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Combined endoscopic endonasal and subciliary approach in revision DCR cases

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ABSTRACT

Background: Study conducted to know surgical outcome of combined endoscopic endonasal and subciliary approach in revision DCR cases and complications associated with the procedure.

Methods: Prospective, single-blinded, randomized, interventional study is carried out in Tertiary level center from August 2009 to April 2016. Totally 18 patients (11 female and 7 male) were involved in the study who has undergone previous DCR (11 external DCR and 7 endoscopic DCR). The results were analyzed at end of the 3rd and 6th month both subjectively and objectively.

Results: All the 18 patients who underwent combined approach were relived from epiphora. None of the patients developed any complications following surgery.

Conclusions: The combination of endoscopic and external approach gives benefits of the both approaches giving huge advantages in revision cases. It gives excellent visualization of the surgical field, ability to correct internal nasal pathologies, make clear rhinostoma, workprecisely on fibrosed lacrimal sac and nearly no external scar. It provides good team work opportunity between otorhinologist and ophthalmologist.

Keywords: Revision DCR, Epiphora, Nasolacrimal duct obstruction, Combined endonasal, Subciliary approach

INTRODUCTION

Dacryocystorhinostomy (DCR) is a surgical procedure were artificial window is created between lacrimal sac and nasal cavity in order to bypass the previously obstructed drainage system, so to establish a permanent pathway to drain the tears. The endonasal approach of DCR was introduced by Caldwell in 1893. Toti in 1904 described the external approaches to DCR. Toti in 1904 described the external approaches to DCR. Toti in 1904 described the external approaches to DCR. Toti in 1904 described the external approaches to DCR. Toti in 1904 described the external approaches to DCR. Toti in 1904 described the external approaches to DCR.

The endonasal DCR has many benefits such as an absence of a visible scar, minimal postoperative morbidity, faster recovery, and success rates (>90%)

comparable to that of External DCR.^{2,10} Nasal endoscopy, simultaneously helps treat the septal deviations, synechia formation or middle turbinate compression over the fistula.² The most common complication of endoscopic DCR is failure of the procedure with persistence of epiphora.¹⁵ Endonasal DCR has a number of factors that can lead to failure. Anatomical variation in the nasal cavity can cause difficulties for surgical correction. Insufficient size of the osteotomy, closure of the ostium, adhesions between the ostium and the middle turbinate, formation of synechiae between the ostium and the nasal septum, and granuloma formation within the ostium can cause postoperative nasolacrimal duct obstruction.⁴ Endoscopic DCR procedures require additional high-cost surgical instruments and visual systems, and possibly a

steeper learning curve. ⁸ Endonasal techniques were also limited because they provided poor visualization of the lacrimal sac in the superior nasal cavity and lacked effective instrumentation to adequately open the sac. ¹⁵ This may result from fibrous occlusion of the rhinostomy site or the presence of synechiae between the lateral nasal wall and middle turbinate or nasal septum. Failure to open the entire portion of the lacrimal sac satisfactorily may result in continued epiphora due to accumulation of lacrimal debris in the residual sac (lacrimal sump syndrome). Other potential complications include orbital injury, postoperative bleeding, and sinusitis. ¹⁵

External dacryocystorhinostomy (DCR) has been the gold standard treatment for primary acquired nasolacrimal duct obstruction for over a century.^{2,8} The traditional external DCR has consistently demonstrated success rates of 91% and higher (usually greater than 95%).³ But its failure rate is still about 4-13%.² The major causes of failure in external DCR are canalicular obstruction and closed osteotomy, caused by cicatricial tissues. Other causes of failure include middle turbinate abnormalities (concha bullosa, lateralization, hypertrophy), ostium problems (closed, small or too high ostium), mucosal abnormalities (intranasal adhesions, contact granuloma, scar formation, rhino sinusitis, and pouch formation known as sump syndrome), nasal wall abnormalities (preceding maxillofacial trauma, ipsilateral septal deviation, lateral nasal wall scarring) and aggernasi overpneumatization which partially overlaps the medial aspect of the lacrimal fossa, resulting in a DCR ostium located within the ethmoidal air cells.^{2,9} The external approach may be associated with unrecognized trauma to the anterior ethmoid, middle turbinate, and nasal septum. without preventing further complications such as synechiae due to the absence of a clear visual assessment of the nasal cavity. Further, less frequent complications have been reported, including cutaneous necrosis, cerebrospinal fluid leakage, maxillary and frontal bulbar sinusitis, retro hemorrhage, transient lagophthalmos, and subcutaneous emphysema.4 Observations show that most of the causes of failure are located within the nasal cavity, which are outside the ophthalmologists' territory.²

