

Original Research Article

Study of patient outcome in endoscopic dacryocystorhinostomy using a microdebrider in chronic dacryocystitis patients

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ABSTRACT

Background: Endoscopic dacryocystorhinostomy (DCR) has become accepted as a suitable treatment for patients with chronic dacryocystitis. In this study authors did endoscopic dacryocystorhinostomy using a microdebrider, which is a recent advancement tool being used successfully in other endoscopic sinus surgeries also. Limited studies are available as of now on this topic.

Methods: A total number of 33 patients (with 40 affected eyes) presenting with complains of epiphora having nasolacrimal duct obstruction were selected. They underwent an endoscopic DCR in which dissection of some nasal mucosa and widening of bony ostium was done using a microdebrider. Silicone stent was passed into the nasolacrimal duct through both punctum. Patient outcome was assessed by using both objective (endoscopy and dye test) and subjective (improved symptoms) criteria. Standard follow up time for clinical course was kept 3 months with weekly visits.

Results: Patients which got relief from epiphora in 37 eyes (92.5% cases) had no obstruction on endoscopy and positive dye test. Rest (7.5 % cases) had presence of granulation tissue at rhinostoma site and negative dye test, which was cited as the cause of failure.

Conclusions: The use of microdebrider is potentially beneficial in endoscopic endonasal dacryocystorhinostomy. By using such an instrument, the minimal amount of tissue damage occurs, a large fistula is formed, and the recurrence due to the formation of adhesions/synechiae/granulations is prevented/reduced thus reducing the time of surgery, complications and failure rate.

Keywords: Chronic dacryocystitis, Dacryocystorhinostomy, Microdebrider, Nasolacrimal duct, Rhinostoma

INTRODUCTION

Acquired dacryocystitis can be acute or chronic.¹ Chronic dacryocystitis is the inflammation of lacrimal sac, frequently caused by bacteria. Chronic being more common than acute. Dacryocystorhinostomy (DCR) is a surgery done for chronic dacryocystitis, with symptomatic distal obstruction of Nasolacrimal Duct (NLD). It is a bypass surgery in which obliterated NLD is bypassed and the lacrimal sac is directly opened into nasal cavity. Dacryocystorhinostomy is contraindicated

too young (less than 4 years) or too old (more than 60 years) patient, markedly shrunken or fibrosed sac, tuberculosis, syphilis, leprosy or mycotic infections, tumors of sac or atrophic rhinitis.

DCR can be performed by following methods: External approach, Endonasal approach, with or without laser, Laser assisted trans canalicular approach or user image guided navigation system. During the past 2 decades, endoscopic DCR (EN-DCR) has become accepted as a suitable treatment for patients with obstructions of the

lacrimal system at the level of the sac (saccal obstruction) or below it (postsaccal obstruction).^{2,3}

The study by Woog, which examined the epidemiology of lacrimal obstruction, demonstrated that the most common form of acquired symptomatic lacrimal obstruction is nasolacrimal duct obstruction (NLDO), which occurs with an annual frequency of 0.02%.⁴ The same study also confirmed that acquired lacrimal pathway obstruction was most common in middle-aged individuals, with a median age of 67 years. Moreover, 69% of patients with all forms of obstructions and 73% with NLDO were female.

Primary acquired nasolacrimal duct obstruction (PANDO) accounts for approximately two-thirds of the patients with stenosis. The etiology and the pathogenesis of PANDO are unclear, but it is known that gradual inflammation and subsequent fibrosis of the nasolacrimal duct are factors that predispose to obstruction of the drainage system.⁵ PANDO occurs more frequently in postmenopausal women.⁴ Furthermore, individual structural features such as the drain lines from the frontal and ethmoidal sinuses, the anatomically narrow and high infundibulum and septal deviation may play an important role in the inflammatory processes that occur in the nasolacrimal duct.⁶ Secondary acquired nasolacrimal duct obstruction (SANDO) in adults may result from infectious etiology.

