

# External Dacryocystorhinostomy with Intubation in Shrunken Fibrotic Sac in Chronic Dacryocystitis

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## ABSTRACT

**Purpose:** To assess anatomical success rate of external dacryocystorhinostomy (DCR) with intubation in long standing chronic dacryocystitis with shrunken fibrotic sac. Secondary objective was to document frequency of intraoperative and postoperative complications of external DCR in such cases.

**Study Design:** Quasi experimental study.

**Place and Duration of Study:** Ophthalmology department, Abbasi Shaheed Hospital, Karachi from January 2015 to December 2017.

**Material and Methods:** Patients with chronic dacryocystitis for 2 years or more, 18 to 60 years old, repeated acute attacks twice or more in past 1 year and fibrotic sacs were included. Canaliculitis, canalicular blocks, punctal agenesis and enlarged sacs were excluded. Surgeries were carried out under general anaesthesia. Fibrotic lacrimal sac was identified and excised, ostium was created in nasal bone and bi-canalicular intubation was done. Surgery was labeled successful if patency of the pathway was achieved by syringing at 6 months postoperatively.

**Results:** There were 82 patients, with 59 (72%) females. Mean ages were  $32 \pm 10.3$  years. Left eye was seen in 44 (53.7%) patients. Surgery was successful in 61 (74.3%) patients. Intraoperative bleeding occurred 8 (9.8%) and lacrimal crest was difficult to locate in 6 (7.3%) cases. Postoperatively wound infection and ecchymosis was seen in 8 (9.8%) patients, cheese wiring in 5 (6.1%) and fistula was seen in 2 (2.4%) patients. Cross tabulation was done between gender and successful dacryocystorhinostomy which was statistically not significant (p value 0.71).

**Conclusion:** Dacryocystorhinostomy with intubation has good surgical outcome in long standing chronic dacryocystitis with fibrosed sacs. It has few Intraoperative and postoperative complications but they are manageable.

**Key Words:** Dacryocystorhinostomy, Canalicular Intubation, Dacryocystitis, Chronic dacryocystitis, Lacrimal Sac, Nasolacrimal duct blockage.

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## INTRODUCTION

One of the significant causes of ocular morbidity in children and adults is dacryocystitis<sup>1</sup>. An acute inflammation of the lacrimal sac with tenderness and erythema of overlying tissues is termed as acute dacryocystitis<sup>2</sup>. However, chronic dacryocystitis is

more common than acute condition. Initially it may present with only epiphora but later there can be mucoid discharge, conjunctival hyperemia and chronic conjunctivitis<sup>2</sup>. Lacrimal abscess has also been reported in 23% of eyes<sup>2,3</sup>.

Dacryocystectomy was first described by Woolhouse in 1724 as treatment of choice for recurrent dacryocystitis secondary to nasolacrimal duct obstruction<sup>4</sup>. In recent years dacryocystectomy i.e. complete excision of lacrimal sac is limited to lacrimal sac tumors. Less commonly, if recurrent dacryocystitis is due to inflammatory causes such as Wegener's granulomatosis, risk of subsequent nasal cutaneous fistula formation following DCR surgery<sup>5</sup> or recurrent dacryocystitis without epiphora as well as in cases of dry eyes<sup>6</sup>.

Currently Dacryocystorhinostomy (DCR) is the treatment of choice for patients with acquired nasolacrimal duct obstruction (NLDO)<sup>7</sup>. Various techniques have been employed like anterior and posterior lacrimal flap suturing with nasal flaps, with or without rubber catheter or silicone tube. Intubation with silicone tube was first introduced by Gibbs in 1967, which is now widely practiced in lacrimal surgeries<sup>8</sup>. The cause of primary failure in patients with DCR is frequently due to closure of the rhinostomy site<sup>9</sup>. This closure is most commonly due to scarring, adhesion and granulation tissue formation<sup>10</sup>.

Most of the patients reporting to a government sector hospital belong to a poor socioeconomic background. They present to us late and are unwilling for surgical treatment as first option. In fact, surgery is the last option for them either due to financial problems or illiteracy. In such patients, lacrimal sacs are fibrosed and shrunken such that the sac has to be sacrificed by removing it. If these sacs are to be left in place they are source of recurrent infections and failed procedure due to insufficient marsupialization<sup>11</sup>. Lee et al has reported small sacs to have a high risk of failure<sup>12</sup>. Endolaser equipment for DCR is expensive, needs more expertise and is not available in our setup.

