>
<td>142.6 ±21.1</td>
<td>124.44±24.98</td>
<td>123.91±22.97</td>
<td>124.96±23.81</td>
</tr>
<tr>
<td>P value</td>
<td>0.196</td>
<td>0.835</td>
<td>0.12</td>
<td>0.048</td>
</tr>
<tr>
<td>DBP (mmHg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Epinephrine</td>
<td>81.70±12.1</td>
<td>70.79±14.33</td>
<td>74.79±16.57</td>
<td>74.86±17.87</td>
</tr>
<tr>
<td>Placebo</td>
<td>81.2±8.8</td>
<td>77.18±15.35</td>
<td>77.64±14.13</td>
<td>78.24±13.98</td>
</tr>
<tr>
<td>P value</td>
<td>0.299</td>
<td>0.386</td>
<td>0.428</td>
<td>0.324</td>
</tr>
</tbody>
</table>

HR, SBP and DBP are shown as mean ± standard deviation. There were no significant differences in hemodynamic characteristics between two groups. Maximum of variation is shown in SBP (18.92%) between baseline and T5 and this variation for HR and DBP are about 13.35%. With repeated measurement these differences between different times are not significant.
Figure 1
Flow of study: Hemodynamic effects of intraocular epinephrine during cataract surgery

Discussion
Many agents with different concentrations and methods are used to maintain mydriasis during cataract surgery. There are many studies which assess the mydriatic and hemodynamic effects of these agents. Irrigation fluid containing epinephrine is thought to be of benefit in this respect (Liou et al 1998; Lou et al 2001; Schouwenberg et al 2006). Epinephrine is a synthetic sympathomimetic drug. It interacts with alpha, beta 1 and beta 2 adrenergic receptors, the stimulation of which depends on the plasma concentration. At low plasma concentration, epinephrine primarily stimulates beta adrenergic receptors, leading to increased HR (beta 1) and peripheral vasodilatation (beta 2). At higher concentration, alpha adrenergic activity starts to prevail, causing increased vascular tone and blood pressure (Schouwenberg et al 2006). Epinephrine maintains mydriasis by direct action on the dilator papillae of the iris (Corbett et al 1994). Different concentrations of epinephrine are used and there are many studies assess the pupillary responses to these various doses (Corbett et al 1994; Schouwenberg et al 2006; Fell et al 1989). Two studies showed that commercial epinephrine 1:1000 with its preservative sodium bisulfate damaged corneal endothelial function and ultra-structure in rabbit and monkey eyes with sodium bisulfate being the main cause of the damage (Edelhauser et al 1982; Hull et al 1976). They concluded that endothelial damage can be prevented by dilution of epinephrine. Duffin et al studied the pupillary responses to various doses of intraocular epinephrine (Duffin et al, 1983). They concluded that epinephrine concentrations of 1:96,000 or less may be effective in maintaining mydriasis during cataract surgery. Corbett et al demonstrated that epinephrine 1:1,000,000 in the intraocular infusion is of significant benefit in maintaining mydriasis during cataract surgery (Corbett et al 1994). One advantage of giving epinephrine in the irrigation fluid, as opposed to a bolus, is that it continues to enter the eye while the stimulus to miosis persists, because during surgery there is a tendency for the pupil to constrict, particularly following manipulation of the iris. As epinephrine is administered over a longer time period by infusion than by injection, a more
dilute concentration can be used (Corbett et al 1994). Because of the previous studies that demonstrated epinephrine 1:1,000,000 is effective for maintaining mydriasis during cataract surgery, we used the same concentration of intraocular infusion of epinephrine 1:1,000,000 in our study (Corbett et al 1994; Liou et al 1998).

Systemic absorption of epinephrine infused into the eye can potentially occur via the vascular structures of the anterior segment and via the nasolacrimal duct from overspill into the conjunctival sac (Liou et al 1998). Because of potentially adverse cardiovascular side effects of absorbed epinephrine during intraocular infusion, the hemodynamic effects of intraocular infusion of epinephrine 1:1,000,000 in this study was assessed.

In another study of intraocular irrigation with 1:500,000 epinephrine, plasma concentration of epinephrine and noradrenalin did not differ significantly from those noted before induction of anesthesia (Fell et al 1989). In a similar study on a mixed population of patients receiving local or general anesthesia, there was no significant changes in blood pressure or heart rate during the time of epinephrine administration (Fiore et al 1988). In addition, Yamaguchi et al concluded that both patients with or without hypertension incurred no additional risk of significant changes of either arterial blood pressure or heart rate during intraocular epinephrine irrigation at a concentration which maintain pupil dilation (Yamaguchi et al 1988). In Liou SW et al study, pulse rate and blood pressure in patients of the study group, even those with hypertension, showed no significant fluctuation during the surgery (Liou et al 1998). Later, Liou SW et al found that blood pressure did not elevate after injection of epinephrine 1:400,000 (Liou et al 2001). In our study, the patients in the study group, even those with hypertension, showed no increase in blood pressure or in heart rate. In the present study, after 5 minutes following intraocular infusion with epinephrine (1:1000, 000), DBP decreased significantly, but these values were restored 5 minutes later. There were no significant differences in these parameters after 10 and 15 minutes in both groups. These findings are comparable to a study by Yang et al (2005). In their study, blood pressure was significantly affected after infiltration with epinephrine 1:200,000 in functional endoscopic sinus surgery (FESS) with decreasing SBP, DBP and MAP at 1 and 1.5 minutes after infiltration. Various studies have shown that changes in vital parameters after infiltration of epinephrine depend on the physical status of the patient, the amount of vasoressor used, the vascularity of the site of administration and its rate of absorption. Because the nasal area is a highly vascular area and absorption of epinephrine is rapid, lower BP was observed 1 minute after infiltration and was restored quickly 1 minute later. Homma and associates also found that the mean plasma epinephrine concentration reached a maximum 3 minutes after infiltration of epinephrine during dental treatment. In this study, 5 minutes after intraocular infusion of epinephrine (1:1000,000), DBP decreased significantly but was restored at 5 minutes (Homma et al 1999). There was no significant difference in DBP between the two groups after 10 and 15 minutes. This may be related to the slower absorption of epinephrine from the eye. Systemic absorption of epinephrine infused into the eye can potentially occur via the vascular structures of the anterior segment and via the nasolacrimal duct from spillover into the conjunctival sac (Liou 1998). In Yang’s study, a slight increase in HR was recorded with hypotension. In the present study, a decrease in DBP was not associated with tachycardia, which may be because of concurrent fentanyl use at the time of anesthesia induction. In another animal study (Schlag et al, 2012), the hemodynamic effects of sub-mucosal injection of two volumes of adrenaline (1:10,000) into different parts of the upper gastrointestinal track during endoscopy in pigs were assessed. The results of this study showed significant hemodynamic changes after endoscopic sub-mucosal injection of adrenaline especially in the esophagus. The difference between the results of
this study with ours is due to the differences in site of injection, and the concentration of adrenaline. In our study, we used adrenaline at a concentration of 1:1,000,000 and the vascularity of esophagus is much more than intraocular, therefore our results did not show any significant hemodynamic changes. This suggests that the effect of injection site epinephrine concentration can exert an effect on the hemodynamic situation.

**Conclusion**

Intraocular infusion of epinephrine 1:1,000,000 is a safe and effective method to maintain mydriasis during cataract surgery without adverse cardiovascular side effects.

**Acknowledgments**

The authors thank Mohammad Reza Samiei MD, Department of Anesthesiology, School of Medicine, Shahid Sadoughi University of Medical Sciences And Health Services, Yazd, Iran.

Source of support: This study was conducted under financial support of Faculty of Medicine, Shahid Sadoughi University of Medical Sciences.

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Source of support: acknowledged. Conflict of interest: none
Artificial drainage devices for glaucoma surgery: an overview

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Haryana, India

Abstract
Artificial drainage devices (ADD) create an alternative pathway for aqueous drainage from the anterior chamber of an eye through a tube to the subconjunctival bleb connected to an equatorial plate under the conjunctiva. The ADDs, both valved and non-valved, are available for end stage or refractory glaucoma. Currently, some of these devices, particularly the Express shunt, are recommended for the primary treatment of glaucoma. In this article, we highlight various ADDs, their indications and contraindications, surgical techniques and associated complications.

Key-words: Artificial drainage devices, glaucoma, recent advances

Introduction
Artificial drainage devices (ADD) create an alternative pathway for aqueous drainage from the anterior chamber of an eye through a tube to the sub-conjunctival bleb connected to an equatorial plate under the conjunctiva. ADDs are indicated for patients with neo-vascular glaucoma, glaucoma with uveitis, secondary glaucoma following penetrating keratoplasty, retinal detachment surgery, cataract surgery and failed filtration surgery (Lieberman et al, 1990). A variety of materials have been used to facilitate aqueous drainage from the anterior chamber, including silk thread, glass, platinum, teflon, cartilage, and autologous lacrimal canaliculus (Melamed & Fiore, 1990). These early implants were associated with high complication rates, excessive scar formation near the limbus, seton migration and conjunctival erosion. Molteno introduced the implant consisting of a long silicon tube attached to a large end plate placed 9-10 mm posterior to the limbus. The modern implants are based on this concept of Molteno (Molteno et al 1976). This article outlines various drainage devices, surgical techniques and complications following ADD insertion.

Description of ADD
Currently, the ADDs are divided into three categories: those with no resistance, those with resistance and those with variable resistance to aqueous outflow.

ADDs with no resistance
These implants consist of a silicon tube connected to an end plate placed sub conjunctively which acts as surface for bleb formation. Molteno implants are of two types: single plate and double plate. A single plate Molteno implant is a silicon tube with external diameter of 0.63 mm and internal diameter of 0.30 mm connected to the upper surface of a polypropylene plate (Molteno et al 1969; Lloyd et al 1992). The double plate implant consists of two plates one of which is attached to silicon tube in the anterior chamber while the second connects the two plates forming a surface area of 270 mm² (Molteno 1981).
The Baerveldt implant consists of a silicon tube attached to a barium impregnated silicon plate with a surface area of 200 mm², 350 mm² or 500 mm². The advantage of the Baerveldt implant is that it has a large surface area plate that can be implanted through a one-quadrant conjunctival incision (Lloyd et al 1994). The Schocket implant is a cheap and easily assembled implant which includes a silastic tube used for NLD intubation. This tube is connected to a 360° encircling silicon band, like that used in retinal detachment surgery. The disadvantage of this implant is that the surgical procedure of implantation is cumbersome and lengthy (Schocket et al 1982; Schocket et al 1985).

**ADDs with set resistance**

To avoid early post operative complication such as excessive drainage and hypotony, the concept of a one-way valve that opens at predetermined IOP was introduced by Krupin and associates (Krupin et al 1976). The Ahmed glaucoma valve (AGV) has lowest incidence of hypotony amongst all valved devices. The AGV consists of a silicon tube attached to a silicon sheet valve held in a polypropylene body (Coleman et al 1995). The valve consists of a thin silicon elastomer membrane which creates a venturi-shaped chamber. Because the inlet is wider than the outlet, a pressure gradient between the anterior chamber and the bleb is created which enables the valve to open in response to pressure differential, as described by Bernouill principle. The valve is designed to open at an IOP of 8 mm of Hg or more. The Optimed implant is made up of a silicon tube with PMMA plate. The flow is restricted by the presence of an element in the rectangular box situated at the end of the tube with in the plate.

**ADDs with variable resistance**

These are modified Molteno and Baerveldt implants. These devices include a tissue resistance mechanism that limits the aqueous flow. However, since the tissue apposition force is variable, IOP levels remain unpredictable.

The Molteno implant with a pressure ridge is a dual chamber, single plate implant with a V-shaped pressure ridge on the upper surface of the plate which encloses an area of 10.5 mm² around the opening of silicon tube (Molteno 1990; Freedman 1992). The pressure ridge and the overlying Tenon’s capsule regulate the flow of aqueous into the main bleb cavity during the early post-operative period, thereby decreasing excessive filtration and hypotony. But in our experience, these complications are not effectively prevented by the pressure ridge mechanism. The Baerveldt bioseal is a flap that overhangs the silicon tube as it opens on the end plate. The apposition of bioseal elements to the sclera with absorbable sutures provides early resistance, which limits the aqueous flow beneath the device.

**Pathophysiology**

After implantation of the ADD, there is formation of a fibrous capsule around the end plate over a period of several weeks. The fibroblasts do not adhere to the silicone or polypropylene material of the plate. This is an important feature which allows success of drainage implant. The aqueous humor passes out of the anterior chamber and collects in the space between the end plate and non-adherent fibrous capsule. Aqueous flow then passes through the fibrous capsule via passive diffusion and is absorbed by periorcular lymphatics. The fibrous capsule is the main site of resistance to aqueous outflow. Therefore, the success of drainage surgery is dependent on capsular thickness and surface area of encapsulation. The thinner is the capsule and larger the surface area of encapsulation, the lower will be the intraocular pressure. A large plate will have an increased surface area of encapsulation and greater intra-ocular pressure (IOP) reduction. Heuer and colleagues achieved a higher success rate and a better IOP reduction with the double plate implant due to its increased surface area (Heuer et al 1992).
Comparison of various ADDs

**Baerveldt vs Ahmed glaucoma valve**
The Ahmed and Baerveldt drainage implants show competitive IOP lowering potential with good success rates. At 1 year follow up, both devices have similar IOP control rates and success end points (Tsai et al 2003; Syed et al 2004). Similar results were seen in an Asian population, as described by Wang et al (Wang et al 2004). The Ahmed implant has a higher hypertensive phase with raised IOP after 1-2 months of implant and high rate of bleb encapsulation as shown by Tsai JC et al and Syed HM et al in two different studies (Tsai et al 2003; Syed et al 2004). Syed et al demonstrated a higher hypotony rate for Baerveldt implants (Syed et al 2004).

**Baerveldt vs double plate Molteno implant**
Smith et al compared 18 eyes with a Baerveldt implant and 19 eyes with a double plate Molteno (Smith et al 1995). Both the implants had a relatively good and similar IOP reduction (> 44%), good success rates and better visual outcomes after one year. The Baerveldt implant was associated with slightly more risk of AC shallowing and the Molteno was associated with an increased incidence of corneal graft failure.

**Ahmed vs double plate Molteno**
A retrospective study done by Ayyala RS showed a better IOP reduction with the double plate molteno as compared to the Ahmed glaucoma valve at 12 and 18 months of follow up (Ayyala et al 2002). The chances of a hypertensive phase were greater with the Ahmed implant than the double plate Molteno, but ultimately, the success rate by the end of 2 years was similar in both the groups.