The first external dacryocystorhinostomy was done by Toti.⁷ With the introduction of modern endoscopes and rhinology instruments there has been significant interest for intranasal approach. McDonogh and Meiring described the first modern endonasal DCR procedure in 1989.⁸ Weindenbecher et al, Whittet et al, Linberg et al, described the advantages of endonasal DCR which are: (1) avoid facial scar for better cosmesis specially in female patient, (2) cause minimal postoperative discomfort, (3) can be performed on both the sides at the same sitting, (4) no dysfunction of lacrimal pump mechanism, (5) nasal pathology can also be dealt in the same sitting, (6) minimal blood loss, (7) preserve functional anatomy, (8) attachment of medial canthal ligament not disturbed, (9) faster than external DCR, (10) good illumination of operative field, (11) active infection is not a contraindication to surgery, (12) success rate is comparable with external DCR.⁹⁻¹¹

Yoon et al selected 76 patients (with a total of 84 affected eyes) who had been diagnosed with a nasolacrimal duct obstruction.¹² These patients underwent an endoscopic dacryocystorhinostomy using a microdebrider. According to their study the symptoms were alleviated in 72 eyes, with a primary success rate of 85.7%.

Authors performed DCR via endoscopic intranasal approach using a microdebrider (Figure 1). With the use of microdebrider for the endoscopic surgery, the use of an expensive laser can be avoided, there is minimal amount

of tissue damage, a large fistula can be formed, and the recurrence due to the formation of granulation tissue or adhesions can be prevented.

Authors also found a reduced time of surgery and lesser complications that add to the improved surgical outcome.



Figure 1: Microdebrider: hand piece with cutters and protection drills.

METHODS

The present study was undertaken in the Department of Otorhinolaryngology in collaboration with Department of Ophthalmology at University College of Medical Sciences and Guru Teg Bahadur Hospital, Delhi.

33 (40 affected eyes) patients of acquired chronic dacryocystitis with nasolacrimal duct obstruction were included in this study.

Authors included cases of unilateral or bilateral acquired chronic dacryocystitis in patients of age group 15-70 years. Patients with canalicular block, atrophic rhinitis, chronic inflammatory conditions, acute dacryocystitis, suspicion of malignancy and post traumatic obstruction were excluded from the study.

After thorough history and clinical examination, besides routine investigations, patients were subjected to the following special investigations: syringing, probing and ocular examination.

Surgical technique

After preanesthesia checkup and informed and written consent, procedure was performed under general anaesthesia.

Patients were put in supine position, head end elevated. Serial dilatations of superior and inferior lacrimal puncta and irrigation (Figure 2) with normal saline was carried out. Nasal mucosa was prepared by packing with cotton pledgets soaked in 4% xylocaine and 1:1,00,000 adrenaline solution

for 5 minutes. After removal of pledgets, 0.5 ml 1:1,00,000 adrenaline and 2% lidocaine solution were injected at lateral nasal wall adjacent to the anterior attachment of middle turbinate, anterior end of middle turbinate and septum. Lacrimal probe was introduced and advanced till the site of obstruction/ stenosis to see tenting inside the nasal cavity. A circular incision 1 cm diameter was made using a sickle knife number/knife number 12. Part of nasal mucosa was dissected using a microdebrider. In the medial wall of the exposed lacrimal bone an ostium was made using a bone punch. The ostium was widened using a microdebrider. Rhinostoma of adequate size was created. After completion of DCR, patency was checked by lacrimal irrigation. Bicanalicular silicone tubing of size 23 G (Figure 3) was passed into the nasolacrimal system through the both punctum/ canaliculus (Figure 4) and nasal end was knotted and tied with silk thread into the nose through the surgically created nasolacrimal fistula. Nasal packing was done.

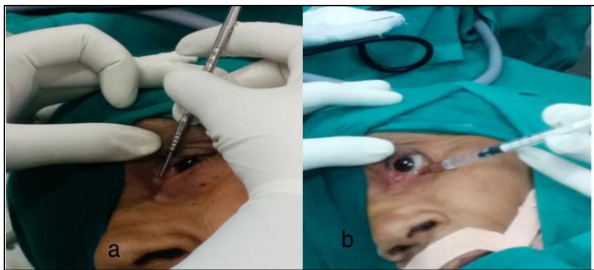


Figure 2: A) Serial dilatation of lower puncta, B) irrigation of the lower puncta (syringing).



Figure 3: 23-gauge silicone lacrimal stent.