Objective of this study was to assess anatomic success rate of external DCR with intubation of fibrosed and shrunken sacs in chronic dacryocystitis. Further we studied the frequency of intraoperative and postoperative complications of external DCR in such cases.

## MATERIAL AND METHODS

This study was conducted in the department of Ophthalmology, Abbasi Shaheed Hospital, Karachi, a tertiary care hospital, Karachi from January 2015 to December 2017. It was a Quasi experimental study with non-probability convenient sampling technique. The study was conducted in adherence to tenets of the Declaration of Helsinki. Written informed consent was taken from all the patients informing about the details of the procedure along with its complications.

We included patients between 18 to 60 years of age with chronic dacryocystitis of 2 year or more in duration, repeated acute attacks twice or more in past 1 year and presence of shrunken fibrosed sacs on dissection at the surgical table. Patients who had canalculitis, canalicular blocks, punctal agenesis, mucoceles and enlarge sacs preoperatively were excluded. Detailed history of patients was recorded including demographics and duration of symptoms. Lacrimal passages were checked by probing and syringing in every patient. Nasal examination was carried out with the help of an ENT surgeon to exclude nasal pathologies. Significant nasal pathologies like polyps and severe deviated nasal septum were treated first by an ENT surgeon and then considered for an eye surgery. All the surgeries were carried out under general anaesthesia by a single surgeon.

Skin was cleaned with 10% povidone. Nasal packing was done with gauze piece soaked in xylocaine with 2% adrenaline. Upper and lower puncta were dilated with nethleship punctum dilator and probes were passed to check the patency. Vertically curved skin incision was given 8 to 10 mm away from the medial canthus and 12 to 15 mm long with surgical blade no 15. Hemostasis was achieved with suctioning and cotton swabs soaked in xylocaine with 2% adrenaline. Blunt dissection was done to separate skin and fascia, to expose medial palpebral ligament. This ligament was excised with blade. Underlying sac was identified and separated from periosteum. Fibrosed sacs were identified and defined as shrunken and contracted on surgical microscope. It was not possible to incise them and make a flap. They were completely excised. Periosteum was elevated to expose lacrimal fossa with periosteal elevator. Lacrimal osteotomy was created with Kerrison's Rongeurs bone punch, about 15 mm to 20 mm in diameter. Nasal pack was removed and curved artery forceps was introduced to check the opening of fistula. Nasal mucosa was cut open with blade. Silicone tube was then passed from

upper and lower puncta tied near lacrimal fossa. Now the tube was passed through the created fistula and retrieved in nasal cavity with an artery forcep. Another knot was tied in the tube and secured with silk 4/0. Dissected area was irrigated with an antibiotic solution (gentamycin 80 mg/2 ml). The wound was closed in two layers. Inner layer of medial palpebral ligament and subcutaneous tissue was closed with an interrupted Vicryl 6/0 and skin layer with an interrupted Prolene 4/0. Nasal cavity was packed with gauze piece rubbed in Polyfax ointment. Antibiotic ointment was applied to the wound and it was bandaged for 24 hours for hemostasis. Patients were discharged on the same day. Nasal pack and bandage was removed next day.

Patients were given oral antibiotic ciprofloxacin 500 mg BD, an anti-inflammatory agent (Danzen DS) and an analgesic (Diclofenic sodium) and antihistamine for 5 days. Topical steroid and antibiotic eye drops (Moxifloxacin & dexamethasone) were given QID for 2 weeks with steroid and antibiotic ointment (tobramycin dexamethasone) at bed time. Skin sutures were removed on 10<sup>th</sup> postoperative day and silicone tube was removed at 6 months. Surgery was labeled successful if patient was symptom-free and patency was achieved on syringing at 6 months.

Intra-operative complications like an angular vein tear, nasal mucosal bleeding, and difficulty in passing tube or identifying lacrimal crest were recorded. Postoperative complications like infection, bleeding, ecchymosis, cheese wiring of puncta, lacrimal fistula and wound related complications were noted and entered in SPSS version 22. Frequencies and percentages were calculated for categorical data. Means with standard deviation, minimum and maximum were calculated for numerical data.

## RESULTS

There were 82 patients in this study, males were 23 (28%) and females were 59 (72%) with ratio of 1:3. Their mean ages were  $32 \pm 10.3$  SD years. Left eye was involved in 44 (53.7%) patients. Other demographic features are given in table 1.