**Ahmed vs Krupin eye valve with disc vs Double Plate Molteno**
Yagira et al performed a non-randomized retrospective study of patients who received the double plate Molteno (27 patients), Krupin eye valve with disc (13 patients) and Ahmed glaucoma valve (13 patients) (Taglia et al 2002). The double plate Molteno produced a greater reduction in IOP but with a higher rate of hypotony.

**Indications**
Artificial drainage devices are associated with serious intraoperative and post operative complications, hence these are reserved for patients with refractory and intractable glaucoma. Glaucoma drainage devices are indicated for patients with neovascular glaucoma, glaucoma with uveitis, secondary glaucoma following penetrating keratoplasty, retinal detachment surgery, cataract surgery, refractory infantile glaucoma, and failed filtration surgery. The patients with aphakia who need contact lenses may require an ADD (Lieberman & Ewing, 1990). Additionally, patients with bad surface diseases like pemphigus are also candidates indication for ADD. In most cases, trabeculectomy with antimetotics such as Mitomycin-C and 5- Fluorouracil should be attempted before ADD is used.

**Contraindications**
ADDs are associated with various postoperative complications so are contraindicated in noncompliant patients. The drainage devices are not recommended for patients with poor endothelial function.

**Surgical technique**
The surgical technique is the same for most implants. A fornix based conjunctival flap is made in the superotemporal or superonasal quadrant with two relaxing incisions. The superotemporal quadrant is preferred because a supero-nasal approach may induce postoperative strabismus (Prata et al 1993). A partial thickness rectangular scleral flap is created as large as possible so that the tube is covered. The draining part of the implant is placed in the sub-Tenon’s space and the anterior portion is sutured to the sclera approximately 7 mm posterior to the limbus.

The silicon tube is radially placed across scleral flap and excess tube is trimmed so as to overlap the limbus by 2 mm. A 23 gauge needle is used to enter
the anterior chamber and the tube is inserted through this opening. The scleral flap is sutured with 10-0 nylon. The conjunctiva is attached back around the limbus. Due to larger dimensions, Baerveldt and Schocket implants require dissection in one or more than one quadrant. A scleral patch graft from donor tissue may be placed over the tube to avoid post-operative erosion of tube as a modification of original technique (Minckler et al 1988).

Post-operative period

Hypotensive phase
After surgery this phase lasts from day 1 to 4 weeks. During this phase the bleb looks to be diffuse and thick valved with few engorged blood vessels. The IOP is low and varies from 2-3 mm of Hg to 10-12 mm of Hg.

Hypertensive phase
Beginning 3-6 weeks after surgery, it can last for 4-6 months. The bleb appears inflamed; dome shaped and may be associated with a raised IOP of 30 mmHg or greater. The Ahmed glaucoma valve has increased incidence of hypertensive phase when compared to Baerveldt implant and the double plate Molteno as shown in many studies. The increased incidence can be explained because of increased surface area of these two implants. The difference may also be due to the different bio-materials used in various implants.

Stable phase
After the hypertensive phase there is stabilization of IOP in the mid to high teens. The bleb appears as a thick-valved, dome-shaped, elevated area overlying the end plate with no associated inflammation.

Complications

Intraoperative complications
Globe perforation and uveal tissue exposure can occur while fixing the implant or while dissecting the sclera, especially in previously operated eyes which have thin sclera. Intra-operative complications can be vitreous loss, ciliary body bleeding while inserting the tube. If the incision is large there can be leakage around the implant. There can also be hyphema, supra-choroidal hemorrhage or expulsion, and vitreous hemorrhage.

Post operative complications
The tube vs trabeculectomy study done by Gedde and associates compared the efficacy and the clinical outcomes of nonvalved ADDs vs trabeculectomy with mitomycin-C (Gedde et al 2007a; Gedde et al 2007b). He reported a similar rate of intraoperative complications in the two groups. At one year follow up, patients who had a tube shunt device were less likely to develop post-operative complications (p=0.001), lower incidence of failure, and more likely to take anti glaucoma medications. Gedde and associates also found that the presence of intra-operative or post-operative complications did not increase the risk of failure.

One of the major post-operative complications of ADD is shallow anterior chamber secondary to wound leak, overfiltration, and choroidal effusion. The incidence of overfiltration is higher in non-valved implants. To address this complication, ligatures can be placed around the external portion of the tube or the internal lumen can be occluded. An 8-0 suture can be tied around intraocular portion of the tube and cut after one week with an argon laser. Alternatively, releasable sutures with one end of the suture placed on the cornea can also be used (Sayyad et al 1991). Hypotony from overfiltration usually can be left as such unless there is a flat anterior chamber with lens-cornea touch. In this case, the anterior chamber should be reformed with a viscoelastic agent. In recalcitrant cases, one needs to repeat the procedure. Choroidal effusions can be managed conservatively with steroids orally or topically. Large effusions require surgical drainage.

Increase in intraocular pressure
Raised intraocular pressure may be encountered in the early post operative period, and can be due to fibrin, vitreous, an iris plug occluding the lumen, or a tight external ligature. The techniques which have been reported to open the occlusion include
irrigation of the tube with saline through paracentesis or use of Nd-YAG Laser for vitreous incarceration or Nd-YLF. A tight suture can be severed with an argon laser. A late increase in intraocular pressure can be due to a thick fibrous capsule. Raised intraocular pressure can also be the result of topical steroids used during the postoperative period (Mermoud & Salmon, 1993).

Ocular motility disturbances may occur following large plate implant, which manifest as diplopia and strabismus. When implanted in inferonasal quadrants, larger plates can interrupt extraocular movements. It can be corrected by a replacement with a smaller design, transfer to another quadrants, or, in persistent cases, removal of the implant.

The intraocular portion of the tube may touch the cornea leading to corneal edema and decompensation. The tube-cornea touch can be minimised by using a scleral patch graft instead of a scleral flap. Alternatively, the tube can be repositioned (Freedman, 1987). Retraction of the tube may occur as a result of inadequate anchoring of the tube to episclera. Late erosion of tube may also occur. Epithelial ingrowth is uncommon, but may occur in tubes inserted closer to limbus. A sterile hypopyon has also been reported. Other late complications include choroidal effusion, choroidal hemorrhage, retinal detachment, endophthalmitis and phthisis bulbi.

Endophthalmitis as a result of drainage device implantation is not very common; the incidence is less than 2% (Al Torbak et al. 2005). Early postoperative endophthalmitis may be associated with host flora while late onset endophthalmitis is more common in thin-walled and leaky blebs that allow trans-conjunctival migration of bacteria (Gedde et al. 2001). Diminution of vision may be seen secondary to suprachoroidal hemorrhage, corneal edema, cataract, band shaped keratopathy and cystoid macular edema. Due to the high risk of complications, the US Food and Drug Administration has classified these devices as Category 3, presenting a potential unreasonable risk requiring the highest level of regulation (Krawczyk 1995).

**Recent advances in ADDs**

Recently, many advances have been made in the field of ADDs with respect to materials, design, and technique of implantation. All implants share the common goal of shunting aqueous humor out of the anterior chamber and bypassing the trabecular meshwork to increase outflow and lower the IOP. Some recently introduced implants are described below.

**Ex-Press shunt (Stainless steel)**

The Express shunt is the latest development in the treatment of difficult glaucoma cases. It consists of a 3 mm long stainless steel tube with a central hollow lumen that is 400 micrometers in external diameter and 50 micrometers internally. The bleb formation starts immediately and micro cysts within the bleb can often be seen within the first or second postoperative day. Additionally, surgery with the Express is less time consuming than with a larger shunt and, if it fails, a more extensive shunt procedure can be planned later. The Ex-Press shunt was initially designed to implant near the limbus through sclera into the anterior chamber. The external plate of the shunt was placed under the conjunctival flap thereby producing a filtering bleb near the entrance of Ex-Press shunt. This led to a number of postoperative complications including hypotony, choroidal detachment and suprachoroidal hemorrhage (Wamsley et al 2004). To overcome these complications, the Ex-Press shunt is implanted under the scleral flap which reduces the overall complication rate (Wamsley et al 2004; Dahan & Carmichael, 2005).

**Gold micro shunt (GMS)**

This device uses a 24 carat gold plate which is implanted into the suprachoroidal space. It is a biocompatible and inert material. The IOP reduction is achieved by the presence of opening and closing holes in the gold microshunt. The outflow is titrated with the help of 790 nm Titanium sapphire laser (Ozdamar et al 2003).
Artificial nano drainage implant (ANDI)
ANDIs are a biomedical device with a characteristic design that increases its success rate. It is a serpentine microchannel made of poly dimethyl siloxane (PDMS). The microchannel regulates the forward flow by friction. The special serpentine design increases the length of channel thereby creating a larger pressure differential over a smaller area. It also decreases the chances of infection by impeding bacteria movement up the device (Barth et al 2011).

Sutureless ADD surgery (Fibrin glue assisted)
The fibrin glue assisted surgical technique is similar to the Vicryl suture technique but instead of sutures, Tisseel fibrin glue is applied to the silicon tube to facilitate adherence to the underlying sclera. The Tisseel glue considerably reduces the postoperative conjunctival inflammation and decreases the time of surgery with no adverse effect on IOP control (Kahook & Noecker, 2006).

Glaukos iStent
It is a Titanium device which is placed inside the Schlemm’s canal, thereby allowing the aqueous humor to flow directly into the canal and bypassing the trabecular meshwork (Spiegel & Kobuch, 2002). The advantage of this implant is that it is free from bleb related complications. It is implanted through a clear corneal incision under topical anaesthesia.

Eyepass glaucoma implant
It is a Y-shaped stent made of silicon. The Eyepass directly shunts aqueous humor from the anterior chamber into the Schlemm’s canal bypassing the trabecular meshwork. The arms of the Y-shaped implant facilitate the flow of aqueous in both the clockwise and counter clockwise direction (Karmel 2004; Daly 2004). The rate of complications is also reduced. More studies and long term follow up is required to determine the safety and utility of this implant and any additional advantage over the currently used ADDs.

Aquaflow glaucoma implant
A non-penetrating deep sclerectomy along with the aqua flow collagen glaucoma implant has shown significantly lower post operative complications and better outcomes when compared to conventional trabeculectomy (Mermoud et al 1999). The Aquaflow glaucoma implant is a 5 mm × 4 mm in length. The collagen implant is inserted under the scleral flap after a deep sclerectomy. It swells to double its original size after absorption of eye fluids, and the implant takes 6 to 9 months to dissolve. The normal time for surgical scar healing is less than the life of this device. Once the aqua flow is dissolved, a channel remains to allow the aqueous flow to exit from the desired location, thereby maintaining the reduced IOP. Since the surgeon does not enter the anterior chamber, the chances of cataract formation are also reduced.

Future perspective
Currently, an aqueous shunt is in clinical trials which will include the formation of a thinner capsule and have greater hydraulic conductivity. It is based on the hypothesis that changing the geometrical design of the commonly used shunt devices from a plate design to a cylindrical shape will reduce the tension on the capsule surrounding the implant (Wilcox & Minckler, 1994). In experiments on rabbits, the cylindrical design produced a thinner bleb as compared to the Baerveldt implant with an 8 times increase in hydraulic conductivity as measured by perfusion experiments (Wilcox et al 2000). The goals of new designs are to produce easier- to-use implants with fewer complications, and more predictable IOP control. Currently, none of the available implants provide predictable resistance to fluid outflow.

Conclusion
Artificial drainage devices have been successfully used to treat glaucoma in refractory cases but due to high rates of complications, they are reserved for cases of recalcitrant glaucoma. In developing countries with illiteracy and poor follow-up
trabeculectomy with Mitomycin-C remains the treatment of choice.

References


Source of support: nil. Conflict of interest: none
Introduction: Vision Science is considered to be a quite developed discipline in Nepal, with much research currently in progress. Though the results of these endeavors are published in scientific journals, formal citation analyses have not been performed on works contributed by Nepalese vision scientists.

Objective: To study Nepal’s contribution to vision science literature in the database “Web of Science”.

Materials and methods: The primary data source of this paper was Web of Science, a citation database of Thomas Reuters. All bibliometric analyses were performed with the help of Web of Science analysis service.

Results: In the current database of vision science literature, Nepalese authors contributed 112 publications to Web of Science, 95 of which were original articles. Pokharel GP had the highest number of citations among contributing authors of Nepal. Hennig A contributed the highest number of articles as a first author. The Nepal Eye Hospital contributed the highest number of articles as an institution to the field of Vision Science.

Conclusion: Currently, only two journals from Nepal including Journal of Nepal Medical Association (JAMA) are indexed in the Web of Science database (Sieving, 2012). To evaluate the total productivity of vision science literature from Nepal, total publication counts from national journals and articles indexed in other databases such as PubMed and Scopus must also be considered.

Keywords: Vision science literature; bibliometrics; citation analysis, Nepal
account for 90.8% of world blindness, compared to 9.2% from the developed countries. Therefore, an inverse relationship exists between the burden of the world blindness and the contribution to the highest impact factor research (Mandal & Benson 2004). The top 10 countries in terms of total number of articles published in the ophthalmic literature were the United States, the United Kingdom, Japan, Germany, Canada, Australia, Italy, The Netherlands, Sweden and France. India ranked 13th position among vision science literature publications (Kumaragurupari, 2010).

There are approximately 210,000 blind persons in Nepal and one eye doctor (ophthalmologist) per 240,000 persons (BP Eye Foundation, 2009). Given this ratio, there are relatively few ophthalmologists in Nepal, and therefore, examining and treating patients is their first priority. Large numbers of patients, limited access to research facilities and poor data management are obstacles faced by vision science researchers in Nepal, where research endeavors are generally self-initiated. Even after research has been completed and the paper has been written, language barriers can remain which obstruct effective communication of the research to the international scientific community. However, in spite of these obstacles, research is still being conducted and articles are published in this country. Web of Science has indexed only one journal from Nepal, while Scopus (Sieving 2012) and PubMed have indexed five medical journals each (PubMed 2012).

In order to evaluate scientific productivity, citation analyses need to be performed on research publications from a given country. “Citation analysis” is defined as counting the number of times a publication has been cited (University Library, University of Illinois, 2012). Therefore, one can gauge the importance of a publication within a discipline by counting the number of times it has been cited by other scholars in the field. If an article has a high number of citations, one may conclude that it has been the subject of discussion or criticism in its discipline. Additionally, finding the list of articles that have cited a particular article is a bridge to more information about a research topic (University Library, University of Illinois 2012).

