

ORIGINAL RESEARCH ARTICLE

A STUDY OF ENDONASAL ENDOSCOPIC DACRYOCYSTORHINOSTOMY BY CONVENTIONAL VERSUS MODIFIED MUCOSAL FLAP TECHNIQUE: A RANDOMIZED CONTROLLED STUDY

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ABSTRACT:

Introduction: Modified dacryocystorhinostomy with mucosal flap is a newer technique, it involves creation of large rhinostomy and preservation of nasal and lacrimal sac mucosa, which increases the success rate of this procedure.

Objective: To compare the result of endonasal endoscopic dacryocystorhinostomy done by conventional method versus modified mucosal flap technique in chronic dacryocystitis patients.

Methods: 96 cases of chronic dacryocystitis of either sex, and age group 20 to 60 years with nasolacrimal duct obstruction diagnosed by syringing were enrolled in this study between November 2014 to October 2016. Group-A patients underwent conventional dacryocystorhinostomy and Group-B patients underwent modified dacryocystorhinostomy with mucosal flap technique. The post operative follow up was done upto 6 month to assess lacrimal patency using syringing.

Results: Success rate was determined by symptomatic relief of epiphora and patency at syringing at the end of 6 month. Success rate of conventional dacryocystorhinostomy was found to be 75% and modified dacryocystorhinostomy with mucosal flap technique was 93.75% (p value 0.011).

Conclusion: Success rate of mucosal flap technique was better and found statistically significant.

Keywords: Dacryocystitis, Nasolacrimal duct, Dacryocystorhinostomy.

INTRODUCTION:

In 1893 Endonasal dacryocystorhinostomy was described by Caldwell¹. Endonasal approach modernized by McDonough and Meiring² in 1989. For the past decade many types of endonasal approaches have been tried. Endonasal endoscopic approach for dacryocystorhinostomy has become popular over external DCR because of no facial scarring, less post-operative complications and short hospital stay.

Recently modification of lacrimal sac wall and nasal mucosa in order to improve the surgical success increased. Modified DCR with mucosal flap technique involves creation of a large rhinostomy and preservation of lacrimal sac and nasal mucosa to create mucosal flaps. Closure of bare bone with nasal mucosal flap and apposition between the lacrimal sac mucosa and the nasal mucosa decreases the formation of granulation tissue³.

Lacrimal and nasal mucosal flaps results in primary

intention healing which minimizes granulation tissue formation and therefore minimal shrinkage of post operative DCR ostium In our study we attempt to compare the procedure, complications and surgical outcome between conventional endonasal endoscopic DCR and modified endonasal endoscopic DCR with mucosal flap technique. The intention of this study is to find, if modified DCR with mucosal flap technique can be a better alternative to conventional DCR.

AIM

To evaluate and compare the result of endonasal

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endoscopic DCR done by modified mucosal flap technique with conventional DCR.

Methodology

1. Patient & Methods: This randomized controlled study was carried out over a period of two year in tertiary care centre after ethical committee approval. Total 96 cases were randomized into two groups, 48 in each group. Every consecutive patient complaining of epiphora and diagnosed as acquired nasolacrimal duct obstruction fulfilling inclusion criteria and willing to come for follow up were included in the study.
2. Inclusion criteria: Patients of age group of 20-60 years with epiphora due to nasolacrimal duct obstruction either primary or secondary and patients with fistula/mucocele/pyocele of lacrimal sac.
3. Exclusion criteria: Patient with congenital dacryocystitis, canalicular or common canalicular blockage, eyelid malposition, post traumatic lid and bony deformities, patients with failed external DCR and patients of DNS and other nasal pathologies.

Written and informed consent of each patient taken. Group A patients underwent conventional DCR while Group B patients underwent modified DCR. Most of the patients were in the age group of 40-50 years (39.6%) which was followed by 50-60 years age group (26%). All surgeries in both groups were done transnasally under endoscopic control by single otolaryngologist senior surgeon. All cases selected for the study were evaluated and a brief history was taken from each patient regarding symptomatology and duration of disease. A detailed clinical examination was performed. Anterior rhinoscopy was done to look for any intranasal pathology like deviated nasal septum, inferior turbinate hypertrophy, spur, stenosis etc. Nasal endoscopy was done to see the accessibility of operation site and nasal pathology prior to the surgery. Lacrimal sac syringing, probe test, and routine investigations of every patient were done. The patients were posted for surgery either under G.A or L.A with sedation and positioned in reverse trendelenberg position for surgery.

4. Surgery:

(a) Conventional endoscopic endonasal dacryocystorhinostomy:

Group-A patients underwent Conventional endoscopic endonasal dacryocystorhinostomy.

In conventional DCR lacrimal sac is connected directly to the nose by removing the layers of bone and mucosa which separate these two structures.

(b) Modified endonasal dacryocystorhinostomy with mucosal flap technique:

Group- B patients underwent modified mucosal flap technique.