Unfortunately, failure rates in the 5-20% range have been encountered in both external and endoscopic primary DCR. ¹⁶ Patient-related factors may also play a part, as it has been demonstrated that patients who fail the first revision surgery are more likely to fail subsequent revisions. Failure of primary surgery is widely accepted to be a result of scar formation or ostial stenosis. Although there is no compelling evidence to indicate that the size of the ostium correlates with outcome, this premise is generally accepted. In actuality, the limited literature available on findings at the time of revision surgery cites other Sino nasal obstructive factors along with incomplete initial surgery as the 2 major causes of DCR failure. ¹⁶

The success rate of revision DCR varies between 41 to 94% in various studies. ¹⁷ This huge variation in different studies may be attributed to differences in inclusion criteria, operative techniques, follow-up times, post-operative care and criteria to define the success of the surgery. ¹⁷ Sac identification is one of the difficult part in revision surgeries. Sac localization may be facilitated through trans illumination using a 20 gauge fiberoptic endoilluminator introduced through the superior or inferior canaliculus, or with the aid of a surgical navigation system. ¹¹ But having endoilluminator and navigation increases surgical cost considerably.

Studies and found that lacrimal flow was obstructed on the side of the deviation which resolved with septoplasty. Given that there is a vast amount of literature to support that intranasal pathologies contribute to DCR failures, it is a surprise that there have been a paucity of reports addressing these pathologies at the time of the primary EXT-DCR.

Combined approach offers advantage like excellent cosmetic scar, less accidental damage to nasal mucosa while making osteotomy, less injury to medial canthal ligament and angular vein and less chance of hemorrhage and epistaxis postoperatively over traditional external approach. It also offers benefits like bigger bony ostium approach.14 conventional endoscopic endoscopic and external approaches have their own advantages and disadvantages, hence this combined technique was carried out to harness benefits of the both approaches and take huge advantages in revision cases. A large number of studies have established the efficacy of endoscopic and external approaches separately in revision cases, but limited data exist regarding outcomes from combined approach revision DCR. Hence the present study is carried out.

Aim

To study surgical outcome of combined endoscopic endonasal and subciliary approach in revision DCR cases and complications associated with the procedure.

METHODS

Study subjects

This study is a prospective, single blinded randomized, interventional study is conducted in the tertiary level center during August 2009 to April 2016. Ethical clearance was approval from the Institute Ethics Committee. 18 patients who had failed external DCR and had the symptom of failure (epiphora) up to one year after the surgery were included in this study.

All patients were counseled and explained about the procedure and consent taken. All patients were asked about a history, and were examined byophthalmologist for regurgitation and otorhinolaryngologist performed

nasal endoscopy prior to surgery. Anatomical obstruction was defined if tearing continued with a closed irrigation test. Functional obstruction was defined if tearing continued despite an open irrigation test. None of the patient underwent CT dacryocystography.

All surgeries were performed by a two surgeons, endonasal part by otorhinolaryngologist and external part by ophthalmologist.

Inclusion criteria

Patients with symptoms of anatomical nasal lacrimal duct obstruction, with previous history of external DCR or endoscopic DCR with symptom of failure (epiphora).

Exclusion criteria

Exclusion criteria were patients with nasal lacrimal duct obstruction without previous Dacryocystorhinostomy (fresh cases); acute infection due to the potential risk of exacerbation and spread of infection and unpredictable scarring; age lesser than 18 years; patients having canalicular block, patients with atrophic rhinitis, polyposis, chronic granulomatous diseases; patients with functional nasolacrimal duct block. [Functional NLDO is defined by lack of anatomic obstruction but delayed tear clearance]; patients with lid malposition, entropion, ectropion, punctal abnormalities, and systemic inflammatory disease.