Web of Science, Scopus (Sciverse Scopus, 2011) and Google scholar (Harzing, 2008) are the tools to evaluate the citation analysis. Web of Science is an online academic citation index provided by Thomson Reuters. It is designed to provide access to multiple databases, cross-disciplinary research, and in-depth exploration of specialized subfields within an academic or scientific discipline. As a citation index, any cited paper will lead to any other literature (book, academic journal, proceedings, etc.) which currently, or in the past, cites this work. In addition, literature which shows the greatest impact in a field covered by Web of Science, or more than one discipline, can be selectively obtained. For example, a paper’s influence can be determined by linking to all the papers that have cited it. In this way, current trends, patterns, and emerging fields of research can be assessed. Web of Science has indexing coverage from the year 1900 to the present (Wikipedia, 2012).

The h-index is an index that attempts to measure both the productivity and impact of the published work of a scientist or a scholar. The h-index is based on the set of the scientists’ most cited papers and the number of citations that they have received in other publications. This index can also be applied to the productivity and impact of a group of scientists such as a department or a university or a country. The index was suggested by Jorge E Hirsch (Wikipedia, 2012 Feb 26).

This paper intends to study the overall picture of vision science research, its publication and its use with the help of reliable tool “Web of Science”.

**Materials and methods**

The primary data source of this paper was Web of Science, a citation database of Thomas Reuters. The search statement of the Web of Science database was used. The search word used was Nepal.
A total of 112 publications of vision science literature of Nepal were extracted from the database. Among those publications, 95 were original articles. Only original articles were used for author or subject productivity. Reviews, meeting abstracts, letters, editorialis, proceeding papers and news items were excluded. Only purely ophthalmic literature was extracted, as defined by the database. For example, though the total literature contribution of Khatry SK in Web of Science was 112 publications, only 5 of his articles were evaluated. Articles evaluating nutrition and other related subjects were excluded. The publications of an individual institution were studied according to the database definition from the “address of institution” search option.

During September 2011, the database was searched and relevant information was downloaded for required analyses. All bibliometric analysis had been done with the help of Web of Science analysis service. Some parts of the evaluation were performed with Microsoft Excel.

**Results**

**Ten most productive years of vision science publications in Nepal**

In the year 2010, Nepal contributed a total of 9 original vision science articles to the database “Web of Science”, making it the most productive year thus far. Only the ten most productive years are shown in the figure above.

### Table 2

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According to Table 2, articles written by GP Pokharel had the highest number of citations and his h-index was 14.
Table 3
Authors contributing to vision science literature of Nepal with high h-indexes from international institutions

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Table 3 shows that Ellwein B had the highest h-index among international contributions to the vision science literature of Nepal.

Table 4
Productivity of national ophthalmic institutions of Nepal

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Table 4 shows Nepal Eye Hospital contributing the highest number of articles to the database Web of Science followed by Nepal Netra Jyoti Sangh and Tilganga Institute of Ophthalmology. Publications of Nepal Netra Jyoti Sangh were most cited in other worldwide ophthalmic literature.

Table 5
Contribution to Vision Science literature of Nepal by international institutions

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<th>No. of articles</th>
<th>Citations</th>
<th>Cited without self-citation</th>
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</thead>
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<tr>
<td>University of California, San Francisco</td>
<td>15</td>
<td>303</td>
<td>287</td>
</tr>
<tr>
<td>National Eye Institute, Bethesda</td>
<td>9</td>
<td>554</td>
<td>533</td>
</tr>
<tr>
<td>Foundation Eye Care Himalaya</td>
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<tr>
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<td>84</td>
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<tr>
<td>Munich University</td>
<td>5</td>
<td>71</td>
<td>70</td>
</tr>
<tr>
<td>University of Tromso</td>
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<td>World Health Organization</td>
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<tr>
<td>Seva Foundation, Berkley</td>
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<td>194</td>
</tr>
<tr>
<td>Aravind Eye Hospital</td>
<td>4</td>
<td>68</td>
<td>66</td>
</tr>
</tbody>
</table>

University of California, San Francisco contributed the largest in number of articles as an international collaborator. Articles produced in collaboration with the National Eye Institute, Bethesda were cited more often than those with the other institutions (Table 5).
Table 6
Most cited ophthalmic articles of Nepal

<table>
<thead>
<tr>
<th>Article</th>
<th>Author</th>
<th>Journal</th>
<th>Year, Vol., No</th>
<th>Total cited</th>
<th>Average citation per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>diagnosis of corneal ulceration in Nepal</td>
<td>PCK, Koirala S et al</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refractive error study in children: sampling and measurement methods</td>
<td>Negrel MD, Maul E, Pokharel GP</td>
<td>American Journal of Ophthalmology</td>
<td>Year 2000, Vol 129, issue 4</td>
<td>84</td>
<td>4.4</td>
</tr>
<tr>
<td>for a multi country survey</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>and operated blind population in Nepal</td>
<td></td>
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</tbody>
</table>

Source: Web of science

Table 6 shows that the most cited article was “Refractive error study in children: result from Mechi Zone, Nepal” by Pokharel GP et al. The use of this article was the highest among the articles on vision science from Nepal listed in Web of Science. Out of 5 articles, GP Pokharel contributed the 4 highest cited articles. Among those 5 articles, 3 articles were published in the American Journal of Ophthalmology.

Currently, the Journal of Nepal Health Research Council and that of the Nepal Medical Association are indexed in Web of Science (Website accessed on 10.06.2012).

Discussion

Researchers in less developed countries (United Nations, 2012) such as Nepal, rarely get budgetary allotments for research. However, simply the facts that there are a total of 112 articles in the database “Web of Science” contributed by the Nepalese researchers demonstrate their willingness to independently undertake research endeavors. Only one journal from Nepal is indexed in the database Web of Science (Sieving, 2012). India contributes the total number of 269 journals in the database (Nagaraja, 2011). When compared to other countries, Nepal contributes a relatively small number of scientific publications to the world of Vision Science literature. The year 2010 contributed the highest number of articles in this database.

The contributions of GP Pokharel, RP Pokharel, Hennig A and Upadhyaya M are quite high in numbers. Nepal’s oldest ophthalmic institution, Nepal Eye Hospital contributed the relatively more vision science related literature.

The high h-index of an author or co-author does not always mean the actual productivity of the author or the co-author in the given field. It only tells about how many times the article is cited by other authors. The Scopus database has the possibility for calculating h-index by excluding “self-citation” and “all of co-authors”. But Web of Science does not have this facility. Scopus database is weaker than Web of Science in terms of time coverage (Dehghani, 2011). In the table no 2 it shows that Bha  

307
Some authors (Dehghani, 2011) propose that co-author citation should not be considered for calculating h-index or highly cited research. In this article, it only intends to talk about the study of citation received by the scientific articles which were not initiated before in Nepal.

Limitations
The data used in this study was extracted only from the database “Web of Science”. Web of Science only covers approximately 23,000 journals out of the total peer reviewed journals published in the world. Therefore, the present study was not based on the total scientific publication output of vision science literature of Nepal.

Conclusion
To evaluate the total productivity of vision science literature from Nepal, total publication counts from national journals and articles indexed in other databases like PubMed and Scopus must also be considered. We hope that the results of this study will inspire those in the field of vision science in developing countries to make further contributions to the growing body of literature in this discipline.

Acknowledgement
I would like to thank Ms Emily Cole, US for her valuable suggestions while preparing this article.

References


University Library, University of Illinois (2010). Citation analysis [online]. Available at: <http://www.library.illinois.edu/learn/tutorials/citationanalysis.html> [Accessed 26 Jan 2012].


Source of support: nil. Conflict of interest: none
Repositioning of Ahmed glaucoma valve tube in the anterior chamber with prolene sutures to manage tube-endothelial touch

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Abstract

Background: Corneal endothelial damage is a known complication of aqueous shunt surgery. Objective: To describe a new technique for repositioning the Ahmed glaucoma valve tube in a case of tube-endothelial touch. Case: A patient with advanced glaucoma, having undergone Ahmed glaucoma valve (AVG) implantation, developed localized corneal endothelial damage due to contact between the tube and superior corneal endothelium. Two 10-0 prolene anchor sutures were passed over the tube in the anterior chamber, repositioning it away from the endothelium, thus preventing further damage to the corneal endothelium. Resolution of corneal oedema was noted without affecting the tube drainage and intraocular pressure. Conclusion: Intracameral repositioning of the shunt tube using prolene sutures is a useful technique for correcting the tube malposition.

Keywords: Ahmed glaucoma valve, endothelial damage, prolene suture

Case report

A 60-year-old male glaucoma patient who had undergone AGV implantation 2 years ago presented with a complaint of progressive diminution of vision in his right eye. On examination, his BCVA was 20/
200 OD, PR accurate with pseudophakia and advanced glaucomatous optic neuropathy with near total cupping. The IOP was 14 mmHg without medication. The left eye had a BCVA of 20/20 with no ocular abnormality. Corneal bullae had formed in the supero-temporal quadrant, wherein the AGV tube was seen touching the endothelium (Figure 1a). The patient was scheduled for tube repositioning using prolene sutures in the anterior chamber. Limited peritomy was done in the nasal and temporal quadrant and a sclera groove was made. One double armed 10-0 prolene suture (straight long needles) was passed from the nasal to the temporal sclera (1 mm posterior to the limbus) and the knot was buried within the preplaced scleral groove (Figure 1b). A Sinskey hook was used to manipulate the tube such that it was placed under the suture and away from the corneal endothelium (Figure 1c, 1d). In the post-operative period, progressive improvement was noted in the corneal oedema and there was reversal of the localized bullous keratopathy. The IOP was 16 mmHg at 1 week and 14 mmHg at 4 weeks of follow up.

Discussion

An incorrectly positioned tube in the anterior chamber can occur in the early and late postoperative period. It may lead to corneal decompensation due to tube-corneal endothelial touch. The exact mechanism of damage to the corneal endothelium remains unclear, and many theories have been proposed. McDermott and associates proposed the jet flow around the tube end caused by the heart-beat, inflammation in the chamber, intermittent tube–corneal touch, tube–uveal touch, and a foreign body reaction to the silicone tube as possible mechanisms of corneal endothelial damage (McDermott et al, 1993). It has been suggested that high IOP and long duration of elevated IOP before surgery may affect the endothelium directly or may indirectly cause hypoxic damage (Setälä et al, 1979). Fiore and associates proposed that the mechanism of corneal endothelial damage may involve the toxicity of the preservatives in eye drops, the duration of surgery, shallowing of the anterior chamber during or after surgery, or changes in the composition of the aqueous humor attributable to the direct connection with the sub-Tenon space (Fiore et al, 1989). The cell loss can vary from 15.3% at 1 year to 18.6% at 2 years (Eun-Kyong Lee et al 2009) and is accentuated in cases of tube-corneal touch. The reported frequency of tube-endothelium touch is variable, ranging from 8% to 20% (Hill et al, 1991; Lloyd et al, 1992). Repositioning of the AGV, cutting the tube, a change of the implantation site and insertion of the tube into the posterior chamber or into the posterior segment via pars plana (after vitrectomy) may be considered (De Guzmann et al, 2006). Explantation of the drainage device is often the last alternative. Trimming of a glaucoma shunt tube with Descemet membrane endothelial keratoplasty (DMEK) has also been reported (Bersudsky V et al 2011).

In this case, the position of the tube could be corrected by placing a transcameral suture from limbus to limbus. The other option was to remove the implant and put in a new implant. However, this
would constitute a major surgery and increase the risk of fibrosis and failure, and escalate the surgical cost. This procedure will allow tube repositioning while retaining its function. Since the sutures are away from the pupillary axis, glare and other annoying visual symptoms will not occur. Possible complications or side effects of our technique are the induction of astigmatism, erosion of the suture at the limbus, long-term degradation of Prolene and ocular infection. The risk of ocular infection is considered to be very small as the externalized suture is buried within a scleral groove covered by conjunctiva.

Conclusion

Thus, our technique of placing limbus to limbus anchor sutures to depress the tube away from the endothelium offers a quick and minimally invasive alternative to correct tube-endothelial touch in eyes with malpositioned glaucoma drainage devices.

References


Source of support: nil. Conflict of interest: none
Case report

Prosthetic rehabilitation of a patient with enucleated eye - a case report

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Abstract

Background: The loss of an eye has a crippling effect on the psychology of the patient, making rehabilitation process challenging for both doctor and patient. Objective: To report a case of anophthalmic socket with prosthetic rehabilitation in a cost effective manner. Case: A 32-year-old female presented with anophthalmic socket for prosthetic rehabilitation. A custom made ocular prosthesis was implanted successfully.

Conclusion: The custom made ocular prosthesis is simple, affordable and can be carried out in a small clinical set-up and provides a superior natural appearance.

Key-words: Ocular prosthesis, ocular defect, evisceration, enucleation

Introduction

Because the loss of an eye has a psychological effect on the patient and their families, immediate replacement of the lost eye is necessary to promote physical and psychological healing for the patient and to improve social acceptance (Mishra et al, 2009). According to the Society for the Prevention of Blindness, 50% or more of eye losses are caused by trauma. Other conditions that cause eye loss include malignancies and congenital defects. Depending on the severity of the situation, the surgical management may include one of the three approaches: evisceration, enucleation and, exenteration (Kumar et al 2008). The art of making artificial eyes has been known to man for centuries with the earliest known examples found in mummies dating back to the Forth Dynasty in Egypt [1613-2494B.C.]. Ambroise Pare, a French Surgeon-dentist, is considered to be the pioneer of modern artificial eyes. He fabricated artificial eyes made of glass as well as porcelain. In 1944, a Naval dental school tested the use of acrylic resin in fabricating a custom-fitted ocular prosthesis. Unlike a glass eye, an acrylic resin eye was easy to fit and adjust, unbreakable, aesthetically pleasing, longer lasting and easier to fabricate (Gupta et al 2010). This article
describes a case report where a simple technique has been used for fabrication of an ocular prosthesis.