**Table 1:** Demographic features of patients in this study.

Variables	Frequency (%)
Mean age in years	$32 \pm 10.3$ SD
Minimum age	18
Maximum age	60
Females	59 (72%)

Variables	Frequency (%)
Right eye	38 (46.3%)
Left eye	44 (53.7%)
Nasal Pathologies	3 (3.7%)
Mean duration of symptoms	3.5 years $\pm$ 2.0 SD
Successful procedure	61 (74.3%)

Intra-operative bleeding was seen in 8 (9.8%) and lacrimal crest was difficult to locate in 6 (7.3%) patients. Post-operatively wound infection and ecchymosis was seen in 8 (9.8%) patients. Fistula was least common and seen in 2 (2.4%) patients. Main outcome was successful surgery, which was seen in 61 (74.3%) patients. Other intraoperative and postoperative complications of surgery are summarized in table 2.

**Table 2:** Intraoperative and postoperative complications of CDCR.

Variables	Frequency	%
Intraoperative complications		
Angular vein cut	4	4.9
Nasal mucosal bleed	4	4.9
Difficult lacrimal crest	6	7.3
Postoperative complications		
Infection	8	9.8
Ecchymosis	8	9.8
Cheese wiring	5	6.1
Tube displacement	4	4.9
Wound contracture	3	3.7
Fistula	2	2.4
<b>Total</b>	<b>48</b>	<b>58.7</b>

Cross tabulation was done between gender and successful dacryocystorhinostomy which was statistically not significant (p value 0.71) given in table 3.

**Table 3:** Cross tabulation showing association of success of procedure with gender.

Gender	DCR		Total
	Successful	Failed	
Male	18 (21.9%)	5 (6.1%)	23 (28%)
Female	43 (52.4%)	16 (19.5%)	59 (72%)
Total	61 (74.3%)	21 (25.6%)	82 (100%)

P value: 0.71

## DISCUSSION

External dacryocystorhinostomy with silicone tube intubation gives 80 to 90% results depending upon

surgical techniques, surgeon's skills, correlated systemic or nasal disease and patient's response to surgery<sup>13</sup>. Anatomic success rates vary from 90% to 100% reported by various studies<sup>14</sup>. Whereas success rate in our study was 74.3% (61 out of 82 patients), checked by syringing the lacrimal passages at 6<sup>th</sup> month post operatively. Success rate of our patients was relatively less as compared to other studies<sup>13,14</sup>. Repeated infections make these sacs fibrosed. It is documented that chronic inflammation and fibrosis are most common histopathological changes of lacrimal sac in patients suffering from nasolacrimal duct obstruction<sup>15</sup>. It is very difficult to make complete marsupialization of fibrosed flaps so the sac has to be removed. We have specifically selected fibrosed and shrunken sacs with chronic dacryocystitis of minimum 2-year duration. The above mentioned studies did not discuss mean duration of symptoms. Patients in developed countries present early and they have easy access to health care facilities. We can infer that longer the duration of symptoms, more are the episodes of acute infection more the sac will be fibrosed. More delayed the surgery more is the chance of failure. Early surgery will certainly improve outcome.

Failed cases in our study were 21 (25.7%). Syringing was done at 6<sup>th</sup> months post operatively and early if, and when required. Absence of fluid in nasal cavity was labeled as failed DCR. An ENT surgeon examined nasal cavity of these patients. The cause of failure in our patients was closed osteotomy site due to scarring. Inadequate or inappropriate sac marsupialization is reported to be 60.2% in etiological analysis of 100 failed DCR during re-operation.<sup>11</sup> We removed whole sac in long standing dacryocystitis to avoid failure and patient's agony of reoperations. Smaller fibrosed sacs are documented to have high failure risk<sup>12</sup>. Diverse aspects of causes of failed DCR have been reported in literature ranging from cicatricial ostium closure, scarring of common canaliculus, distal canalicular obstruction, granuloma formation and bone neogenesis<sup>16</sup>. Incorrect localization of sac, inappropriate osteotomy size and location, insufficient sac opening, significant deviated nasal septum and concha bullosa are few reported intraoperative surgical causes that lead to subsequent failures<sup>16</sup>. However, success rate of DCR can be increased by the use of intraoperative anti-fibrotic agent, Mitomycin C<sup>17</sup>.