Figure 4: A) Stent inserted into both puncta, B) nasal end of the stent (endoscopic view).

In the postoperative period systematic antibiotics, topical antibiotic drops, NSAIDs, topical nasal decongestants were given and cleaning of debris and mucus from rhinostomy site was done.

First visit at the end of first week postoperatively. Second visit at end of second week postoperatively. Third visit one month postoperatively. Nasolacrimal silicon tubing removal was done after 3 months following primary DCR and 6 months following revision procedure. Follow-up diagnostic nasal endoscopy was done at first and second week, third month postoperatively.

Surgical outcome was evaluated both subjectively and objectively and time taken in surgery was recorded.

Effect on quality of life (subjective assessment)

Patients were asked regarding any: excoriation, abscess, itching sensation near eye, pain sensation near eye, any disturbance in daily activities, degree of epiphora.

Pain was analysed using visual analogue scale: 1 free of symptoms, 2 significantly improved, 3 slightly improved, 4 no improvement, 5 worsen. Score of 1, 2 and 3 represents successful and score of 4, 5 represents failure. Any disturbance due to silicone tubes.

Objective assessment

Visualization of rhinostomy opening and its size, Presence of granulation tissue at the opening, syringing of the eye, after instillation of solution of 2% fluorescein dye to the eye, whether dye observed in the nasal cavity spontaneously or after pressure application to lacrimal sac.

Criteria for successful surgery

Resolution of preoperative symptoms, Nasolacrimal patency confirmed by syringing and Positive fluorescein dye test.

RESULTS

Following results were drawn from the present study.

Mean age of presentation of chronic dacryocystitis was 37.09 years. Sex distribution was males 8(24.24%) and females 25 (75.76%). All 33 (100%) patients presented with epiphora while 5 (12.5%) cases presented with mucocoele and 14 (35%) patients presented with discharge. The disease was unilateral in 26 (78.78%) and bilateral in 7 (21.22%) cases. The lacrimal pump mechanism was found to be maintained in 37 (92.5%) cases as assessed by positive fluorescein dye test on eye blinking movements (spontaneously) or on pressure, seen during nasal endoscopy 3 months after surgery (Table 2) (Figure 5). 38 (95%) eyes were free of any complications and 1 (2.5%) had developed synechiae and 1 (2.5%) developed cheese wiring due to stent (Table 3). The time

taken for surgery varied from 21 to 34 minutes with an average of 25.77 minutes and standard deviation of 2.99 minutes. Patient got relief from epiphora in 92.5% cases. (including two revision cases of the same study which were primary failure cases and subsequently after revision surgery were successful). Presence of granulation tissue at rhinostoma site post-surgery was seen in 7.5% cases (Table 4). On rhinostoma visualisation in follow up 35 cases had normal size and 5 cases had

decreases size while in nine of the cases it was closed or not visualised (Table 5). The failure of procedure was mainly due to formation of granulation tissue and soft tissue over growth at the rhinostoma site which resulted in its decreased size and fibrotic closure.

The overall success rate was 87.5%. which increased to 92.5 % after 2 failure cases underwent revision surgery in the same study and were successful.

Table 1: Subjective assessment.

Score	Relief in symptoms	POD 7	POD 14	POD 30	POD 90
1	Free	31 (77.5%)	34 (85%)	35 (87.5%)	36 (90%)
2	Significantly improved	8 (20%)	3 (7.5%)	2 (5%)	1 (2.5%)
3	Slightly improved	0	2 (5%)	2 (5%)	0
4	No improvement	1 (2.5%)	1 (2.5%)	1 (2.5%)	3 (7.5%)
5	Worse	0	0	0	0

Scores of 1, 2, and 3 are considered as successful while 4 and 5 as failed; POD: post-operative day.

Table 2: Fluorescein dye test in follow-up.

Fluorescein dye test	POD7	POD14	POD30	POD90
Spontaneously	37 (92.5%)	36 (90%)	37 (92.5%)	37 (92.5%)
On pressure	2 (5%)	3 (7.5%)	1 (2.5%)	0
Did not appear	1 (2.5%)	1 (2.5%)	2 (5%)	3 (7.5%)

Table 3: Complications in follow-up.

