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## Effectiveness of sedation in dacryocystorhinostomy surgery

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### Abstract

**Background:** Chronic dacryocystitis is a common ophthalmic problem almost always requiring surgery as the only definitive treatment.

**Aim:** To compare the perioperative outcome of external DCR surgery under local anesthesia with and without sedation.

**Subjects and methods:** One hundred consecutive patients with chronic dacryocystitis undergoing dacryocystorhinostomy (DCR) surgery were randomly divided into two groups using computer generated random table. Group A underwent DCR under local anesthesia (LA) without sedation and group B under LA with sedation. The outcome parameters were intra-operative pain, surgeon's comfort, intra-operative complications and duration of surgery.

**Statistical analysis:** SPSS version 11.5 software was used. Chi square test was used to compare the difference between the groups.

**Results:** There were 50 patients in each group. The mean age  $\pm$  SD of the patients was 34.4 $\pm$ 12.12 years (95% CI=28.89-38.55 years). Sixty-nine percent of them were female. Significantly higher number of patients experienced pain in Group A as compared to Group B (100% vs 50%,  $P < 0.001$ ) Surgeon's discomfort was significantly present in group A as compared to group B (70% vs 10%), ( $p = 0.00001$ ). Blood loss was significantly more in group A than in group B ( $p = 0.017$ ). There was no significant difference in the duration of surgery. The post operative success rate in both the groups was comparable after six months of follow-up.

**Conclusion:** The use of sedation with LA improves the perioperative outcome of DCR surgery in terms of patient's pain, surgeon's comfort and intra-operative complications.

**Key words:** dacryocystitis, dacryocystorhinostomy, sedation

### Introduction

Dacryocystitis is an inflammation of the lacrimal sac secondary to obstruction of the naso-lacrimal duct (NLD). It can be acute or chronic. The definitive

treatment (Dalgesh et al 1967) of chronic dacryocystitis due to NLD obstruction for duration greater than one year is dacryocystorhinostomy (DCR). The principle of DCR is anastomosing the lacrimal sac to the nasal mucosa of the middle nasal meatus. Toti (1904) first described DCR. The best known technique for DCR was described by Dutemps and Bourget in 1920 (Duffy et al 2000). It can be performed with or without silastic tube intubation. The former has been reported to improve the success rate of the procedure (Duffy et al

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2000; O, Donnell et al 2001). Caldwell et al (1993) described the intra-nasal approach for DCR. Currently endoscopic intra-nasal DCR is available (Massaro et al 1990). Gonnering et al (1991) have described the performance of successful intranasal DCR by using either the argon laser, potassium-titanyl-phosphate: YAG laser, or a CO<sub>2</sub> laser for tissue removal. The overall success rate of external DCR is better than that of the endonasal DCR (Zaman et al 2003).

External DCR can be carried out under general anesthesia (GA) or local anesthesia (LA) with or without use of sedation. It is commonly done under LA on outpatients basis (Benger et al 1992; Dresner et al 1991). LA provides anesthesia and excellent hemeostasis for the operation (Fanning, 2000). The commonly used LA in DCR is 2% lignocaine with or without 1:200,000 adrenaline or a mixture of 2% lignocaine and 0.5% bupivacaine in equal parts.

The advantage of adding adrenaline to plain lignocaine is that it maintains better homeostasis, prolongs the duration of action of LA and allows the use of higher dose.

A number of sedatives can be used in conjunction with LA. The commonly used ones are pethidine (1-2 mg/kg body weight intramuscularly) and promethazine (1 mg/kg body weight intra-muscularly). Also, midazolam (1-2 mg) or droperidol (0.5 mg) intravenously, along with a modest dosage of alfentanil (125-250 microgram intra-venously), may be given (Fanning, 2000). Ketamine in a dose of 0.1-0.2 mg/kg combined with midazolam may also be given (Fanning, 2000). This combination produces excellent amnesia as well as analgesia.