Case report

A 32-year-old female reported to the Department of Prosthodontics and Maxillofacial Prosthetics, in a dental college, for the fabrication of an ocular prosthesis for the left eye (fig. 1). History revealed surgical removal of the eyeball due to malignancy. Examination of the socket revealed healthy conjunctival lining and absence of infection. Treatment plan included fabrication of custom made ocular prosthesis by a team including prosthodontists and an ophthalmologist. An impression of the anophthalmic socket was made by injecting impression material directly into the socket using a syringe. Once filled, the head was moved to the vertical position and the patient was directed to move his eyes both up and down and side to side to facilitate the flow of the impression material into all aspects of the socket. Next the patient was asked to look at a distant spot at eye level with gaze maintained in a forward direction to ensure that the posterior aspect of the enucleated socket and tissue bed will be in the correct position for the fitting procedure (Kumar et al 2008). After the material sets, the impression was rotated out of the socket and was checked for accuracy (fig. 2). Then two-piece dental stone mold was made by placing the impression in the dental stone leaving a hole in the anterior part of the mold (fig. 3). The hole left in the mold was filled with molten wax to fabricate a scleral wax pattern. Wax pattern was finished and polished and was evaluated for the fit. Wax was added or trimmed from the basic scleral pattern until satisfactory contours of the eyelids were achieved both in open and closed positions. The position of the contra lateral eye’s iris was used as a guide, to mark the expected position of the iris on a wax pattern (Adarsh et al 2011). A stock eye was selected with the correct iris size and color. The peripheral and posterior surfaces of the stock eye were reduced leaving only iris portion of the stock eye. This trimmed stock eye was embedded in correct position on the wax pattern (fig 4). The try in for the wax pattern was done to verify the iris position, the eye was fitted. After the wax pattern was found to be satisfactory, it was invested and processed by selecting appropriate shade of heat cure acrylic that matches the sclera of patient’s natural eye. After processing, the final prosthesis was recovered and polished with pumice powder to a high shine. Prosthesis was inserted into the socket, and checked for any areas requiring adjustment (fig. 5). The esthetics and comfort of the patient were evaluated and the patient was educated on insertion and removal of the prosthesis. The patient was instructed to wear the prosthesis 24 hours and clean it once in 3-5 days with gentle soap (Kapoor et al, 2010).

Discussion

The importance of an ocular prosthesis with acceptable aesthetics and reasonable mobility in restoring normal appearance in patients with
anophthalmia has long been recognized. Ocular prosthesis can be either ready-made (Stock) or custom made. A Custom made prosthesis has several advantages. Since it is made to fit a particular patient, it has an improved fit and better retention. An exact color match of the iris and sclera can be achieved with the adjacent eye, and if well-made, it maintains its orientation when patient performs various ocular movements (Mishra et al 2008). It can also be polished and cleaned repeatedly when needed and are practically unbreakable. A custom made ocular prosthesis is a good option when reconstruction by plastic surgery or the use of osseo-integrated implants is not possible or desired (Gupta et al 2010).

**Conclusion**

The use of custom made ocular prosthesis has been a boon to the patient who cannot afford the expensive treatment options available. The technique provides a form which is more closely adapted to the dimensions of the defect and allows better tracing response during eye movements. The procedure used here is Simple, affordable and can be carried out in a small clinical set-up and provides a superior natural appearance.

**References**


Source of support: nil. Conflict of interest: none
Ocular myocysticercosis: Favorable outcomes with early diagnosis and appropriate therapy

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Abstract

Background: Ocular myocysticercosis is rare and a high index of suspicion is required for its diagnosis. Objective: To describe clinical characteristics and treatment outcome of ocular myocysticercosis. Cases: We describe a series of three patients who had different clinical presentations of ocular myocysticercosis namely diplopia, restricted ocular motility and sub-conjunctival cyst. The treatment with oral albendazole and prednisolone was effective in all three cases. Conclusion: Favorable outcomes can be achieved with a high index of suspicion, early diagnosis and treatment with oral albendazole and prednisolone in patients with ocular myocysticercosis.

Key-words: Myocysticercosis, albendazole, steroids

Introduction

Ocular cysticercosis is a parasitic infection caused by the larvae of cestode Taenia solium. It is endemic in developing countries of Latin America, Asia and Africa especially in areas of poverty and poor hygiene (Sekhar & Hanovar 1999). The cysticerci travel via the hematogenous route and lodge themselves in any part of the ocular or orbital tissue. After reviewing all the documented cases of ocular and adnexal cysticercosis, Kruger-Leite et al (1985) found that 35% of cysts were reported in sub-retinal space, 22% in the vitreous, 22% in the sub-conjunctival space, 5% in the anterior segment ad only 1% in the orbit.

The clinical manifestations of ocular cysticercosis depend on the location, size, relation to the adjacent structure and the stage of development of the cyst. The most common presenting features are restricted ocular motility, recurrent pain and redness, diplopia, proptosis, subconjunctival cyst, atypical optic neuritis, papilloedema, lid nodules and sub-retinal and intra-vitreal cysts (Pushker et al, 2001).

The spectrum of clinical presentations of ocular myocysticercosis is diverse. We present three cases of ocular myocysticercosis with varied presentations who had a favorable outcome following early diagnosis and appropriate therapy.

Case 1: A 32-year old female presented with a history of episodes of pain and redness in the left eye for one week and diplopia in inferior gaze for two days. Ocular examination revealed a visual acuity of 20/20 in both eyes and mild conjunctival...
congestion in the inferior bulbar conjunctiva of the left eye. Ocular movements were normal in the right eye, whereas in the left there was mild restriction in down gaze. Magnetic resonance imaging (MRI) of the orbit showed a ring enhancing lesion with an eccentric nodule in the inferior rectus muscle (Figure 1). Ultrasonography showed a well defined hypoechoic area in the inferior rectus muscle with a central echodense reflective structure suggestive of the scolex. Diagnosis of cysticercosis was confirmed by enzyme linked immunosorbent assay (ELISA). The patient was given oral albendazole 15mg/kg/day and prednisolone 1mg/kg/day for 4 weeks. Within 15 days of initiating treatment, her symptoms of diplopia, redness and pain decreased and completely regressed after 4 weeks of therapy. There has been no recurrence during the 2-year follow up period.

**Case 2:** A nine-year old girl presented with a history of gradual onset squint in the left eye for one month with no associated complaints. The patient had a history of episodes of generalized seizures one year ago for which an MRI of the brain was done elsewhere. She was reported to have a ring lesion in the left parietal lobe and was commenced on oral sodium valproate, after which her seizures did not reoccur. Her visual acuity was 20/20 in both eyes and upon ocular examination she was found to have an exotropia of 50 prism dioptres in the left eye with restricted abduction and adduction in the same eye (Figure 2A). The brain and orbit MRI showed expansion of the left lateral rectus muscle with an area of hyper-intensity within the muscle on T2W images and was suggestive of a cyst which slightly displaced the optic nerve medially. The ultrasonography also showed an enlargement of the left lateral rectus muscle with a hypoechoic area within it and mild displacement of the optic nerve. ELISA for cysticercosis was significantly positive and the patient was started on oral albendazole (15mg/kg/day) and prednisolone (1mg/kg/day). After two days of treatment, the patient returned with complaints of severe pain and swelling in the left eyelid (Figure 2B). Although her visual acuity was normal, she had severe periorbital edema with conjunctival chemosis and congestion in the left eye. A repeat ultrasound of the left eye showed periorbital edema with no changes from previous examination. Topical tear substitute was added to the regimen of oral therapy and the patient was seen at frequent intervals. Her symptoms of pain, swelling and redness improved after one week and her ocular movements improved after 4 weeks of oral albendazole and prednisolone therapy. After one year, there was a residual exotropia of 15 prism dioptres in the left eye.

**Case 3:** A 20-year old male presented with history of a painful red nodule in the right eye for two months (Figure 3A) and binocular diplopia for one month. A CT scan of the orbit performed at another facility one month ago showed thickening of the right medial rectus muscle with an area of focal heterogeneity. He was started on oral steroids which caused a mild improvement in the symptoms. However, after discontinuation of steroid treatment, his symptoms recurred and he came to our facility for a second opinion. The visual acuity was 20/20 in both eyes. There was a smooth, hemispherical, subconjunctival cystic swelling 1.2cm x 1.2cm on the medial bulbar conjunctiva of the right eye. The overlying conjunctival and episcleral vessels were congested. An ultrasonography was recommended. The patient returned the next day with the spontaneous extrusion of a small balloon like translucent structure from the eye, which was wrapped in a piece of cloth. Upon examination of the eye, the cystic lesion could not be seen and there was a defect visible in the medial conjunctiva, along with localized congestion of vessels. Histopathological examination confirmed the diagnosis of cysticercosis cellulosae (Figure 3B), following which he was started on the regimen of oral albendazole and prednisolone, tear substitute and ciprofloxacin eye drops. His signs and symptoms regressed completely with the above therapy.
Discussion

While ocular cysticercosis predominantly affects the posterior segment, orbital involvement is not rare. The intraocular cysts are readily diagnosed because of their visibility; however, the diagnosis of extraocular myocysticercosis remains speculative. With the advent of better imaging modalities and the availability of ELISA, extraocular myocysticercosis can be diagnosed more easily if clinical suspicion is high.

There are no clear cut guidelines for the management of extraocular myocysticercosis. Surgical removal of the cyst presents a high risk of inadvertent injury to the muscle, resulting in ocular motility disturbances. Surgical intervention is not recommended in myocysticercosis (Mohan K et al, 2005).

Spontaneous extrusion of the cyst, as seen in our third patient, may occur due to inflammation and frequent movement of the muscle involved (Sekhar & Lemke, 1997).

Oral albendazole is a highly effective cysticercidal drug which blocks the glucose uptake of the parasite, thus depleting its glycogen stores. This leads to the death of the larva, release of toxins and severe inflammation. Concurrent use of oral steroids suppresses this inflammation and its sequelae (Sekhar & Lemke, 1997).

Albendazole (15mg/kg/day in two divided doses) combined with oral prednisolone (1mg/kg/day) for
a period of 4 weeks is effective in the treatment of ocular myocysticercosis (Sihota & Honavar 1994). We used a similar regimen for all three patients with favourable outcomes. While complete recovery has been reported in the majority of patients with ocular myocysticercosis, ocular motility restrictions and residual deviations, as seen in our second patient, have also been reported (Sekhar 1997 & Sundaram et al 2004).

Side effects of oral albendazole are rare, though occasional cases of dizziness and gastrointestinal problems have been reported. Optic neuritis has been reported following administration of oral albendazole in a patient with orbital cysticercosis (Tandon et al, 1998). One of our patients developed severe periorbital edema and chemosis on the second day of oral albendazole therapy. A localized inflammatory reaction after initiating this treatment has been previously reported which usually peaks on the third day of the therapy. Therefore, it has been suggested that oral steroids should be started three days prior to therapy with albendazole (Pandey et al, 2000).

Praziquantel has also been used for treatment of ocular myocysticercosis. However, the cyst elimination rate with praziquantel is reported to be only 67% as compared to 80% with albendazole (Soleto J et al, 1998).

**Conclusion**

A high index of suspicion, early diagnosis and appropriate therapy result in favorable outcomes in patients with ocular myocysticercosis. Moreover, oral albendazole and prednisolone are effective for the treatment of ocular myocysticercosis.

**Acknowledgement**

We acknowledge the help rendered by Dr Sangeetha Mohan and Dr Kanwardeep in providing histological diagnosis. The authors would also like to thank Dr Thomas Mathew for the help.

**References**


Source of support: nil. Conflict of interest: none
Accommodative spasm with bilateral vision loss due to untreated intermittent exotropia in an adult

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Abstract
Background: Intermittent exotropia (IXT) is an exodeviation intermittently controlled by fusional mechanisms. Patients with IXT may present with asthenopic symptoms, blurred vision, headaches, diplopia or visual confusion and reading difficulties; especially after prolonged periods of near work. Objective: To report the presentation and management of a young adult with intractable accommodative spasm secondary to long standing intermittent exotropia. Case: The patient was found to have bilateral accommodative spasm with high pseudomyopia and severe impairment of vision. There was a tendency for recurrence with discontinuation of cycloplegics. Conclusion: A total relief of symptoms was noticed after strabismus surgery was undertaken for the exotropia. A detailed orthoptic evaluation with emphasis on recognizing accommodative spasm as an unusual presentation of IXT, could aid in appropriate diagnosis and treatment of such cases.

Key-words: Pseudomyopia, intermittent exotropia, accommodative spasm, vision therapy

Introduction
The near response triad consists of a normal synkinesis between accommodation, convergence and miosis (Faucher et al, 2004). When one or more of these components exceeds the demand required by the stimulus, a ‘spasm of near reflex’ is said to occur. While some patients may have isolated accommodative spasm (AS) without involving convergence and pupils, others may show spasm of convergence without abnormal accommodation (Rutstein and Marsh-Tootle, 2001; Rutstein, 2010; Goldstein and Schneekloth, 1996). A varied etiology has been proposed for spasm of near reflex, including uncorrected hypermetropia, psychological disorders (Goldstein and Schneekloth,1996), intermittent exotropia (Rutstein and Marsh-Tootle, 2001; Rutstein, 2010) and certain organic disorders like meningitis, pituitary tumour, head trauma and certain ocular/systemic drugs (Goldstein and Schneekloth,1996).

Here, we describe an unusual case of a young myopic male with intractable accommodative spasm secondary to untreated IXT with no neurological abnormalities. Clues for diagnosis and the role of vision therapy exercises as an important adjunctive management are discussed.

Case report
A 22-year old male presented to the strabismology sevices of Shroff’s Charitable Eye Hospital with complaint of a headache associated with blurred
and fluctuating vision for the past 4 years which severely affected his daily activities. His past ocular history was relevant that he wore glasses with a myopic correction of -2.00 dioptre sphere (DS) in the right eye and -1.50 DS in the left eye. The patient was of a neurotic disposition but denied any history of head trauma, physical or psychological ill health and was not taking any medications.

The presenting Snellen’s visual acuity was 2/60 in each eye. Ocular movements were full and pupillary reactions were normal to light and accommodation. There was no pupillary miosis. Dynamic retinoscopy (Monocular Estimation Method, MEM) was unstable and revealed a lead of accommodation of -5.00DS in both eyes.

The refractive error by retinoscopy was -10.00 DS in both eyes, present under both unocular and binocular conditions. Cycloplegic refraction (1% Cyclopentolate eye drops instilled half an hour before examination) was -2.25 DS in the right eye and -1.50 DS in the left eye. Under cycloplegia, with the above refractive correction the visual acuities improved to 6/6 in each eye. Biomicroscopy, intraocular pressures and dilated ophthalmoscopy were all normal. A cover test and assessment of the accommodative facility could not be performed in the undilated state due to visual impairment and poor fixation.