Complication	POD 7	POD14	POD30	POD90
Synechiae	5 (12.5%)	1 (2.5%)	1 (2.5%)	1 (2.5%)
Cheese wiring of stent	1 (2.5%)	1 (2.5%)	1 (2.5%)	1 (2.5%)
Vestibular stenosis	0	0	0	0
Soft tissue growth at stoma	0	0	0	0
Allergic reaction to stent	0	0	0	0
None	34 (85%)	38 (95%)	38 (95%)	38 (95%)

Table 4: Granulation tissue at stoma site in follow-up.

Granulation tissue	POD7	POD14	POD30	POD90
Present	0	3 (7.5%)	3 (7.5%)	3 (7.5%)
Absent	40 (100%)	37 (92.5%)	37 (92.5%)	37 (92.5%)

Table 5: Rhinostoma visualization in follow-up.

Rhinostoma	POD7	POD14	POD30	POD90
Normal	40 (100%)	37 (92.5%)	35 (87.5%)	35 (87.5%)
Decreased in size	0	3 (7.5%)	5 (12.5%)	5 (12.5%)
Not visualized or closed	0	0	0	0

DISCUSSION

In our study, the gender distribution was 24.24% males and 75.76% females comparable to study by Ji Chul Choi et al, with 16.6% males and 83.3% females.¹³ Wang Zhi et al, included 23 males (24.7%) and 70 females (75.26%) while Huang Yang et al, included 10 males (32.25%) and 21 females (67.74%) in their study SW

Yoon et al, included 14 males (18.42%) and 62(81.57%) females.^{12,14,15} This indicates that chronic dacryocystitis is more common in females as compared to males in adults. The higher incidence of this disease in females is attributed to the narrow lumen of the bony nasolacrimal canal in females, or the possible hormonal effects on its mucosa leading to obstruction.

In the present study, age of the patients was between 16 and 66 years (mean 37.09 years) as compared to study by Choi et al, where age of patients ranged from 31 to 76 years (mean 58.1 years).¹³ In the study conducted by Zhi et al age of patients ranged from 17 to 75 years (mean age 45.18 years) while Yang et al, had patients of age 32-64 years.^{14,15} In study by Yoon et al the mean age was 45.5 years in all patients.¹² It indicates that onset of disease is at an early age in the Indian population. This disease affects adults over middle age or the newborn due to the anomalies in the development of lacrimal passage in children. The disease is less common in children and adolescents.

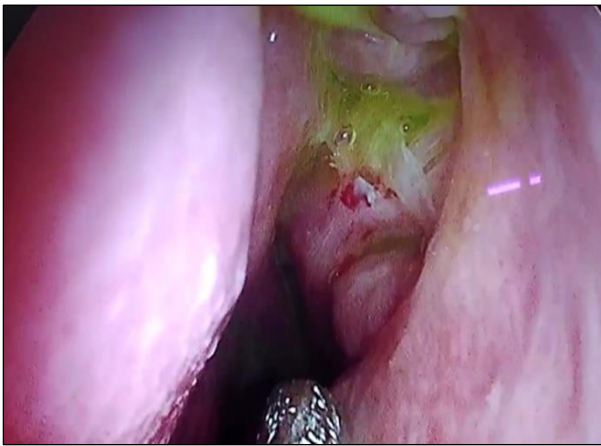


Figure 5: Dye in nasal cavity (endoscopic view) positive test.

In the present study 7 (21.22%) cases had bilateral disease and 26 (78.78%) cases had unilateral disease as compared to study by Choi et al, where 12 (25.0%) patients had bilateral disease and 36 (75%) patients had unilateral disease.¹³ In study by Narioka and Ohashi 87.92% patients had unilateral and 12.08% had bilateral disease while study by Mortimore and Banhegyi had 85.39% patients having unilateral disease and 14.61% with bilateral disease.^{16,17} In study by Yoon et al, 89.5% had bilateral and 10.5% had unilateral disease.¹² In the present study 4 (10%) cases were previously failed endoscopic endonasal dacryocystorhinostomy cases. In study by Yoon et al, 16.66% cases were revision.¹² Mortimore and Banhegyi study had 13.33% revision cases while Narioka and Ohashi study had included all previously failed cases.^{16,17}

All primary patients were followed up for a period of 3 months and revision cases were followed up for 6 months till the time of stent removal for evaluation of objective findings as well as subjective symptoms. Mortimore and Banhegyi followed up their cases for 12 months and Narioka and Ohashi followed their patients for mean postoperative period of 27.3 months (9-54 months) while Zhi et al followed up their patients for 3-6 months (mean 4.39 months).^{14,16,17}

The time taken for surgery varied from 21 to 34 minutes with an average of 25.77 minutes and standard deviation of 2.99 minutes.