In the past, DCR used to be carried out under GA, but nowadays it is mostly done under LA except in children (<15 years of age). Many studies have compared the outcome of DCR under local anesthesia versus general anesthesia.

No published report comparing the outcome of DCR surgery with or without the addition of sedatives is available. This study was carried out to compare the efficacy of DCR surgery under LA with and without sedatives.

### **Subjects and methods**

One hundred consecutive patients with chronic dacryocystitis undergoing DCR surgery from March

2007 to February 2008 were randomly divided into two groups: A and B, using computer-generated random table. Group A underwent DCR under local anesthesia without sedation and group B with sedation.

The drugs used for sedation were pethidine (1 mg/kg) IM with promethazine (0.5mg /kg), which were given IM in the deltoid region half an hour before giving local anesthetics.

The local anaesthetic used was 2% lignocaine with adrenaline 1:200,000. The maximum dosage of lignocaine for a healthy adult is 7 mg/kg or 500 mg for a 70 kg person. This corresponds to 25 ml of 2% solution.

All patients with NLD obstruction with chronic dacryocystitis and above 15 years of age undergoing DCR surgery were included in the study. The exclusion criteria were failed DCR, canalicular block and bleeding disorders. Other pathological conditions for exclusion criteria were atrophic rhinitis, rhinosporidiosis, deviated nasal septum, hypertrophied turbinates, nasal polyp and malignancies. Similarly, acute dacryocystitis, pyoceles, encysted mucocele, post traumatic lid and bony deformity were also excluded.

The research proposal was approved by the institutional review board and ethics committee. An informed consent was obtained from all the patients included in the study. The operation was performed in the operation theatre with resuscitation facility, Ambu bag, oxygen supply and drugs required for cardiopulmonary resuscitation, with preparedness for possible problems occurring during the operation due to sedatives.

Preoperative blood pressure and pulse were measured. Intra-operatively, at least three readings were taken and postoperative vitals and blood pressure were taken before shifting the patient to the ward.

### **Technique of local anesthesia**

The delineating incision with a marking pencil was made. The local anesthetic agents were injected subcutaneously, parallel and anterior to the lacrimal crest in the lacrimal sac fossa, superior and posterior to the medial canthal tendon.

### **Steps of external DCR surgery**

The middle nasal mucosa was packed with sterile ribbon gauge soaked in 2% lignocaine with 1:200,000 adrenaline. A straight vertical incision was made

medial to the inner canthus, avoiding the angular vein. The anterior lacrimal crest was exposed by blunt dissection. The periosteum was divided from the spine on the anterior lacrimal crest to the fundus of the sac and reflected forwards. The sac was reflected laterally from the lacrimal fossa. The anterior lacrimal crest and the bone from the lacrimal fossa were removed. A probe was introduced into the lacrimal sac through the lower canaliculus and the sac was incised in the 'H' shaped manner to create two flaps. A vertical incision was made in the nasal mucosa to create anterior and posterior flaps. The posterior flaps were excised. The anterior flaps were sutured together and suspended to the overlying muscle with Vicryl® 6/0. The medial canthal tendon if divided during surgery was re-sutured to the periosteum. The skin incision was closed with interrupted Vicryl® sutures.

The procedure was done by surgeons with more than 3 years of experience in doing external DCR surgery using the same surgical technique.

### Postoperative evaluation

Syringing was done on the first postoperative day after removal of the nasal pack. Systemic oral antibiotic was given starting from one day before surgery for 7 days and topical for two weeks. A nasal vaso-constrictor drug was given for two weeks. The patients were discharged on the second post-operative day.

### Measurement of outcomes

#### Pain score of the patients

0	No pain
0 - 3	Mild pain
4 - 6	Moderate pain
7 - 9	Severe pain
10	Maximum pain imaginable

On completion of the surgery, the patient was asked to grade the severity of pain experienced during the surgery on a 0-10 numerical rating scale ('0' representing no pain and 10 representing worst pain imaginable). The rated values were categorized for analysis.