Based on the clinical picture, the case was diagnosed as that of accommodative spasm with pseudomyopia and was advised to use homatropine (2%) eye drops twice a day for ten days. After discontinuing cycloplegic therapy, the patient was advised to perform vision therapy exercises to improve accommodative facility.

On review, it was observed that the patient had very poor accommodative amplitudes with binocular and monocular accommodative facility being 0 cycles per minute with ± 2.00 DS flipper with difficulty in relaxation of accommodation. However, positive fusional convergence ability was normal. Table 1 shows the accommodative facility measured on the first and last visit of vision therapy exercises after discontinuing the homatropine eye drops.

After two weeks, the patient complained of persistent blurred vision. His visual acuity was 6/36 in the right eye and 6/24 in the left eye. When checked uniocularly, the BCSVA was 6/6 in each eye. A lead of accommodation was present on dynamic retinoscopy. Prism alternate cover test revealed intermittent exotropia of the basic type measuring 25 prism dioptres (PD) base-in and 16 prism dioptres base-in for distance (6 m) and near (33 cm) respectively; poorly controlled at both distance and near. Stereopsis, as measured with the Titmus fly test was 3000 arc/sec. Prism adaptation test (PAT) was done for 1 hour and Fresnel prism of 20 PD base-in was prescribed, with which the BCSVA was 6/9 binocularly. The patient was instructed to return in one month for adjustment of prisms.

At the follow up visit, his visual acuity was 6/6 in the right eye and 6/9 in the left eye. Orthoptic evaluation showed 40 PD base-in of manifest exotropia for distance and 25 PD base-in for near after PAT. He underwent bilateral lateral rectus recession of 8.5 mm under general anesthesia. Post surgery, retinoscopy revealed a refractive error of -2.50 DS in the right eye and -1.50 DS in the left eye with BCSVA 6/6. There was no lead or lag of accommodation on dynamic retinoscopy. Cover test showed exophoria of 14 prism dioptres for both distance and near. Stereopsis was 40 sec of arc at near. He was advised to continue vision therapy exercises at home. At the last follow up, undertaken 3 months back, the patient was asymptomatic and an exophoria measuring 5 prism dioptres was present for both distance and near with a stereo acuity of 40 sec of arc.

**Discussion**

Large exophoria or intermittent exotropia has been described as a cause of accomodative spasm (Burian & Hermann,1945; Seaber,1966; Rutstein et al, 1988; Goldstein and Schneekloth,1996). As...
compared to an orthophoric person, a patient with IXT requires a greater convergence to fixate at a near target, especially if there is a large angle and a rigid connection between convergence and accommodation in the central nervous system.

In our patient, although the etiology was intermittent exotropia, he presented in a state of chronic bilateral spasm of accommodation, with high pseudomyopia, bilateral decrease of vision, severe asthenopic symptoms and variable angle of deviation. Whenever an attempt was made to wean the cycloplegic, the pseudomyopia recurred. Cycloplegia along with guided vision therapy exercises over a period of time helped normalize the accommodative amplitude. This enabled us to neutralize the exodeviation with Fresnel prisms to promote sensory fusion and relax accommodative convergence, following which strabismus surgery was done for the full deviation uncovered after prolonged prism adaptation, which led to complete resolution of symptoms.

It has been observed that when intermittent exotropia is the etiology, the accommodative spasm is usually intermittent, present under binocular conditions and absent with cycloplegia (Rutstein & Marsh-Tootle, 2001; Shimojyo et al., 2009).

In our case, the accommodative spasm was initially present under both monocular and binocular conditions. We theorize that the chronic state of accommodative spasm occurred as a result of a sustained over-accommodative response in an attempt to overcome a large angle exodeviation and maintain fusion. Age related worsening of the phoria-myopia, as suggested by Shomojyo et al. could have been a contributing factor. Another unusual feature in our case was the absence of pupillary miosis or convergence spasm despite a severe accommodative spasm.

The etiology of accommodative spasm is most often functional or idiopathic although a number of organic causes have been reported (Rutstein et al., 1988; Goldstein & Schneekloth, 1996). A neurological evaluation was not done in our patient as the etiology was evident, the condition had been present for four years and he had no associated symptoms. A variety of methods have been used for the treatment of accommodative spasm including cycloplegics, miotics, plus lenses, minus lenses and occlusion of nasal section of spectacle lenses with equally variable results (Goldstein & Schneekloth, 1996). As in our case, Shimojyo et al. (2009) noted that reducing the exodeviation by surgery not only improves binocular vision but also reduces the associated myopic shift and pupillary constrictions.

In our case, though the etiology was IXT, the presentation was that of spasm of accommodation; the accommodative dysfunction was immediately corrected once the etiology and the IXT were corrected by surgery. Initially, the etiology for accommodative spasm was not clear and became obvious only once the accommodative spasm was relaxed by cycloplegia.

**Conclusion**

A detailed orthoptic evaluation should be performed in all cases of accommodative spasm before assuming that it is idiopathic.

**References**


Source of support: nil. Conflict of interest: none
Melanocytoma of the optic disc – a case report

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Abstract

Introduction: Melanocytoma of the optic disc is a benign lesion. Objective: To describe a case of optic disc melanocytoma. Case: A 48-year old lady presented with gradual visual impairment associated with a floater. The right eye fundus examination showed a mass uniformly dark black in colour on the optic disc. The mass completely obscured the fluorescence on fluorescein angiography and was thus differentiated from malignant melanoma. Conclusion: Optic disc melanocytoma can present with visual impairment and a floater. Fluorescein angiography can be useful to differentiate between malignant melanoma and melanocytoma.

Keywords: Optic disk melanocytoma, diminution of vision, fluorescein angiography

Introduction

Melanocytoma is also known as magnocellular nevus. It is a benign, stationary heavily pigmented tumor that may develop wherever uveal melanocytes are present and most commonly occur on or adjacent to the optic disc with little potential for growth (Zimmerman, 1962). They are typically unilateral and rarely undergo a malignant transformation. Melanocytomas are classically asymptomatic lesions causing no appreciable change in the visual acuity except in the case of malignant transformation, extensive necrosis, or large size. At early stages, malignant melanomas can mimic a melanocytoma, thereby causing diagnostic difficulty. Considering its rarity and the diagnostic dilemma, we report a case of optic disc melanocytoma to describe its clinical features and the method of its diagnosis.

Case report

A 48-year old, dark skinned, female patient presented with gradual progressive diminution of vision associated with floaters in right eye. Her distant visual acuity was 6/60 in the right eye and 6/24 in the left eye. The slit-lamp bio-microscopy revealed a normal anterior segment except for immature senile cataracts in both eyes. General and systemic examination revealed no abnormalities. Her right eye fundus showed a uniformly black, raised mass sitting on the optic disc, occupying the superior two thirds. It extended into the adjacent retina for one disc diameter in the supero-temporal quadrant (Figure – 1). The surface was smooth and the course of the blood vessels over it was undisturbed.

The remaining portion of the posterior segment was normal. No abnormality was detected in the left eye. Intraocular pressure was 10 mmHg in both eyes. Upon examination with fluorescein angiography, the mass was found to completely the underlying disc and choroidal fluorescence (Figure - 2). The B-scan ultrasonography (Figure-3) showed a round elevated lesion with high internal reflection. The Goldmann perimetry showed an enlargement of the blind spot (Figure-4).
Discussion

Melanocytoma is a special type of nevus that can occur anywhere these types of cells are present, including the iris, ciliary body, and the optic disc. The lamina cribrosa of the optic nerve head, with its population of melanocytes, is the origin of these pigmented lesions on the optic nerve (Riedly et al, 1985).

Melanocytoma of the optic disc is more rare than melanocytoma of the uvea. Ophthalmoscopically, it appears uniformly black with fibrillate margins due to infiltration into the adjacent retina. Some patients have afferent papillary defects and nerve fibre bundle defects, possibly due to nerve fibre layer compression. Histopathologically, the tumor cells are round or slightly polyhedral with distinct borders and small, round, normochromic nuclei.

Melanocytoma commonly involves the inferotemporal aspect of the optic disc but, in this patient, it was located superiorly. On examination, the diagnosis strongly favoured was melanocytoma for the following reasons: a) Dark skinned female individual: melanocytoma is more common in blacks and those with dark complexions. b) Normal visual acuity: Malignant melanoma that involves the optic disc usually produces a profound diminution of vision with disc oedema, retinal haemorrhages, and retinal detachment. Vision in our patient was reduced due to cataracts, though some may be attributed to the melanocytoma. c) The mass was dark black with uniform pigmentation: Malignant melanoma usually presents with less pigmentation pattern. d) Fluorescein angiography showed a blocked fluorescence characteristic of the melanocytoma, unlike alternating areas of hyper-fluorescence and hypo-fluorescence which are present in malignant melanoma.

In a case of melanocytoma, Zimmerman et al (1962) reported the occurrence of a sudden decrease in vision with papillitis and retinal haemorrhages due to ischemic necrosis. Malignant melanoma was suspected and the eye was enucleated. Such incidences have occurred in the...
past. For example, Reidy et al (1985) observed one a melanocytoma of the optic disc which was followed for 17 years, and suddenly transformed into a malignant melanoma.

A sudden decrease in vision or increase in size should be viewed with caution as an indication of transformation into malignant melanoma. Other factors, such as like acute vascular change, necrosis or a haematoma in a melanocytoma, though rare, should be carefully monitored. It may be difficult to distinguish between a melanocytoma and a malignant melanoma in early stages, when the ultrasonic examination is not helpful and fluorescein angiography can be misleading. Therefore, it is essential to maintain close, continuous observations and perform serial colour the importance of close continuous observations and serial colour fundus photography at every visit, so as to monitor the size and the rate of growth of the tumour and to guard against malignant transformation.

The role of spectral-domain optical coherence tomography has also been described as a useful tool in diagnosing and monitoring the optic disc melanocytoma (Punjabi OS, 2011).

**Conclusion**

Melanocytoma of the optic disc can present with visual diminution and floaters. The condition can be differentiated from malignant melanoma by the fundus fluorescein angiography.

**References**


**Source of support:** nil. **Conflict of interest:** none
Homocystinuria masquerading as vitamin B12 deficiency
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Abstract
Background: Homocystinuria is a rare metabolic disorder characterised by excess homocysteine in the urine. Vitamin B12 deficiency has diverse cutaneous, nervous and ophthalmic manifestations. Objective: To report a case of homocystinuria masquerading as vitamin B12 deficiency. Case: We hereby are presenting an interesting case of a 4 year old boy who was being treated for Vitamin B12 deficiency on the basis of history of delayed milestone, abdominal pain and hyperpigmentation of skin which was diagnosed as homocystinuria. Conclusion: It is important to carry out ophthalmological examination in every case of megaloblastic anemia if associated with blurring of vision and mental retardation.

Key-words: Homocystinuria, vitamin B12 deficiency, lens subluxation, mental retardation.

Introduction
Vitamin B12 deficiency is an important cause of megaloblastic anemia, skin hyperpigmentation, vitiligo, angular stomatitis, hair changes, peripheral neuropathy, subacute combined degeneration of the spinal cord and psychosis (Fenton & Rosenberg, 1995; Devalia, 2006). We report case of a four year old child with vitamin B-12 deficiency who was diagnosed as a case of homocystinuria when he was referred to us in eye OPD for blurring of vision.

Case report
A 4-year-old boy was admitted in pediatric department of our hospital with chief complaints of abdominal pain and vomiting for 4 days. There was a history suggestive of delayed milestones of development since birth, along with history of generalized increased pigmentation of skin and mucus membrane of oral cavity for past three years. On general physical examination, the child had streaky thin yellow hairs and his gait was suggestive of genu valgum. Examination of respiratory, abdominal and cardiovascular systems was normal. On the basis of history of delayed milestone, abdominal pain and hyperpigmentation of skin, a provisional diagnosis of Vitamin B 12 deficiency was made.

On further investigation, hemoglobin was 9 gm%, vitamin B12 levels were 100 p mol/L and a peripheral smear revealed megaloblastic anemia. Serum electrolytes, liver and kidney function were within normal limits (sodium-133, potassium-4.5, blood urea-24, serum creatinine-0.6mg/dl, serum bilirubin-0.6mg/dl). His ultrasound abdomen showed mild liver and spleen enlargement. The head MRI showed nonspecific hyperintense foci in the right frontal/ periventricular and in left frontal, subcortical white matter region. The chest X-ray was normal on radiological study. The child was sent for ophtalmic examination for complaints of blurring of vision.

The child’s visual acuity was 2/60 in both eyes. Pupils were normal in size and both direct and
consensual pupillary reactions were within normal. Anterior segment slit-lamp examination revealed iridodonesis. On pupillary dilatation, bilateral inferiorly subluxated lens with zonular dialysis (Figure 1) and phacodonesis were noted. The rest of the central and peripheral fundus examination and optic disc were within normal limits. Refraction showed myopia of -5.5DS OU.

On the basis of streaky thin yellow hairs, mental retardation since birth, genu valgum in gait with inferiorly sub-luxated lens; a differential diagnosis of homocystinuria was kept in mind, and serum for estimation of homocystine level was sent. It was found to be 225 µmol/l (normal level = 5-15 µmol/l). The key laboratory test for homocystinuria is sodium nitroprusside test which also came out to be positive in this patient. Thus, a final diagnosis of homocystinuria was reached.

Discussion

Vitamin B12 deficiency can present with diverse cutaneous, nervous and ophthalmic manifestations. The cobalamin (B 12) in methyl derivative form is necessary to methylate homocysteine to methionine (Fenton & Rosenberg, 1995). In the absence of B12, there is accumulation of both methylmalonic acid and homocysteine levels, therefore leading to homocystinuria. Homocystinuria is an autosomal recessive disorder of methionine metabolism and is an important cause of dislocated lens in mentally retarded children. A child with this disorder presents with genu valgum, vertebral collapse, osteoporosis and life threatening thrombo-embolic events (Fenton & Rosenberg, 1995; Ubbin et al, 1993). The screening of newborn infants for classic homocystinuria has been performed and the incidence is estimated to be 1 in 344,000 (Ubbin et al, 1993). Early diagnosis of homocystinuria is important to prevent visual and CNS complications.