Time taken was more in the initial cases, later which reduced due to learning curve. There are no available studies till date where microdebrider has been used in chronic dacryocystitis patients and time taken to surgery was noted. This is obvious from the present study that microdebrider is a useful tool to reduce the time to complete surgery. Also, the learning curve is rapid.

In primary cases, stents were removed after 3 months and in revision cases after a gap of 6 months. In Narioka and Ohashi study, the interval between installation and removal of the stent varied from 10-31 weeks after the first revision surgery and from 11-23 weeks after the second revision surgery and concluded that gender, age, duration of the first revision surgery and the timing of stent removal were not significantly related to failure.¹⁶ Durvasula has reported good results after 3 months.¹⁸ Kim et al, reported decrease in long-term patency with stent with success rates dropping from 90% to 77%.¹⁹ Naik et al, reported a success rate of 89.53%, in their study of a group of 172 patients with no stent placement and a success rate of 89.39% in a group of 66 patients with stent placement.²⁰

In the present study, after a period of follow up of 3 months (6 months for revision cases), 37(92.5%) cases were successful (including two revision cases of the same study which were primary failure cases and subsequently after revision surgery were successful) at the end of 3 months after surgery as evidenced by relief of symptoms of epiphora and patency to syringing and all 4(100%) revision cases (2 of the same study and 2 from previous study) were successful. In study by Yoon, et al, 87.1 % success rate was found in idiopathic cases, 33% success rate in post-traumatic cases and 100 percent success rate in revision cases, overall being 85.7%.¹² Mortimore et al had 87% success rate whereas Yang et al, had 93.55% success rate.^{15,17} Choi et al, described success rate of 100% in nasolacrimal duct-sac junction obstruction cases, 90% in nasolacrimal duct obstruction cases and 78.6% in common canaliculus obstruction cases. Hofmann et al described success rate of 83% in their study.¹³

In the present study, failure rate was 7.5% (3 cases). In study by Yoon et al, 12.9% failure rate in idiopathic cases and 66% failure rate in post-traumatic cases.¹²

From the current study, it is clear that a microdebrider improves success rate of endoscopic DCR by providing excellent surgical visualization, the attached suction absorbs the blood along with resected mucosa over lacrimal bone and reduces the damage of adjacent tissue mucosa thus preventing adhesions/granulations/synechiae. Since the microdebrider works by pulling and holding tissue to the cutting surface of the blade, when the blade is rotating

slowly it cuts more tissue, and when the speed of rotation is increased it removes less. The tissues sheared off during the process are drawn into the cannula by suction. The work site can be continuously irrigated by introducing water through a small side port in the cannula. This irrigation prevents the pieces of removed tissue from clogging the suction port. During procedures, pieces of removed tissue can be collected for laboratory analysis.

CONCLUSION

The use of microdebrider is potentially beneficial in endoscopic endonasal dacryocystorhinostomy for the treatment of nasolacrimal duct obstruction in cases of chronic dacryocystitis. The benefits are minimally invasive procedure with minimal trauma and no scar with preservation of pump function and ligaments and muscles of medial canthus. A microdebrider allows us to effectively remove the bone and soft tissue because its motor can be connected to different types of dissectors and drills. In addition, this tool enables us to obtain excellent surgical visualization because its attached aspirator absorbs the resected material along with any blood, keeping the site free of debris. Thus, by using an instrument like microdebrider, the minimal amount of tissue damage occurs, a large fistula is formed, and the recurrence due to the formation of adhesions/synechiae/granulations is prevented/reduced thus reducing the time of surgery, complications and failure rate.

So, this technology is surgeon friendly, relatively easy to perform, reliable, making it a realistic and worthwhile option for endoscopic endonasal dacryocystorhinostomy.

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