#### Surgeon's comfort score during surgery

This was also done by the visual analogue scale.

0 \_\_\_\_\_ 10

This is a 0-10 scale where 0 means no discomfort and 10 means maximum discomfort or surgery not possible without second analgesics.

The numerical rating of surgeon's discomfort was done as follows.

0	No discomfort
0 - 3	Minimal discomfort
4 - 6	Moderate discomfort
7 - 9	Severe discomfort
10	Surgery not possible

In case the patient in group A had unbearable pain and the surgeon's discomfort was so severe that surgery could not be continued, intravenous sedatives were given and surgery continued.

### Intra-operative complications

Hemorrhage-intra-operative blood loss was measured by counting the number of average sized gauge pieces. A fully-soaked-standard sized gauge piece was considered to be equivalent to three to five ml blood loss.

Injury to adjacent structures like angular vein, ethmoidal artery, CSF leakage and any other complications, if present, were noted.

### Duration of surgery

The duration of surgery from the beginning of cleaning and draping to the application of the eye pad and bandaging was noted.

Post-operative complications, if any, were also noted.

**Definition of successful surgery:** A patent lacrimal passage on syringing and or the patient free of symptom was considered successful surgery.

### Follow-up

The post-operative variables were evaluated on the 1st post-operative day, at 1st week, 6 weeks, 3 months and 6 months.

## Results

### Patient characteristics

Seventy-two percent of the patients belonged to the age group 21-40 years. The mean age  $\pm$  SD of the patients was 34.4 $\pm$ 12.12 years (95% CI=28.89-38.55 years). The mean age in group A was 34.06 $\pm$ 12.04 years (95% CI=28.55-38.21 years) while in group B was 34.74 $\pm$ 12.30 years (95% CI=29.23-38.89years). Both groups were comparable (p value=0.78). Most of the patients (69%) were female. The female: male ratio in

group A was 3.5:1 while in group B was 3.4:1 ( $p > 0.05$ ). 62% of the study populations were house wives, 11% students, 10% farmers, 6% labors, 3% businessmen, 3% tailors and 2% service holders.

Sixty percent of the study population was from India and 40% from Nepal. Among the Nepalese, 16% were from Sunsari district and the remaining from near-by districts of eastern Nepal. Twenty-two patients in group A and 28 in group B had dacryocystitis in right eye, while 25 in group A and 20 in group B had it in left eye. Three patients in group A and 2 in group B had bilateral disease. Of the total, 5% had bilateral involvement.

The mean duration of symptoms in group A was  $1.34 \pm 0.88$  years (95% CI=1.2-1.9 years) while in group B it was  $1.13 \pm 0.89$  years (95% CI=0.99-1.69 years). There was no difference in duration of symptoms in the two groups ( $p = 0.24$ ).

Changes in vital signs (pulse rate and blood pressure) are given in Table 1.

#### Intra-operative pain

In group A, all patients (50) had pain while in group B, 50% (25 patients) had pain and 50% (25 patients) did not have pain ( $p < 0.001$ ).

#### Grading of pain

In group A, 2% of patients had maximum pain imaginable, 32% had severe pain, 34% had moderate pain, 32% had mild pain, while in group B, 8% patients had severe pain, 20% had moderate pain and 72% had mild pain ( $p$  value  $< 0.001$ ).

#### Surgeon's discomfort

In group A, the surgeon had no or minimal discomfort in 15 cases, and moderate discomfort or more in 35 cases; while in group B, the surgeon had no or minimal discomfort in 45 cases and moderate discomfort or more in 5 patients ( $p$  value 0.00001).

#### Comparison of blood loss

In group A, 29 patients had less than 20 ml of blood loss, and 21 patients had  $> 20$  ml while in group B, 40 patients had less than 20 ml of blood loss and 10 patients had  $> 20$  ml ( $p$  value 0.017).