In homocystinuria, there is deficiency of the enzyme cystathionine beta synthetase. This enzyme converts homocystine to cystathionine in the trans-sulphuration of methionine cycle. The initial presentation of the disease may be ophthalmic. Ectopia lentis is the hallmark, indeed many cases of homocystinuria have been diagnosed because of it, and other frequent ophthalmic findings are iridodonesis and myopia. Zonular and other cataracts are found in one fifth of patients. Lens subluxation occurs in childhood in 90% of the children by the age of 10 years, most often in the inferonasal direction. Zonular and other cataracts are seen in one fifth of the patients. Central Nervous System findings include mental retardation and seizures. The cardinal vascular sign in classical homocystinuria is thromboembolism. The occurrence of thromboembolic events is noted in only one third of patients (Ubbin et al, 1993; Carson et al, 1963). Genu valgum and pes cavus are usually the first skeletal signs. In our case, classical features of homocystinuria such as cubitus valgus, high arched palate, mental retardation, iridodonesis, phacodonesis, inferiorly subluxated lens and myopia were found, but an initial diagnosis of B12 deficiency was made due to presence of hyperpigmented skin, abdominal pain and loose motions.

With the prompt and early diagnosis of homocystinuria, the development of ocular, skeletal, intravascular, thromboembolic complications can be arrested and the child can be assured normal intelligence (Carson et al, 1963, Schimke et al, 1965; Mudd et al, 1985). To achieve these the treatment should consist of Pyridoxine, folate,
methionine restricted, cysteine supplemented diet, and Betaine (Carson et al, 1963 Chandler, 1964; Burke et al, 1989). Combined pars plana vitrectomy with lensectomy is the treatment of choice (Schimke, 1965). If the lens surgery is successful, and amblyopia is managed well before and after surgery, the visual prognosis is good after surgery (Chandler et al, 1964). Important diagnostic tests include serum and urine levels of homocysteine. The cyanide nitroprusside test in urine is an important screening test (Ubbink, 1993).

In our case, the child was prescribed glasses and was given a diet chart with folic acid and vitamin B-12 supplements. After 2 months of follow up, the lens was found to be dislocated in anterior chamber in left eye and his vision had dropped. An emergency lens aspiration was done and posterior chamber intraocular lens with capsular tension ring was implanted.

In all cases of vitamin B12 deficiency with mental retardation and visual complaints, homocystinuria must be first on the line of differential diagnosis and a sodium nitroprusside test is warranted. These children must be kept on cysteine, vitamin B6 and B12 rich diet and at each visit an anterior and posterior segment examination along with examination for visual acuity and glaucoma should be done for timely intervention.

**Conclusion**

It is important to carry out ophthalmological examination in every case of megaloblastic anemia if associated with blurring of vision and mental retardation.

**References**


**Source of support: nil. Conflict of interest: none**
**Case report**

**Malignant transformation of kissing nevus- a rare entity**

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**Abstract**

**Background:** Kissing nevus is a congenital nevus in adjacent parts of the eyelids. Malignant transformation of kissing or divided nevi of the eyelids is rarely described. **Objective:** To report a very rare case of malignant transformation of kissing nevus with ocular and extraocular spread.

**Case:** A 57-year-old man with 6/6 visual acuity in both eyes presented with a kissing nevus present since birth in right upper and lower eyelids which had a slow growth phase. The upper lid in the area of the nevus was thickened with a 20x12x15 mm black pigmented crusted hemorrhagic nodular lesions. The lower lid had a 6 mm black pigmented ulcerated lesion over the pre-existing nevus in the lateral third of the lid with full thickness infiltration. Another 5x4 mm pigmented lesion over the lower medial lid margin with a thickness of about 3 mm extended to the conjunctival side of the lower lid. Right sided pre-auricular and sub-maxillary nodes were palpable. A biopsy of tissue samples from the eyelid and pre-auricular nodes were consistent with malignant melanoma.

**Conclusion:** Malignant transformation of kissing nevus is rare. It can spread to the conjunctiva, pre-auricular and sub-mandibular lymphnodes.

**Key-words:** lymph node; kissing nevus; malignant melanoma; metastasis

**Introduction**

Divided nevus or kissing nevus is a rare form of congenital nevus that usually occurs on contiguous portions of the upper and lower eyelids of one eye and may cause functional and aesthetic problems (Font RL et al 1996). It was first described in 1919 by Fuchs and is thought to arise during fetal eyelid fusion. The growth arises from melanoblasts or Schwann cells of a neuroectodermic origin during embryologic development (Carmine et al, 2007). When the eyelids are closed the eye appears to be covered by one large nevus. The conjunctiva is rarely affected, whereas the cilia are larger than normal. Though often present from birth, it may also develop later. It shows slow growth, and very rarely, malignant transformation to malignant melanoma (McDonnell et al, 1988).

Malignant melanoma (MM) constitutes approximately 1% of all malignant neoplasms of the eyelid skin (Font et al 1996) and less than 1% of all skin melanomas (Rodriguez - Sains RS et al 1981). Although relatively rare, they are the leading cause of death from primary skin tumors. Eyelid melanomas with conjunctival involvement have been shown to behave in a more aggressive manner than those confined to the eyelid skin.
Recently, inherited mutations in the melanocortin-1 receptor gene have been associated with people with red hair, photosensitivity and to an increased risk of cutaneous MM (Tsao et al 2003).

Cutaneous MM can be classified into four groups according to the following clinical and histopathologic criteria: (1) nodular melanoma, (2) superficial spreading melanoma, (3) lentigo maligna melanoma, and (4) acral lentiginous melanoma.

The American Joint Committee on Cancer (AJCC) has recently revised the staging system for cutaneous melanoma to aid in clinical management (Balch et al, 2001). In stages I and II, the thickness of the melanoma and presence or absence of ulceration are used as the basis for staging because of their effect on prognosis. Stage III patients have regional lymph node or in-transit disease, and stage IV patients have distant metastases. Pathologic information about lymph node involvement obtained from lymphatic mapping and sentinel lymphadenectomy is also included.

Kissing nevi of the lid may affect visual development if the increased bulk of the upper lid causes a mechanical ptosis and occlusion of the visual axis, particularly in childhood and adolescence. Because of severe disfigurement, risk of later malignant change in the lesion and the possibility of deprivation amblyopia, early surgical treatment is recommended for all medium and large congenital melanocytic naevi of the eyelid (Papadopoulos et al, 1991; De Pietro et al, 1981). Early reconstructive surgery preferred in order to achieve the best aesthetic result. If detected relative early, however, it may be treated with local resection, possibly combined with brachytherapy, using a custom-designed orbital plaque, or external beam irradiation. Patients with extensive orbital disease should undergo orbital exenteration with the aim of eliminating the potential for metastasis and improving survival.

Case report
A 57-year-old male presented with complaints of burning sensation in both eyes. His unaided vision in both eyes was 6/6. He had an 11x4 mm large kissing nevus in adjacent parts of right upper and lower eyelids involving the margins affecting the middle and outer part of the eyelids. The pigmented lesion was larger, thicker, and darker in the upper eyelid. The closed eyelid clearly showed a pathognomonic kissing nevus. On enquiry he said that these lesions had been present since birth. The nevus was very slowly increasing in size but he had not consulted a doctor due to his poor socioeconomic background. He sought treatment at our center because one month prior, he had developed ulceration in the nevi of the right upper lid associated with occasional bleeding from the lesion. Conjunctiva, sclera and cornea were exempt from melanocytic pigmentation. The left eye was completely unremarkable and fundus was normal. No lymph nodes were palpable. Family history for melanoma was negative. The growth of the nevi associated with ulceration and bleeding, led us to advise the patient for excisional biopsy with reconstruction of eyelids and admission was planned. The patient was scheduled to follow up the next day for admission but he did not return for further investigations and procedures.

The patient presented two months later with the complaints of rapid growth of the lesion associated with marked painless diminuation of vision in his right eye. He had had rapid growth of the eyelid lesions after the last visit but summoned faith healers for the treatment. When there was no improvement he returned to us for further treatment.

His visual acuity was perception of light with accurate projection of rays in the right eye and 6/6 in the left. Inspection of right eyelids revealed an ill defined thickening of the upper lid in the area of the nevus with a black pigmented crusted hemorrhagic nodular lesion involving nearly the entire conjunctival surface protruding from the palpebral fissure. On palpation, the nodular lesion was about 20mm x 12mm in the horizontal and vertical dimensions with the a thickness of about 15mm. The right lower lid had a 6 mm black pigmented ulcerated lesion over the pre-existing nevus in the lateral third of the lid along the lid margin. Full thickness of the lid was...
involved. Contiguous to it were multiple, small, ill-defined pigmented nodular lesions in the lid margin. There was another pigmented lesion over the lower medial lid margin about 5 mm x 4 mm in size with a thickness of about 3 mm extending to the conjunctival side of the lower lid. There was also diffuse involvement of the bulbar and palpebral conjunctiva along with fornices on both upper and lower sides. These lesions were associated with areas of ulceration, hemorrhage and crusting. Mucopurulent discharge was present (Figure-1). The nasal part of cornea was visible on levoversion and it was hazy. Upon examination, the left eye was normal.

On evaluation of the lymph nodes, preauricular lymph node 10 x 15 mm in size and two submaxillary nodes 10 x 10 mm in size were palpated on the right side. They were firm in consistency with no tethering of the overlying skin. However the cervical nodes of neck were not palpable.

Because of his poor financial background, he was admitted to the free bed of the eye ward and all necessary investigations and treatment procedures were provided free of charge by the hospital.

The computed tomography scan of the orbit showed homogenously enhanced hyperdense tissue involving the anterior and lateral aspect of pre-septal space of right orbit (Figure-2). A chest X-ray and ultrasound scan of the liver revealed no evidence of metastatic lesions. Liver function test and serum LDH were within normal limits.

A tissue sample from the right eyelid was obtained by incisional biopsy and sent for histopathological examination, which showed round to spindle shaped tumor cells suggestive of malignant melanoma (Figure-3). Fine needle aspiration cytology was carried out in the pre-auricular and cervical lymph nodes. Metastatic tumor cells were present in FNAC of preauricular nodes (Figure-4) but the neck lymph nodes showed no evidence of tumor cells.

Hence, we made a provisional diagnosis of malignant transformation of kissing nevus involving the conjunctiva with pericocular lymph node metastasis. Because the malignant lesion was associated with extraocular metastasis and poor visual prognosis, exenteration of the right orbit with lymph node dissection was planned. The patient was briefed about the surgery, the additional need for radiotherapy/chemotherapy, and his prognosis for survival, but he only consented to medical therapy and was unwilling to undergo surgical treatment. Though we counselled him about the gravity of the disease, he left the hospital and did not follow up for the further treatment.

Figure 1: Clinical photography of right eyelids showing infiltrated conjunctiva protruding out associated with pigmentation, ulceration and mucopurulent discharge

Figure 2: The computed tomography scan of the orbit showing homogenously enhanced hyperdense tissue involving the anterior and lateral aspect of pre-septal space of right orbit.

Figure 3: Histopathological examination of tissue sample from eyelid showing round to spindle shaped pigmented tumor cells.
Discussion

Malignant transformation of kissing or divided nevi of the eyelids is very rarely described. We herein report a very rare case of malignant transformation of kissing nevus with ocular and extraocular spread. The reported incidence of congenital melanocytic nevi of malignant change is very variable, ranging from 2% to 30%, depending on the length of follow-up, with an average of 14% over a lifetime (Carmine et al, 2007).

The survival rates of patients with malignant melanomas generally depend on the depth of invasion. Breslow (Breslow et al, 1970) thickness is a well-known prognostic indicator for cutaneous melanoma and it has been found that lesions histopathologically measuring 0.76 mm or less are associated with a 5-year survival rate of 100%, whereas patients with tumors that had invaded more than 1.5 mm had a 5-year survival rate of only 50% to 60%. The presence of regional lymph node metastases is the single most important prognostic factor for most solid neoplasms. The presence of ulceration may be another high-risk histologic feature and may predict nodal metastasis, and the presence of extracapsular extension increases the risk of nodal recurrence. At the time of the first visit, the patient was in a potentially surgically curable stage. However, because he did not pursue further treatment, the malignancy became more extensive and the above mentioned complications suggest a poor prognosis. Hence, it is not only important for ophthalmologists to perform early biopsy of suspicious lesions when excision and reconstruction are easy, but to also promote awareness among patients so that they understand the severity of the disease. This will allow them to choose the most appropriate treatment that will lead to the best prognosis.

Conclusion

At the earliest sign of malignant transformation of a kissing nevus, prompt management is required. The tumors can grow very rapidly and progress from a surgically curable stage to an extensive disease with metastasis requiring exenteration with a poor survival prognosis.

Reference


Source of support: nil. Conflict of interest: none
Case report

An unusual case of transient cortical blindness with sagittal sinus thrombosis in a case of Henoch-Schonlein purpura

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Abstract

Introduction: Henoch-Schonlein purpura (HSP) is one of the most common causes of small vessel vasculitis in children, but sometimes may have an atypical presentation. Objective: To report an unusual case of transient cortical blindness in a patient with Henoch-Schonlein purpura. Case: A 3-year-old female child was brought with the complaint of diffuse abdominal pain and hematochezia, which was preceded by high grade fever and cough. Three days later she developed hematuria, hematemesis, melena and hemoptysis along with palpable purpura. Four days later she became irritable and developed a few episodes of generalized tonic clonic seizure, followed by cortical blindness. The CT scan of the brain showed bilateral non-enhancing occipital hypodensity. The magnetic resonance venography showed thrombosis in transverse and sigmoid sinus. She was treated with corticosteroids and her mental status and vision improved. Conclusion: The HSP can cause transient cortical blindness, and recovery is good if therapy is initiated at the appropriate time.

Key-words: Henoch-Schonlein purpura, cortical blindness, magnetic resonance venography

Introduction

The HSP is one of the most common vasculitides of childhood (Cassidy et al, 2005). A diagnostic triad of purpuric rash, arthritis, and abnormalities of the urinary sediment was proposed by Schonlein in 1837, and Henoch described the association of purpuric rash, abdominal pain with bloody diarrhea, and proteinuria in 1874 (Cassidy et al, 2005). The etiology is unknown, but HSP often follows an upper respiratory tract infection. Males are affected twice as frequently as females (Cassidy et al, 2005). HSP is an IgA-mediated vasculitis of small vessels. Immunofluorescence techniques show deposition of IgA and C3 in the small vessels of the skin and the renal glomeruli; the role of complement activation is controversial. To fulfil classification criteria for HSP by the existing ACR criteria, two of the following were required: age less than 20 years, palpable purpura, abdominal pain, and vessel wall granulocytes on biopsy (Cassidy et al, 2005). The EULAR-PReS consensus criteria, for HSP are palpable purpura (mandatory criterion) in the presence of at least one of the following four criteria: diffuse abdominal pain, any biopsy showing predominant IgG deposition, arthritis (acute, any joint) or arthralgia, renal involvement (any hematuria...
and/or proteinuria) are required (Miller et al, 2007). CNS manifestations of HSP are rare and produce significant morbidity. Anticardiolipin or antiphospholipid antibodies may be present and contribute to the intravascular coagulopathy.