Surgical technique

Patients received premedication Inj Fortwin 30 mg and Inj. Phenargan 50 mg half an hour before surgery. The head end of OT table raised to near 30 degree to decrease the venous return and hence to decrease the bleeding during surgery. The procedure was performed under local anesthesia. The nasal cavity is packed with cotton pledgets soaked in mixture of 30ml xylocaine 4% topical solution, 4 ml of 1:2,00,000 adrenaline and 10 ml of 1:1000 xylometazoline.

Inj. 1% xylocaine in 1:400000 adrenaline is used to give local anesthesia. Supra trochlear, supra orbital infra orbital block given. 4 mm, 0 and 30 degree nasal endoscopes are used and local anesthesia is injected just anterior to attachment of the middle turbinate along the lateral wall and maxillary line. The maxillary line is identified as a curvilinear eminence along the lateral nasal wall that runs from the anterior attachment of the middle turbinate to the root of the inferior turbinate.

An incision is made in the mucosa on the lateral wall with sickle knife and elevated using the freer elevator. The excess mucosa and scar tissues were carefully removed. The excess bone was meticulously removed with drill and punch. The posterior portion of the sac area exposed by removing the uncinated processand the thin

lacrimal bone. The anterior part of sac exposed by punching the thick bone. Associated intranasal problems such as nasal septal deviation, concha bullosa, and synechia that caused the recurrence of epiphora were corrected during the same session.

The lacrimal probe is passed to tent out the medial wall of the lacrimal sac so that incision can be put over sac. But usually in present, revision cases the tenting out was unsatisfactory. At this stage about 10 mm external subciliary incision put infero medially over skin andtissue dissected using scissors. Sac is identified. The lacrimal probe used to tent the sac. The sac wascarefully cut on medial part. 1% betadine solution injected to confirm sac opening. Once again the bony ostium was examined for adequacy of the opening, and if felt inadequate, it is enlarged to around 15 mmx10 mm size (tip of little finger negotiated into ostium).

A bicanalicular aurolac lacrimal intubation tube is passed throughboth canaliculi, with subsequent retrieval of the probes from the rhinostomy site endoscopically. The tubing is then tied at the nasal vestibule forming a closed-loop stent. The external inferomedial subciliary incision is closed by 8-0 vicryl in layers. Antibiotic eye ointment applied. Patients were put on oral antibiotics and anti-inflammatory drugs. Nasal douching is not advocated in any of the patients.

Follow up was done with endoscopic examination on 1 week, 3rd month and 6th month to look for and remove any granulation, crust or debris and adhesion at the site of rhinostomy and observe free flow of fluid during syringing and to assess the approximate size of the ostium. The stents are removed at end of 3rd month postoperatively.

Evaluation

If patient is free from epiphora 3 months after surgery then surgery is considered as successful (Royal College of ophthalmologist published guidelines for clinical governance). 18

The patients were subjectively assessed by questionnaire in terms of complete/ partial/no relief of epiphora. Objective assessment done by syringing and grading the findings as

Complete cure means patent: There was no resistance to the flow of the fluid through sac to nasopharynx.

Partial cure means partially patent: When some of the fluid regurgitated through the upper punctum and some passed into nasopharynx.

No cure means Blocked: When whole of the fluid regurgitated through the upper punctum and no fluid passed into the nasopharynx.

RESULTS

The present study involved 18 patients with failed external and endoscopic DCR complaining of epiphora. 11 (61.1%) were female and 7 (39.9%) were male patients. The mean age in present study is 43.4 with standard deviation of 8.4. They were ranged between 21-51 years. All patients went for DCR initially for epiphora. 11 patients underwent surgery following dacryocystitis, 3 following facial injury and 4 doesn't remember the cause. 11 cases had underwent previous endoscopic DCR and 7patients had underwent previous external DCR and all 18 patients were operated previously in outside center.9patients had right side involvement and 9 patients had left side involvement (Table 1).

Table 1: Showing general particulars.