**Table 1**  
Comparison of pre-operative, intra-operative and post-operative vitals

Characteristic	Categories	Mean $\pm$ SD		p value
		Group A	Group B	
Preoperative vitals	Systolic BP (mmHg)	120.2 $\pm$ 13.78	125 $\pm$ 11.65	0.06
	Diastolic BP (mmHg)	78.16 $\pm$ 8	77.2 $\pm$ 8.34	0.55
	Pulse Rate (per minute)	83.36 $\pm$ 7.9	83.76 $\pm$ 9.47	0.81
Intra-operative vitals	Systolic BP (mmHg)	126.28 $\pm$ 14	127.76 $\pm$ 13.56	0.59
	Diastolic BP (mmHg)	82.72 $\pm$ 6.96	81.04 $\pm$ 8.26	0.27
	Pulse Rate (per minute)	88.6 $\pm$ 9.37	84.76 $\pm$ 8.14	0.03
Postoperative vitals	Systolic BP (mmHg)	125.8 $\pm$ 13.72	127.2 $\pm$ 13.25	0.60
	Diastolic BP (mmHg)	81.28 $\pm$ 9.4	80.00 $\pm$ 7.42	0.45
	Pulse Rate (per minute)	86.52 $\pm$ 10.32	82.76 $\pm$ 8.67	0.04

**Table 2**  
Grading of intra-operative pain

Groups	Number of patients	Mild	Moderate	Severe	Maximum pain imaginable
Group A	50	32%	34%	32%	2%
Group B	25	72%	20%	8%	0%
p-value		0.001			

**Table 3**  
Surgeon's discomfort

Groups	No or minimal discomfort	Moderate discomfort or more
Group A	15	35
Group B	45	5
P value	0.00001	

### Duration of surgery

The duration of surgery in group A was  $82.5 \pm 6.2$  minutes while in group B  $77.5 \pm 5.9$  minutes ( $p$  value=0.08).

### Success rate of surgery (among the followed-up patients)

1st POD: 100% in both groups  
7th POD: 94% in group A  
96% in group B  
6 weeks: 87.9% in group A  
90.1% in group B  
3 months: 83.3% in group A  
88.9% in group B  
6 months: 87.5% in group A  
92.35% in group B

### Follow-up rate

7th POD: 100% in both groups.  
6 weeks: 66% in group A  
66% in group B  
3 months: 36% in group A  
36% in group B  
6 months: 16% in group A  
26% in group B

### Discussion

Since tear secretion decreases with age, the actual prevalence of NLD blockade reported in older people may just be an underestimation. Dalgesh et al (1967) in a large series of normal subjects older than 40 years observed the incidence of NLD obstruction in males and females to be 9% and 10% respectively. After 90 years of age, the prevalence was reported to be 35-40%.

Other studies have supported this fact. In older age, the lacrimal system loses elasticity and fails to flush the debris which is collected through the complex and this might be one of the reasons for increased prevalence in these age groups. Ali and Ahmad (2002) reported that 70.8% of the patients of chronic dacryocystitis were in the age group 31-50 years. Similarly, Dresner et al (1991) reported the highest disease prevalence in age group 30-60 years. According to a study by Zaman et al, 80% of the patients with chronic dacryocystitis were in the age group 41-60 years (Zaman et al 2003).

According to the recent study by Badhu et al (2005) in eastern Nepal, the mean age of patients with chronic dacryocystitis was  $27.4 \pm 13.7$  years (95% CI=26.34 to 28.46 years). As expected, we also found similar

results. The mean age group of our patients was  $34.4 \pm 12.12$  years (95% CI=28.89-38.55 years). 71% of them belonged to the 21-40 years group.

We couldn't explain the difference in the age of presentation as reported in the literature from the western and neighboring countries. It is likely that some genetic, environmental, hormonal or some unidentified insults may be responsible.

Most of the authors have reported that the disease is more common in females. It has been suggested that females have a nasolacrimal duct of smaller length and size. Also, the angulation of the canal where obstruction is more likely is more in females. These anatomical factors might be a reason why this condition is more common in females.