Step-1 (Mucosal incision) An incision was made in lateral wall of nose with the help of sickle knife, starting just anterior to the axilla of middle turbinate and proceeded in forward direction for 0.5-0.7cm then vertically downward for 1.25 cm and therefore it proceeded posteriorly.

Step-2 (Flap elevation) A suction freer elevator is used to elevate the flap and creating a posteriorly based nasal mucoperiosteal flap. After elevating the flap it was reflected up towards middle turbinate.

Step-3 (Bone removal) The bone underlying the flap constitutes of anterior lacrimal crest of the maxilla anteriorly and lacrimal bone posteriorly. An osteotomy was performed with straight 2 mm Kerrison punch forceps and an angled punch was used to remove bone at upper limit of the sac. The complete antero-posterior extent of the medial wall of the sac was exposed. Lacrimal bone was removed with a Freer's elevator or with ball probe. At this point, it was important to meticulously locate and remove all small bone fragments.

Step-4 (Lacrimal sac incision and flap creation) The lacrimal sac medial wall incised vertically at the anterior margin of the exposed sac such that posterior lacrimal flap became larger than anterior lacrimal sac flap. Two small horizontal incision one superiorly and another inferiorly was given and U shaped posterior flap created. This lacrimal flap was reposed posteriorly. While small anterior lacrimal flap was reposed anteriorly.

Step-5 (Repositioning of nasal mucosal flap) The posteriorly based nasal flap was cut horizontally into two parts, so as to make superior and inferior nasal mucosal flap. Superior nasal mucosal flap is used to cover the raw bone which left superiorly over the upper limit of the sac. The inferior nasal mucosal flap is apposed with the posterior lacrimal flap⁴ (figure no. 1).

Step-6 (Patency check) With the help of suction tip, mucopurulent discharge or blood was removed, then stoma patency was checked by lacrimal sac syringing done with normal saline from outside by the assistant and free flow of the saline was observed endoscopically. 4% solution of xylocaine with 1:1,00,000 adrenaline soaked cotton pieces were used which were squeezed before placing into the nasal cavity to attain hemostasis and decongestion of the operative site and to improve hemostasis during incision and fashioning of the mucosal flap.

Medicated nasal packing was done with gauze piece soaked with Neosporin ointment. Any complications during the surgery bleeding, damage to lacrimal sac, damage to nasal mucosa and damage to orbital structures were noted and

treated accordingly.5. Post Operative care: For both the groups postoperative nasal packing done with neosporine soaked tape gauze and it is kept for 24 hours. The pack removed after 24 hrs. Saline nasal drops 4 -5 times a day advised to avoid crust formation. Patient will be advised to avoid nose blowing for 4-5 days. Patients followed up on 7th day, 15th day, 1 month, 6month postoperatively and syringing was done (figure no.2). Postoperative Dignostic Nasal Endoscopy done on 7th day to remove the crusts and synechiae if any. Diagnostic nasal endoscopy done during follow up to see any complication (figure no.3). The result of endoscopic DCR with or without mucosal flap technique recorded in the case record form.

6. Outcome measures: We measured anatomical and functional Success by symptomatic relief of epiphora & patency at syringing. Statistical analysis was done by using Epi Info Software version 6.0.

Chi square and Z score test was used and data analysis and recording was done. Level of significance was taken as 0.05.

RESULTS:

96 Patients underwent endoscopic DCR Surgery. Females constituted 59.4% while males constituted 40.6%. Male: female ratio was approximately 1:1.46. Females were commonly affected than males and it is thought to be due to congenital anatomic narrowing of nasolacrimal drainage system, long duration of exposure to smoke and increased probability of exposure to dusty environments⁵. Simple epiphora (52.1%) was the commonest symptom of presentation followed by epiphora with discharge in both groups. Left side involvement (62.5%) of disease was more commonly observed. This could be because; nasolacrimal duct and lacrimal fossa forms a more acute angle on the left side than the right side⁶. Early post- operative complications encountered after conventional DCR were bleeding (6.25%) and ecchymosis (2.5%) while in modified DCR technique bleeding was seen in 4.2% cases and ecchymosis seen in 4.2% cases. Late post-operative complications were shown in table 1. They were encountered after conventional DCR in the form of granulation (35.4%), crusting (16.7%), synechiae(6.2%) and stenosis (8.3%) while in modified DCR technique were granulation (8.3%),crusting(12.5%), synechiae (4.2%) and Stenosis (4.2%). Granulation was observed more in conventional DCR patients most probably because of bare bone which was statically significant (P value-0.004). On the basis of outcome measures of symptomatic relief of epiphora and patency at syringing, the success rate of Group A was 75% whereas in Group B rate was 93.75%. which was shown in table 2. The difference in both groups was statistically

significant (P value-0.011) (table no.2). Table no 3 Showing causes of failure and we found that 12 failure cases were due to granulation, synechiae and stenosis in Group A.

Granulation was seen in 8 cases which were obstructing the neo-ostium site. Stenosis was seen in 3 cases due to scarring and synechiae in one patient. Out of 3 failure cases in Group B granulation observed in one case while synechiae seen in 2 cases.