General particulars		No.	%	
No. of cases		18	-	
Gender	Male	7	38.9	
	Female	11	61.1	
Age (years)	Mean±SD	43.4 ± 8.4		
	Range	21 - 51 years		
Previous surgeries	Endoscopic	11	61.1	
	External	7	38.9	
Side involved	Rt	9	50.0	
	Lt	9	50.0	

Table 2: Subjective relief at 3 months and 6 months.

Outcome	At 3 months		At 6 months	
	No.	%	No.	%
Complete relief	12	66.7	13	72.2
Partial relief	6	33.3	5	27.8

Table 3: Objective improvement at 3 months and 6 months.

Outcome	At 3 months		At 6 months	
	No.	%	No.	%
Complete cure	16	88.9	14	77.8
Partial cure	2.	11.1	4	22.2

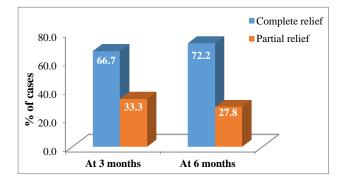


Figure 1: Showing subjective relief at 3 months and 6 months.

The prevalent findings during surgery were adhesions in 4 patients, small ostium associated with septal deviation in 6 patients, Adhesions and small ostium in 7 cases, sump syndrome in 1 patient.

At the end of 3 months subjectively 12 (66.7%) patients had complete cure and 6 (33.3%) patients had partial cure. At end of 6 months 13 (72.2%) patients had complete cure and 5 (27.8%) patients had partial cure (Table 2) (Figure 1).

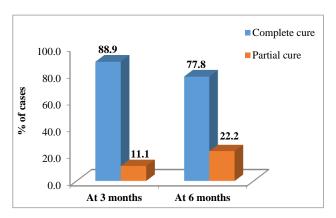


Figure 2: Showing objective improvement at 3 months and 6 months.

Objectively at the end of 3 months 16 (88.9%) patients had complete cure and 2 (11.1%) patients had partial cure. At the end of 6 months objectively 14 (77.8%) patients had complete cure and 4 (22.2%) patients had partial cure (Table 3) (Figure 2).

DISCUSSION

In the present study 11 females and 7 male patients were involved with slight preponderance towards the female side. This is in accordance with Anasua et al study where a large majority 81 (66%) were female and procedure was performed in 69 (51%) right eyes. ¹⁰ In Mohammad et al study 31 were female (62%). ² The age range of the subjects was 18-88 years (mean: 59.98 years). Female preponderance can be due to their poor hygiene, exposure to smoke and dust. Use of eye black and other cosmetics also increase the chances of transmission of infection. There may be congenital anatomical narrowing of nasolacrimal drainage system in females as compared to males.³ In David et al study 3 were males and 5 were females and the average age was 53.1 years.9 In Saiju et al study, there was a considerably greater number of female participants than male (78/22), which is consistent with previous findings.9

In present study revision surgery was performed after 1 year of initial surgery. Revision DCR was performed in 16 eyes at a median interval of 142 days after primary surgery in Anasua et al study. 10

High failure rate in initial endoscopic Surgical dissection may be because in endoscopic dissection soon after the removal of the uncinated process located posterior to the maxillary line an air space is often entered which corresponds to the infundibulum or an anterior ethmoid air cell overlying the lacrimal sac. ¹⁵ This is most often confused with the sac opening by novice surgeons. To expose the lacrimal sac, the bony lacrimal fossa must be uncovered, bony opening should be at least 8-12 mm in diameter to facilitate a successful outcome. ¹⁵

In present study the prevalent findings in during surgery were adhesions in 4 patients, small ostium associated with septal deviation in 6 patients, Adhesions and small ostium in 7 cases, sump syndrome in 1 patient. In Mohammad et al study revision endoscopy showed the most prevalent findings in the endoscopic revision before incision were septal deviation (66%), enlarged middle turbinate (48%), and septal adhesion to the lateral nasal wall (48%).² However, the most common findings after surgical incision were scar formation (32%), ostium problems (28%), underlying adhesion (16%), and sump syndrome (3%). In Anasua et al study 10/16 (62.5%) eyes at revision, the ostium was obstructed by dense firbrous tissue. 10 In David et al study causes of failurewere identified as nasal septal deviation in 8 cases and soft tissue periorbital factors in 5 cases. 9 One of the findings accompanied with the other causes of failure in external DCR, is the sacremnants. In some cases, the inferior part of the lacrimal sac remnants may form a pouch-like space with fluid retention, known as sump syndrome.² Combined approach avoids this completely.