Case report
A 6-year-old female child presented with diffuse abdominal pain and haematochezia for 3 days with a history of high grade fever and cough for 5 days before. Abdominal pain was severe and only partially relieved by antispasmodics. There were also slightly erythematous painful swellings over the right sole and forehead. Three days later, palpable purpuraed over the knee joint and ankle, which later spread to involve thigh, trunk and forearm. At the same time, she develops hematuria, hematemesis, melena and hemoptysis. Seven days after admission, she developed generalized tonic clonic seizures, which recurred 2-3 times thereafter. Following this, she completely lost her vision and became very irritable. Her menace reflex was lost, but light reflex was present. There was no involvement of other cranial nerves and no focal neurological deficit was recorded. Her Blood Pressure was within the 50th percentile. Her speech was intact. Her hemoglobin was 12.4 gm/dl, platelet-435×10^3/cm, RAF, ANA and anticardiolipin antibody was negative. The prothrombin time and activated partial thromboplastin time was 13.2 and 34 respectively. The CT scan of head showed “bilateral occipital patchy non-enhancing hypodensity”, the MRI showed “mild diffuse brain shrinkage” and the MR venography showed “cerebral venous sinus thrombosis in left transverse and sigmoid sinuses with extension into left juglar vein”. She was commenced on corticosteroids, following which her hematuria and hemoptysis disappeared, mental status improved, and the melena and purpuric spots diminished. Low dose aspirin was started on the basis of the MR venogram. She improved rapidly thereafter.

Discussion
This case was diagnosed as HSP on the basis of palpable purpura, abdominal pain with bleeding manifestation and normal platelet count. In this particular case, the CNS manifestation in the form of blindness and seizure was also supported by the CT scan, MRI and MR Venography showing
cerebral venous thrombosis. From 1969 to 2009, 54 cases were published with CNS manifestations worldwide, of which 44 cases were aged less than 20 years (Ozen et al, 2006). Similar cases reported from India were very rare (Ozen et al, 2006). The cause of CNS involvement is either cerebral vasculitis or intra-cerebral hemorrhage. CNS involvement can present with or without hypertension in rare cases, Henoch-Schoenlein purpura can be associated with seizures, paresis, coma, altered mental status, apathy, hyperactivity, irritability, mood liability, somnolence, seizure, and focal deficits (eg, aphasia, ataxia, chorea, cortical blindness, hemiparesis etc).

Polyradiculoneuropathies and mononeuropathies may also occur. The initial management of patients with suspected cerebral Henoch–Schönlein syndrome includes control of arterial hypertension, seizures and repair of disordered hemostasis. Some trials with plasmapheresis have also been reported (Garzoni et al, 2009; Chen et al, 2000). Anti-coagulation agents are advised in patients with secondary anti-phospholipid syndrome (Abend et al, 2007). Regular follow up is required as the renal manifestations can occur 6 weeks after the appearance of skin rash.

Conclusion

The HSP can present with CNS manifestations including transient cortical blindness. It is potentially reversible if the treatment is given at the appropriate time.

References


Source of support: nil. Conflict of interest: none
Weill-Marchesani Syndrome: a rare case report

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Abstract

Objective: To describe the presenting features of Weill-Marchesani syndrome

Case: A 22-year-old man presented with high myopia and progressive visual disturbance. He was of short stature and had brachydactyly. His initial Snellen best corrected visual acuity (BCVA) was 6/24 in his right eye and 6/12 in his left eye. Slit lamp examination revealed a sub-luxated micro-spherophakic lens. The patient was diagnosed with Weill-Marchesani syndrome. Conclusion: Weill-Marchesani syndrome can present with progressive myopia in a person of short stature and brachydactyly.

Key-words: Microspherophakia, brachydactyly, Weill-Marchesani syndrome

Introduction

Weill-Marchesani syndrome (WMS) is a rare connective tissue disorder first described by Weill in 1932, and further delineated by Marchesani (Marchesani et al 1939). Alternatively, it has been named spherophakia-brachymorhipia syndrome or congenital mesodermal dysmorphodystrophy. Diagnostic criteria of WMS include short stature, brachydactyly and microspherophakia and/or ectopia lentis (Faivre et al, 2003). These patients may have joint stiffness and heart defects. Most patients have been described by ophthalmologists, since ocular symptoms and signs are characteristic of this syndrome and require clinical attention. Characteristic eye abnormalities consist of dislocation of the microspherophakic lens causing high myopia, acute and/or chronic angle-closure glaucoma, and cataracts. Despite the clinical homogeneity of disease presentation, autosomal recessive and autosomal dominant modes of inheritance have been reported (Dagoneau et al, 2004; Wirtz et al, 1996).

Knowledge of mode of presentation of this syndrome facilitates its timely diagnosis. We report a case of Weill-Marchesani syndrome to describe its presenting features.

Case report

A 22-year-old man presented with high myopia and progressive visual disturbance. His height was 136 cm (Fig 1 compares his height with the height of his brother, who is 7 years younger) and the body weight 43 kg. He had brachydactyly (Fig 2). His initial Snellen uncorrected visual acuity (UCVA) was 3/60 in the right eye and 4/60 in the left, and the best corrected visual acuity (BCVA) was 6/24 (-10 D sph/ -1.20 cyl at 35°) in his right eye and 6/12 (-10.00 sph - 2.50 cyl at 1400) in the left.

A-scan biometry revealed that the axial lengths of his eyeballs were 23.59 and 23.94 mm in the right and left eye respectively, suggesting a lenticular origin for the myopia. His intraocular pressure (IOP) was...
13 mmHg by Goldmann applanation tonometry in both eyes. Slit-lamp examination of both eyes before pupillary dilation showed normal corneas in both eyes. The anterior chambers were relatively shallow in the middle portion but normal at the periphery. There was bilateral anterior subluxation of the crystalline lens with the lens equator and zonules visible within the pupil (Fig 3). The iris around the pupillary border was pushed anteriorly which was prominently seen in undilated pupil. The posterior segment was normal in both eyes.

Discussion

WMS is a rare connective tissue disorder characterized by short stature, brachydactyly, and spherophakia. Its mechanism is thought to be a developmental abnormality of the mesodermal origin tissues (ciliary body, lens, and epiphysis of bones). It is speculated that in spherophakia, the fetal lens which is physiologically spherical, is not subjected to the force of a properly acting ciliary body and zonules (Dietlein et al, 1996). Angle-closure glaucoma can occur in spherophakia through the pupillary block mechanism. This occurs when the dislocated lens moves into the anterior chamber which depends on the zonular integrity (Willi et al, 1973). Laser peripheral iridotomy can relieve pupillary block, and the area of appositional angle closure can be opened. In some cases, lens extraction may be needed.

Conclusion

Weill-Marchesani syndrome can present with progressive myopia in a person of short stature and brachydactyly.

References


Source of support: nil. Conflict of interest: none
Choroidal metastases as the sole initial presentation of metastatic lung cancer: Case report and review of literature

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Abstract

Background: Choroidal metastasis as an initial presenting feature of metastatic lung cancer is exceedingly rare. External beam radiotherapy (EBRT) is an effective and widely accepted therapeutic modality. However, data addressing the effectiveness of other treatment strategies is limited. Herein, we present a patient with choroidal metastases secondary to lung cancer and review the relevant literature.

Case report: A 25-year-old male presented with deterioration of vision. His evaluation revealed bilateral choroidal metastasis secondary to adenocarcinoma of the lung. Unfortunately, his vision continued to deteriorate despite treatment with EBRT and chemotherapy.

Conclusion: Metastatic lung cancer can manifest with choroidal metastasis as an initial presentation.

Key-words: Choroid, lung cancer, metastasis, radiation therapy

Introduction

Choroidal metastasis as an initial presenting feature of metastatic lung cancer is exceedingly rare (Fernandes et al, 2006). Furthermore, available literature about effective treatment strategies is limited. We intend to present an extremely rare clinical scenario; a young male patient with bilateral choroidal metastases from lung cancer, and review the relevant literature in an attempt to highlight the epidemiological features, pathological characters, therapeutic regimens and disease outcomes of this poorly understood disease entity.

Case presentation

A 25-year-old man presented with decreased vision in the right eye for two weeks. He acknowledged smoking one pack of cigarettes daily for four years. Ophthalmic examination revealed his best corrected visual acuity to be 20/200 in the right eye and 20/20 in the left eye. Results of slit lamp examination were unremarkable. Funduscopic examination of the right eye showed an ill-defined, yellow-white elevated lesion in the choroid more than 10 times the disc diameter, involving the macula and the inferior edge of the fovea with associated serous retinal detachment (Fig. 1A). Funduscopic examination of his left eye showed an ill-defined, yellow-white elevated lesion in the choroid more than 5 times the disc diameter in size, nasal to the disc (Fig. 1B). Fluorescein angiography of his right eye revealed early hypoflusence and late phase
showed hyperfluorescence from the surface of his choroidal tumor associated with accumulated sub-retinal fluid. A B-scan ultrasound revealed a dome shaped, elevated choroidal lesion with moderate internal reflectivity.

The remaining physical examination was normal except for two hard subcutaneous nodules on his chest. In a search for primary malignancy, imaging studies were done, and showed left lung hilar mass, multiple liver metastasis, and widespread bone metastasis (Fig. 2).

Figure 1: A- Right eye fundus examination showed a yellow-white elevated lesion in the choroid, inferiorly located involving the macula with associated serous retinal detachment. B- Left eye funduscopy revealed a choroidal metastasis at the nasal edge of the optic disc.

Figure 2: A- Orbit MRI axial, T1 WI's post contrast image showing soft tissue nodular lesions in the posterior parts of the eye globes mainly at the right side, demonstrating homogeneous contrast enhancement. B- Enhanced CT scan of the chest; mediastinal window shows left hilar soft tissue mass encasing the left main pulmonary artery. C- CT scan through the liver shows multiple hypodense liver lesions represent metastases. D- Bone scan demonstrates multiple active bone lesions represent metastases.

Figure 3: Microscopic examination of the biopsy from lung mass. A- Sheets of tumor cells with acidophilic cytoplasm are seen (H&E X20). B- Mucicarmin stain highlighted intra-cytoplasmic mucin (X20). C- Positive nuclear staining with TTF-1 (X20).

A computed axial tomography (CT) scan guided lung biopsy as well as biopsy of the skin nodules was performed. The tumor showed proliferation of groups of cells within markedly desmoplastic stroma (Fig. 3 A). The cells contained intra-cytoplasmic vacuoles that stained positive with mucicarmine stain (Fig. 3B) consistent with adenocarcinoma. Immunohistochemistry positivity for TTF-1 antibody was demonstrated (Fig. 3 C). Occasional tumor cells were positive for Cytokeratin 5/6 and P63. The overall features were consistent with moderately differentiated adenocarcinoma of lung origin.

The patient was initiated on chemotherapy with cisplatin and docetaxel, and EBRT to both orbits. Unfortunately, the patient continued to experience rapid deterioration of vision in the right eye (visual acuity dropped from 20/200 to counting fingers at 1 meter) and the left eye (visual acuity dropped from 20/20 to 20/200). Fundoscopic examination showed right total serous retinal detachment (RD) and left nasal and inferior serous RD involving the macula. He received EBRT as 30Gy/10Fx over two weeks to both orbits via a pair of parallel-opposed beams. Following completion of radiotherapy, follow-up ophthalmic evaluation (clinical and ultrasonic) showed stability in the size of choroidal lesions in both eyes but no regression of serous RD. Systemic steroids and posterior subtenon steroid injections were applied as treatment for serous retinal detachment. Following the second cycle of chemotherapy, imaging studies revealed significant progression of lung mass and liver lesions.
Discussion

The choroid is a rare site of involvement by metastatic carcinomas. Godtfredsen (1944) reported only six patients (0.07%) in a survey that included 8,712 patients with malignancy. Furthermore, choroidal involvement typically occurs late in the course of metastatic cancer (Fernando et al, 2005). Following breast neoplasm, lung cancer is the second most common cancer to metastasize to the choroid (Fernandes et al, 2006). Post mortem examination of donated eyes of patients with carcinomas showed a 6.1 % frequency of eye involvement in patients dying of lung cancer, however; only 2.7 % of all lung cancer patients in that series had gross metastasis while the remaining had only microscopic metastasis (BabakEliassi-Rad et al, 1996). This finding suggests that most patients die when the choroidal metastasis is at a microscopic stage and before developing visual symptoms, which explains the rarity of this site of metastasis as a presenting feature.

Characteristics of the 30 reported cases and their metastatic lung cancer are outlined in table 1.

Our patient of age 25 years is the youngest reported case of choroidal metastases secondary to lung cancer. Nineteen patients (61%) had accompanying retinal detachment at their initial ophthalmologic evaluation. Most patients had multi-organ metastases, with the brain, liver and bone as the most common metastatic sites.

Choroidal metastasis can be distinguished from primary choroidal melanoma by clinical characteristics; typical choroidal metastasis is more often in the plateau-shaped than in the dome-shaped; yellow-white or mottled in color and associated with subretinal fluid and retinal detachment. FFA characterized by mottled hyperfluorescence in early stage while leakage in late stages and B-scan ultrasonography usually shows moderate reflectivity, mostly no biopsy is needed unless extensive staging work up had failed to reveal the primary or other metastatic sites (Zhang et al, 2009).

EBRT is effective in treating and palliating patients with asymptomatic and symptomatic choroidal metastases. Doses in the range of 3000 to 4000cGy delivered via conventional fractionation are well tolerated and result in visual stabilization or improvement in up to 85% of cases (Wiegel et al, 2002; Amer et al, 2004; Dobrowsky, 1988; Rosset, 1998; Bottke et al, 2000). A unilateral radiation portal is appropriate in patients presenting with unilateral choroidal metastasis (Wiegel et al, 1999). However, it should be noted that patients included in these studies had a diagnosis of metastatic breast cancer and only a few presented with choroidal involvement secondary to a lung neoplasm.