Acquired nasolacrimal duct obstruction usually

occurs in middle-aged or older people<sup>18</sup>. Female patients in our study were 59 (72%) with male to female ratio of 1:3. Most of other studies have similar male to female ratio with female preponderance<sup>6-8</sup>. Females are more frequently affected by this disease due to narrow lacrimal canals, hormonal factors, using colliriums (kajal/surma) and working in the dusty environment<sup>19</sup>. In our country women work in hot humid kitchen for long hours, they wear makeup and use of talcum powder could be another possible contributory factor. However, success rate of dacryocystorhinostomy does not depend on gender specified by insignificant p value (0.71).

Intraoperative bleeding including angular vein cut and nasal mucosal bleeding were seen in 8 (9.8%) of patients in our study. It depends on surgeon's skill and experience. Other studies have reported 0 and 45% intraoperative bleeding and almost negligible bleeding post operatively (1.9%)<sup>13,14</sup>. It can be avoided by careful and blunt dissection. Accidental angular vein cut in our patients was ligated with Vicryl 6/0. Nasal mucosal bleeding was controlled with nasal packing for 24 hours and fortunately there was no bleeding in any patient on removing nasal pack on first postoperative day. It was difficult to find lacrimal crest for making ostium in 6 (7.3%) patients as it was deep seated. These patients had wide depressed nasal bridge and probably brachycephalic skull. This complication should be anticipated when selecting patients as flat nose and narrow face are at higher risk of developing dacryocystitis. Brachycephalic heads have high incidence of developing dacryocystitis because of narrow lacrimal fossa, longer nasolacrimal duct and small diameter of inlet of nasolacrimal duct<sup>20</sup>.

Two (2.4%) patients came with recurrent infections at wound site and they had developed fistula. Other studies have reported wound infection to be 1.9% after external DCR<sup>13,14</sup>. The wound of our patients was reopened and remnants of the sac were removed in these cases. A study conducted in UK, reported cellulitis rate of 8 to 18% when systemic antibiotic prophylaxis was not given<sup>13</sup>. This rate of infection can be reduced five times with routine administration of antibiotics<sup>21</sup>. In our set up routine postoperative broad spectrum antibiotics were given.

Silicone tube intubation in lacrimal drainage system during DCR prevents obstruction of these passages by keeping pathway open throughout the healing process<sup>22</sup>. It prevents formation of granulation tissue at the osteotomy and anastomosis site and also

prevents common canalicular obstruction<sup>23</sup>. Silicone tubes are also being used for small fibrotic sacs, distal and common canalicular obstruction<sup>24</sup>. Cheese wiring was seen in 5 (6.1%) patients. Silicone tubing is reported to cause cheese wiring of canaliculus<sup>8</sup>. It was observed within a week after surgery which had to be manipulated, to break free the tube with adhesions and with copious use of lubricating ointment. It was witnessed in those patients where it was difficult to pass tube due to anatomical variations. Cheese wiring can be avoided by gentle dilatation of punctum, gently passing the silicone tube through the punctum and early recognition for early manipulation.

Four (4.9%) of our patients had tube displacement. In one patient tube recoiled back in an orbital area habitually on sneezing and when she blew nose it came back into the nasal cavity. She was advised to avoid loud sneezing until tube was removed at 6<sup>th</sup> month. Another patient came with tube extrusion in 2<sup>nd</sup> week; this was because of poor quality of tube in which one end of tube was accidentally cut when tying with silk. But its other end was secured intraoperatively. In one patient tube had to be removed early at 3<sup>rd</sup> month because its upper part in canalicular area was loose and causing constant unbearable irritation to her.

Ecchymosis was seen in 8 (9.8%) patients and probably due to rough handling of tissues during surgery. However, it is painless condition and it resolved within 2 weeks. Wound contracture was seen in 3 (3.7%) patients. It depends on type of incision and type of suture material.

Limitation of the study is lack of control group. Another research should be conducted to compare the results of DCR in enlarged sacs with fibrosed sacs.

## CONCLUSION

External Dacryocystorhinostomy with bicanalicular silicone intubation has good surgical outcome in patients with long standing chronic dacryocystitis and fibrosed sacs. It has few intra-operative and post-operative complications but they are manageable.

## Ethical Approval

The study was approved by the Institutional review board/Ethical review board.

## Conflict of Interest

Authors declared no conflict of interest.

## Authors' Designation and Contribution

Erum Shahid; Assistant Professor: Concept, data collection, manuscript writing, statistical analysis, critical review.

Asad Raza Jafri; Associate Professor: Concept, data collection, critical review.

Uzma Fasih; Associate Professor: Concept, literature search, critical review.

Arshad Shaikh; Professor: Concept, critical review.

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