The association of chronic dacryocystitis with serious gynecological pathology or hysterectomy due to de-epithelization is reported by Zolli and Stanon. They reasoned it to be due to hormonal imbalance (Zolland et al 1973). The fact that the disease is more prevalent in the younger age group contradicts this hypothesis (Badhu et al 2005).

We did not study the socioeconomic status of the patients though some studies report a higher prevalence in patients of a lower socioeconomic class. We studied the occupation, which can be taken as one of the arms of socioeconomic status. Most of our patients were housewives. Since two-third of our study population was female, it is no surprise that housewives were found to be commonly affected. We think it is a chance association rather than a cause effect. A larger sample with involvement of different professions would confirm whether profession has any role in its pathogenesis.

The published study from this part of Nepal reported a higher incidence in patients coming from subtropical lowlands with monsoon climate (Badhu et al 2005, 2006). In our study, the majority of the patients were from subtropical lowlands of Nepal and India.

While analyzing the nasolacrimal duct involvement, we found that most (95%) of the patients had unilateral involvement. Fifty percent of the patients had it on the right side and 45% on the left side. But as described in the literature, dacryocystitis is more common in the left

eye compared to the right eye (Delaney et al 2002). The cause of right preponderance in our study may be due to the small sample size.

The mean duration of symptoms was  $1.23 \pm 0.8$  years (95% CI=1.09-1.79 years). The symptoms of the patients varied from 6 months to 3 years. The duration of the symptoms mentioned in the literature is variable, the maximum reported being 50 years.

In our study, there was an increase in intraoperative blood pressure and pulse rate in both the groups. However, the increase in pulse was significantly higher in group A than in group B. The increase in intraoperative and postoperative blood pressure and pulse in group A compared to group B can be explained as the group A patients had more pain compared to group B.

In group A, all patients complained of pain, while in group B, 50% of the patients had pain. The severity of pain was more in group A compared to group B. (p value <0.001).

In group A, the surgeons rated moderate or more discomfort in 35 cases while in group B, moderate or more discomfort was rated only in 5 cases. Discomfort was significantly higher in group A, compared to group B (p value <0.001).

The significant difference in pain and comfort can be explained by the fact that only local anesthesia was given in group A while in group B, local anesthesia with sedatives was given.

The amount of blood loss was more in group A compared to group B (p=0.017). The more hemorrhage in group A can be explained by the surgeon's discomfort and the intraoperative pain experienced by the patients.

The duration of surgery in both groups was comparable (p value=0.08). This is because the duration of surgery depends on the surgeon's skill.

On the 7th POD, 1 patient in group A and 2 patients in group B had wound infection. According to Yazici and Meyer (2002), postoperative wound infection in DCR surgery can be controlled by selective use of antibiotics preoperatively and postoperatively.

All the patients were given pre- and post-operative antibiotics in our study. Poor personal hygiene and

inadequate cleaning of the wound may be the cause of the wound infection.

Success of surgery is defined as patent lacrimal passage on syringing and free of watering. All the patients in both the groups had patent lacrimal passage on syringing on the first postoperative day. After six months, 87.5% of the patients in group A and 92% of the patients in group B had patent syringing.

The success of conventional primary external DCR with or without mucosal flap is 85% to 99%. The success rate reported from this part of Nepal is 88.6% (Badhu et al 2005).

In our study, the success rate was comparable on the 1st POD, 7th POD and at 6 weeks. But success rate was more in group B than in A after 6 weeks. This is due to the inequality in the follow-up rates in the two groups.

Attempts were made to increase the follow-up rate by explaining about the need of post-operative syringing and evaluation. The low follow-up rate may be due to the low socioeconomic condition, transportation difficulties and tendency of the patients not to return for follow-up once their symptoms are relieved.

### Conclusion

The demographic patterns and success rate of DCR surgery are similar to the previous reports from this part of the world. The use of sedatives improves the outcome of DCR surgery in terms of patient's pain, surgeon's comfort and intraoperative complications.

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