The effectiveness of chemotherapy as a single modality in treating choroidal metastasis is not widely reported in the literature, however; a study in patients with breast cancer and choroidal metastasis concluded that systemic chemotherapy is as effective as radiotherapy as all six patients treated with systemic chemotherapy alone showed regression of their choroidal metastasis (Letson et al, 1982). Additionally, of the 30 reported cases we reviewed, 14 patients were treated with chemotherapy without additional EBRT, it was worthy to notice that 6 out of the 14 patients had complete resolution, and additional 4 patients had partial regression of the choroidal metastasis.

Although the available level of evidence supporting chemotherapy as a single modality in treating choroidal metastasis is limited, it can be a reasonable alternative when external beam radiotherapy is not readily available.

Among our reviewed cases, all patients who received EBRT had also received chemotherapy, either concurrently or sequentially. Unfortunately, due to the paucity of data, it was difficult to derive firm conclusions about how these two modalities should best be integrated.

Choroidal metastasis is usually associated with widespread multi-organ metastases, and carries an extremely poor prognosis with survival counted in few months. In the extremely rare event when the
choroid is the only metastatic site, enucleation of the affected eye may carry the advantages of confirming the pathological diagnosis, palliating intractable pain and most importantly, offering a chance for long term survival. O’Connell et al (1990) reported a patient who remained alive and free of recurrence 4 years following enucleation.

**Conclusion**

Choroidal metastasis as an initial presentation of metastatic lung cancer is exceedingly rare. Though the EBRT and systemic chemotherapy are reported to be effective treatment options associated with clinical and objective visual responses, our patient did not improve with the regime.

**Acknowledgement**

We are grateful to Alice Haddadin and Lubna Al-Useily from the King Hussein Cancer Center Medical Library for assistance.

**References**


**Source of support: nil. Conflict of interest: none**
Letter to editor

Surgically induced astigmatism of small incision cataract surgery

Ale JB
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Moreton Eye Group, Brisbane, Australia

Dear Editor,

I would like to congratulate the authors who contributed the article “Comparison of astigmatism following manual small incision cataract surgery: superior versus temporal approach,” which was published in Nepal J Ophthalmol 2012; 4(7):54-58. As one who follows new discussions in the field of cataract and refractive surgery with great interest, I absolutely agree with the authors that the research topic is extremely relevant, particularly among cataract surgeons of the developing world. I found the introduction and discussion sections clearly structured, and the study methodology to be well formulated. However, I would like to draw the authors’ attention to several major concerns outlined below:

1. A table or a figure should be self-explanatory. When presented alone, as in this article, both table titles (captions) do not provide sufficient information for readers to understand the main conclusions that can be drawn from the table.

2. The conclusion is a summary statement of the results that should strongly correspond to the stated objective of the paper. However, in this paper, the author’s conclusions are not supported by the data. The authors conclude that the stability of SIA was better when temporal approach SICS was used. On what basis could the authors conclude that one method is more stable than the other when data from only one visit was presented for each? Stability of the astigmatism can be defined as a function of time; however, the change in SIA over time (i.e. at each follow up visits) is not mentioned in the paper. Moreover, the authors conclude that pre- and post-operative complications are the same in both approaches. However, the paper did not analyse the surgical complications, nor was it stated as an objective of the study.

I would like to advise the Editorial Board to correct errors to eliminate the confusions among the readers.

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Errata (Editorial Board)
The errors in Nepal J Ophthalmol 2012; 4(7):54-58 are regretted. Dr JB Ale (PhD), Vision Scientist, Brisbane, Australia is acknowledged for pointing out the errors.

The following corrections have been made in the article titled “Comparison of astigmatism following manual small incision cataract surgery: superior versus temporal approach”. Nepal J Ophthalmol 2012; 4(7):54-58.

Materials and methods
One hundred and eight eyes were taken.

Table 2: Surgically Induced Astigmatism (SIA)

<table>
<thead>
<tr>
<th>Incision location</th>
<th>Surgically induced astigmatism (SIA) (mean ± SD)</th>
<th>Number of eyes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior</td>
<td>1.45 ± 0.7387 D</td>
<td>54</td>
</tr>
<tr>
<td>Temporal</td>
<td>0.75 ± 0.4067 D</td>
<td>35</td>
</tr>
</tbody>
</table>

Source of support: nil. Conflict of interest: none
Letter to editor

Trench, lollipop, lift and chop technique for mild to moderate cataracts

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2Department of Ophthalmology, Pariyaram Medical College, Kannur, India
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Dear Editor,

We describe a technique to manage cataracts of grade NO2-NO4 based on LOCS III (Chylack et al, 1993) classification using a minor modification of stop and chop technique (Koch et al, 1994) using a peristaltic phaco machine. After completing capsulorrhexis of 6.0-7.0 mm diameter, nucleus is partially prolapsed during hydrodissection, into the anterior chamber filled with OVD. After dialling back the nucleus into the bag, a trench of up to 2/3 the thickness of the central nucleus is created. The phaco tip is then buried into one of the walls of trench, held under the vacuum and edge of the nucleus is lifted into anterior chamber. The nucleus is chopped through the trench into two halves, following which further phacoemulsification of each half is completed within the bag by holding the fragments and chopping them into smaller triangular sectoral pieces.

Minimal stress on zonules, protection of endothelium and minimal usage of ultrasound energy are the key factors for successful phacoemulsification surgery. We here describe a minor modification of standard stop and chop technique using a peristaltic phaco machine for mild to moderate cataracts.

Surgical technique

Under local anaesthesia, a temporal self-sealing clear corneal incision is created using a 3.2 keratome and two side ports are created 2 clock hours on either side of main incision with an MVR blade. Trypan blue with air is used to stain the anterior capsule. After washing out the dye, the anterior chamber is filled with Viscomet PF (2% w/v, Hydroxypropyl methylcellulose) - a dispersive ophthalmic viscosurgical device (OVD). Capsulorrhexis is completed by inserting a cystitome through the side port on right side of the main incision by creating a nick and extending it radially on anterior capsule and completing the rheixis of 6.0 – 7.0 mm in diameter. Hydrodissection followed by hydrodeleniation is performed during which nucleus is prolapsed partially into the anterior chamber. OVD is injected and the nucleus is dialled into the bag thereby assuring the completion of hydrodissection. After the initial cortical cleaning a trench is created upto 2/3 thickness of the central part of the nucleus. Following this the phaco tip is lollipopped with minimal use of phaco power into one of the walls of the nucleus and held under the vacuum and the nucleus is lifted so that the edge prolapses into the anterior chamber. Using a chopper the nucleus is chopped through the trench into two halves by positioning the chopper equatorially or just behind the equatorial edge and moving it centrally following which further phacoemulsification of each half of nucleus is completed within the bag by holding the fragment and chopping it into smaller triangular sectoral pieces. The phacoemulsification parameters are mentioned in table 1.

Vivekanand U et al
Trench, lollipop, lift and chop technique
After the phacoemulsification is completed, a bimanual irrigation-aspiration tip is used to clean residual cortical material. The surgery is completed after implantation of a foldable intraocular lens in the bag. This technique prevents additional stress on zonules, ensures protection of endothelium as there is minimal usage of ultrasound energy.

References


Table 1

<table>
<thead>
<tr>
<th></th>
<th>Power %</th>
<th>Flow rate(cc/min)</th>
<th>Vacuum limit (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trenching</strong></td>
<td>50</td>
<td>18</td>
<td>60</td>
</tr>
<tr>
<td><strong>Chopping</strong></td>
<td>25</td>
<td>22</td>
<td>120</td>
</tr>
<tr>
<td><strong>Emulsification</strong></td>
<td>30</td>
<td>22</td>
<td>180</td>
</tr>
</tbody>
</table>

Received on: 07.11.2011    Accepted on: 05.05.2012

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**Source of support:** nil. **Conflict of interest:** none
Patient reported evaluation of functional symptoms (PREFS): a simple method of ascertaining patient satisfaction post cataract surgery

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Dear Editor,

Cataract surgery remains the most commonly performed procedure within the NHS (HES online, 2009). Technical advances continue to influence indications for surgery such that now other measures of visual function (e.g. contrast sensitivity, glare) are being considered alongside visual acuity in making recommendations for surgery and for evaluating outcomes. Monocular visual acuity alone provides an incomplete assessment of surgical success. Thus various patient centred tools have been developed which aim to obtain self reported information relevant to a patient’s every day visual experience in the context of their own environment (Lundstrom & Pesudovs, 2009; Frost et al, 1998). However, these questionnaires can often be complicated to use and to date no cataract specific UK relevant instrument has been identified which would be suitable for routine use in the NHS (Royal College of Ophthalmologists, 2010).

We propose a simple method to ascertain patient satisfaction (PREFS). We asked patients undergoing cataract surgery between October 2010 and April 2011 (n=136) to grade their primary symptom on a visual analogue scale preoperatively (Figure 1). A score of zero indicated they were scarcely bothered and ten they were very seriously bothered by the specific symptom. They then graded the same symptom on a similar scale four months postoperatively via a phone call. The average PREFS score improved from 6.3 pre to 1.3 post operatively. All patients individually also showed score improvement irrespective of the listing clinician (Staff grade n=42, Nurse practitioner n=7, ST1 n=1, ST3 and above n=39, Associate specialist n=42, Consultant n=11, n denotes the number of patients listed by each grade of clinician).PREFS can be used for any operative procedure and also to audit listing practices within a department. Clinicians whose patients do not regularly show improvement in scores despite uncomplicated surgery may need to re-evaluate their listing practice. One caveat is that patients might feel obliged to report an improvement. However we feel that those who have not benefitted will certainly mention this.

Key-words: Cataract surgery, patient satisfaction, visual analogue scale

PREFS visual analogue scale
References


Source of support: nil. Conflict of interest: none
Dear Editor

I enjoyed reading the manuscript titled “Hooch blindness: a community study report on a few indoor patients of toxic optic neuropathy following consumption of adulterated alcohol in West Bengal” that has been published in your journal (Samanta et al, 2012). The authors reported ten cases of blindness due to methanol intoxication in West Bengal, India. After presentation of their patients’ histories, ophthalmologic examinations, fundus photographs, and assessment of the functional condition of the optic nerve, they have described the treatment performed for their patients. Their treatment included intramuscular injection of hydroxycobalamine (a bolus of 1000 mg repeated after one week), administration of anti-oxidant tablet once daily with local neuro- protective agents for 3 weeks. Since they believed that this treatment resulted in partial recovery of visual disturbances (VD) in all but one of their patients, they recommended the physicians to treat all such patients using this protocol irrespective of their severity of visual disturbances and/or the time elapsed between methanol ingestion and hospital presentation. However, there are some major points worth mentioning about the general management of these methanol-intoxicated patients and the management performed for their VD, in particular. It is not clear why the physicians of the local hospital (District Hospital) have not properly managed the patients in acute stage of methanol intoxication. They have only administered intravenous (IV) infusion of sodium bicarbonate and absolute alcohol. As you know, in methanol intoxication, hemodialysis is absolutely indicated in any patient with VD of any degree accompanied by metabolic acidosis or a detectable methanol level in addition to the antidotal therapy (ethanol or fomepizole), administration of folic or folinic acid, and sodium bicarbonate if indicated (Hovda et al, 2004; Hovda et al, 2008; Sanaei-Zadeh et al, 2011; Shah et al, 2012). Also, interestingly, the authors have not mentioned anything about the type and dose of the administered anti-oxidant tablet and local neuro- protective agents that have suggested. To my knowledge, to date, no other published study has reported managing methanol-induced optic neuropathy in such a way. Instead, in addition to the successful management of a case of methanol-induced VD with prednisone and vitamin B1 (Rotenstreich et al, 1997), IV prednisolone for methanol-induced VD has been used in 6 other studies (36 cases), so far. This treatment has resulted in complete or incomplete recovery of VD in all but three of the patients (Fujihara et al, 2006; Abrishami et al, 2011; Bang et al, 2007; Sodhi et al, 2001; Shukla et al, 2006; Sharma et al, 2011). Moreover, it has been recently suggested that retrobulbar injection of triamcinolone may improve visual outcome in methanol-induced toxic optic neuropathy (Shah et al, 2012). In contrast, it has been
shown that after proper treatment of methanol intoxication without administration of high-dose IV prednisolone, blindness is sometimes permanent (Naraqi et al, 1979; Onder et al, 1998-1999; Paasma et al, 2009; Sanaei-Zadeh et al, 2011) and sometimes partially recovers (Shukla et al, 2006, Scrimgeour et al, 1982). In a number of patients, blindness begins to improve but these patients eventually experience reduced vision after some time (Shukla et al, 2006; Stelmach et al, 1992). This is while in only one previously reported case, the patient’s blindness has completely recovered after methanol-induced optic neuropathy (Sivilotti et al, 2001). Therefore, the patients of the present study (Samanta et al, 2012) might go through this course even without the initiation of their management (i.e. hydoxycobalamine, anti-oxidant tablet, and local neuro- protective agents). It seems that a case-control study is warranted to evaluate the effect of their management in methanol-induced VD. However, with respect to the abovementioned studies, I agree that corticosteroid pulses and vitamin therapy should be administered or retrobulbar injection of triamcinolone has to be performed even without a real evidence as an ultimate chance for the patient for eventual recovery.

References


Source of support: nil. Conflict of interest: none
Acknowledgement

A. Peer-reviewers

The editorial board acknowledges the scientific contributions of the following peer-reviewers.

1. Prof S K Arya, India
2. Dr Sandeep Kumar, India
3. Dr Basanta Raj Sharma, Nepal
4. Dr Martin Spencer, Canada
5. Dr Folkert Tegelberg, The Netherlands
6. Dr Suman Thapa, Nepal
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35. Dr S Dulal, Nepal
36. Prof G Paudyal, Nepal
37. Dr M Lamsal, Nepal
38. Prof BK Bhattrai, Nepal

B. Support for publication

1. The Nepal Ophthalmic Society sincerely acknowledges the continued-support of the Eye Care Foundation, the Netherlands, in publishing the Nepalese Journal of Ophthalmology.

2. The Nepal Ophthalmic Society sincerely acknowledges Dr Swapan Samanta, Hon General Secretary of the Association of Community Ophthalmologists of India for providing with the acid free paper for publication of the 6th and 7th issues of the Nepalese Journal of Ophthalmology.