Postoperative scarring at the site of the rhinostomy is one of the major causes of DCR failure, both with external and endo DCR techniques.2 In Tsirbas et al study five patients hadscarring of the osteotomy that led to failure of the surgery. 12 Several studies have suggested that a dependent ostium position is vital to increase success in external and endonasal surgery. To prevent this many adjunctive treatments such as silicone intubation and mitomycin C application had been used. In this study, silicone intubation was inserted by the ophthalmologist and kept for 3 months. Since postoperative adhesion is a reason for failure, and since silicone intubation prevents adhesion, it helps to enhance the patency of the lacrimal drainage system. The stents were removed in the present surgery after 3 months. The stents are usually removed at 6 weeks postoperatively, but intervals for stent removal ranging from 4 weeks to 6 months have been advocated by others. 15 In present study mucosal flap preservation not done. Several groups have provided sufficient data to suggest that mucosal flap preservation is not necessary for successful long-term outcomes with endoscopic DCR.¹⁶ Gazmend et al study also highlights that flaps does not add any added advantage.²⁰ Some surgeons elect to apply topical mitomycin-C to the intranasal rhinostomy site.8 Mitomycin-C is an antimetabolite that inhibits fibroblast function and has been used to modulate

postsurgical fibrosis in a variety of applications.¹⁷ However reports on the utility of mitomycin-C in prevention of postoperative mucosal fibrosis and rhinostomy closure have demonstrated mixed results.¹⁵ In present study mitomycin C is not employed.

In the present study none of the patients had any complications. Complications such as orbital fat prolapse, orbital and subcutaneous emphysema, conjuctival fistula formation, retobulbar hemorrhage, silicone tube problems such as tube extrusion, punctual erosion, granuloma formation, spontaneous extrusion, tube related epiphora and tube related canliculitis did not occur. This may be attributed to the meticulous dissection. None had a sump syndrome in the present study. This is because the lacrimal sac is approached from the inferior aspect, at entrance of the nasolacrimal duct and osteotomy site is quite low. Even in Rajesh et al study sump syndrome was not observed. None had problem with healing in external inferomedial subciliary scar. Similar results obtained in Rajesh et al study.

All the patients improved in present study. In Rajesh et al study where combined approach is used all the patients had patent lacrimal system at the end of 6 months. 11 Elina et al had success rate of 77% in revision cases. 17 In Mohammad et al study the success rate in revision cases was revealed to be 90%. 2 Revision Non endoscopic nasal-DCR was successful in 13/16 eyes in Anasua et al study. 10 This study has shown that revision DCR when performed as cooperation of otolaryngologists and ophthalmologists create collective "learning curve"-type effect among operating surgeons and surgical results improve drastically. In combined approach, endonasal problems can be corrected increasing the success rate. The combined approach gives chance to correct uncinate, middle turbinate, septal pathologies and an infected ethmoid sinus. It definitely gives upper edge in revision cases and possibly in traumatic cases.

CONCLUSION

The combination of endoscopic and external approach gives benefits of the both approaches giving huge advantages in revision cases. Advantages include excellent visualization of the surgical field, the ability to thoroughly evaluate the location and size of the rhinostomy site and the ability to treat concurrent intranasal factors. Facial scar is also nearly not visible in subciliary incision. It provides good team work opportunity between otorhinologist and ophthalmologist. However, as the number of patients included in the present study is small, further large clinical studies are warranted for conclusive outcome.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

REFERENCES

- Agarwal S. Endoscopic dacryocystorhinostomy for acquired nasolacrimal duct obstruction. J Laryngol Otol. 2009;123:1226–8.
- Mohammad EY, Hassan G, Farhad J, Pupak I, Mohammadreza JN, Narges SC. Teamwork Endoscopic Endonasal Surgery in Failed External Dacryocystorhinostomy. J Ophthalmic Vis Res. 2016;11(3):282-6.
- 3. Sudip KD, Karabi B, Piyali S, Bijan B, Amit D, Soumen NB. Endoscopic Dacryocystorhinostomy: A Study at IPGMER, Kolkata. Indian J Otolaryngol Head Neck Surg. 2013;65(Suppl 2):366–70.
- 4. Jae WY, Ha NO. Success rate and complications of endonasal dacryocystorhinostomy with unciformectomy. Graefes Arch Clin Exp Ophthalmol. 2012;250:1509–13.
- Kyung IW, Hyo SM, Yoon-duck K Characteristics of Intranasal Structures for Endonasal Dacryocystorhinostomy in Asians. Am J Ophthalmol. 2011;152 (3):491-8.
- 6. Herzallah I, Bassam A, Naif B, Osama M, Ameen A, Khalid A, et al. Endoscopic Dacryocystorhinostomy (DCR): a comparative study between powered and non-powered technique. J Otolaryngol Head and Neck Surg. 2015;44:56.
- 7. Ayoob M, Mahida K, Qurat-ul-ain, Dawood Z. Outcome and complications of endoscopic dacryocystorhinostomy without stenting. Pak J Med Sci. 2013;29(5):1236-9.
- 8. Ng DS, Chan E, Yu DK, Ko ST. Aesthetic assessment in periciliary "v-incision" versus conventional external dacryocystorhinostomy in Asians. Graefes Arch Clin Exp Ophthalmol. 2015;253:1783–90.
- 9. David MC, Iuri G, William RN, Taha ZS, Harold Lee HB. Improving outcomes by combining septoplasty with primary external dacryocystorhinostomy. Am J Otolaryngol Head Neck Med Surg. 2014;35:309–12.
- 10. Anasua G, Chetan V, Ritin G, Suryasnata R. Nonendoscopic endonasal dacryocystorhinostomy:

- Outcome in 134 eyes. Indian J Ophthalmol. 2016;64:211-5.
- 11. Rajesh RY, Ameya A, Girish S, Dhond. Combined subciliary and endoscopic dacryocystorhinostomy a novel approach. Otolaryngol Online J. 2014;4(3).
- 12. Tsirbas A, Wormald PJ. Mechanical endonasal dacryocystorhinostomy with mucosal flaps. Br J Ophthalmol. 2003;87:43-7.
- 13. Shrestha, Kafl, Pokhrel, Maharjan, Toran. Successes rate of endoscopic dacryocystorhinostomy at KMC. Kathmandu University Med J. 2010;8(2):195-8.
- 14. Rajesh V, Singh N, Ratnadeep G. A study of 272 cases of endoscopic dacryocystorhinostomy. Indian J Otorhinolaryngol Head Neck Surg. 2004;56(4):259-61.
- 15. Sindwani R, Ralph BM. Endoscopic dacryocystorhinostomy. Operative Techniques Otolaryngol. 2008;19, 172-6.
- 16. Vijay RR, Vikram DD, Todd TK. Revision endoscopic dacryocystorhinostomy. Operative Techniques Otolaryngol. 2008;19:177-81.
- 17. Elina P, Grigori S, Juha S, Kai K, Henri T. Mitomycin C. In revision endoscopic dacryocystorhinostomy: A prospective randomized study. Am J Rhinol Allergy. 2011;25:425-8.
- 18. Jin HR, Yeon JY, Choi MY. Endoscopic dacryocystorhinostomy: Creation of a large marsupialized lacrimal SAC. J Korean Med Sci. 2006;21:719-23.
- 19. Saiju R, Morse LJ, Weinberg D, Shrestha MK, Ruit S. Prospective randomized comparison of external dacryocystorhinostomy with and without silicone intubation. Br J Ophthalmol. 2009;93:1220–2.
- 20. Gazmend K, Ilir B. External Dacryocystorhinostomy with and Without Suturing the Posterior Mucosal Flaps. Med Arh. 2014;68(1):54-6.

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