DISCUSSION:

Ever since endoscopic DCR was popularized in the 90's, there has been a constant debate between the external DCR & endoscopic DCR. According to ophthalmologist endoscopic DCR are not as successful as external DCR. The reason may be related to the lack of outline apposition of the nasal & lacrimal sac mucosa & the smaller bony ostium.

Table-1. Showing late post operative complication (> 48 hours).

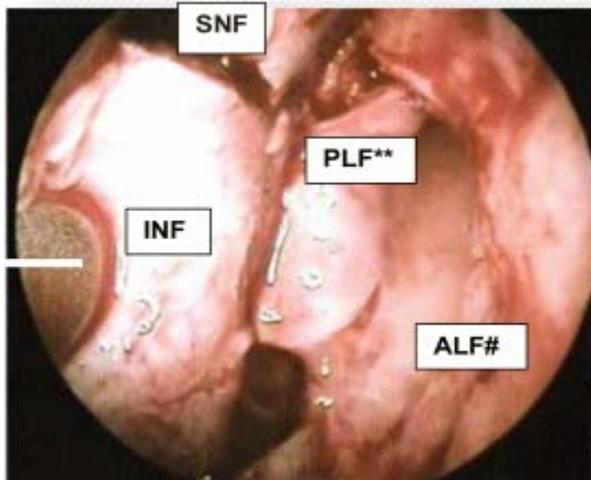
Late complication	Group A (n=48) No. of cases	Group B (n=48) No. of cases	Z-score	p-value
Granulation	17 (35.4%)	4 (8.3%)	2.83	0.004
Crusting	8 (16.7%)	6 (12.5%)	0.534	0.593
Synechiae/Adhesion	3 (6.25%)	2 (4.2%)	0.447	0.655
Stenosis/Cicatrization	4 (8.3%)	2 (4.2%)	0.816	0.414

Table-2. Showing outcome of surgery.

Outcome of surgery	Group A (n=48) No. of cases (%)	Group B (n=48) No. of cases (%)	Chi square	P - value
Success	36 (75%)	45 (93.75%)	6.4	0.011
Failure	12 (25%)	3 (6.25%)		

Table-3. Showing causes of failure.

Causes of failure	Group A	Group B (n=3)	Chi square	P value
Granulation	8	1	2.33	0.019
Synechiae/Adhesion	1	2	0.57	0.56
Stenosis/Cicatrization	3	0	1.73	0.08



SNF-superiornasal flap INF- Inferiornasal flap
**PLF-Posteriorlacrimalsac flap #ALF-Anteriorlacrimalsac flap
Fig.1- Showing rhinostomasite after modified DC Rwithmucosal flap technique.



Fig.-2. Showingostiumatsixmonth follow up.

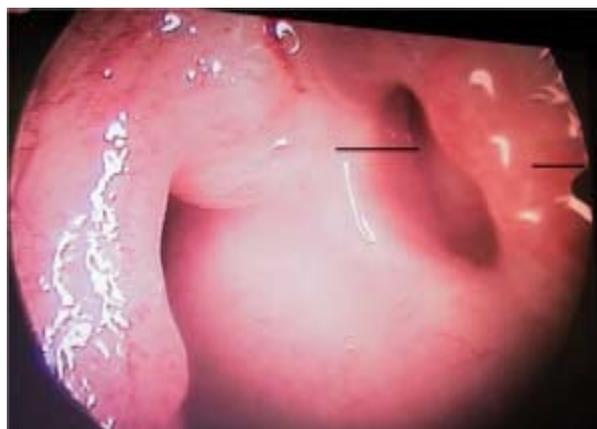


Fig.-3.- Thick arrow showing ostiumand small arrow showing granulation tissue during follow up atthreemonths.

Surgical failure occurs when the lacrimal sac does not marsupialise on the lateral nasal mucosal wall. With this article we hope to resolve this problem to some extent.

Dacryocystorhinostomy has been classified as external and endoscopic. The later has been further sub classified as laser assisted DCR, endoscopic canalicular laser assisted DCR and mechanical endonasal DCR with drills or without drills. In conventional endoscopic DCR surgery, the nasal mucosal flap is completely excised, along with the medial wall of lacrimal sac. Patency of the rhinostomy site depends on anastomosis of the cut edges of the nasal and lacrimal sac mucosa. However the pattern of anastomosis between these cut edges in unpredictable. If nasal to nasal mucosa and lacrimal to lacrimal mucosa anastomosis occurs, then the rhinostomy site will be closed. In modified mucosal flap technique, the nasal mucosal flap was preserved till end and was cut horizontally to make superior and inferior nasal flap. A U-shape lacrimal flap is created and apposition of nasal and lacrimal sac flap done.

Tsirbas and Wormald⁷ in their article have shown new technique in endonasal DCR. They emphasize on preservation of nasal mucosa and creation of a flap anastomosis. The general principle of creating a mucosa lined fistula is vital in external DCR was emulated in this new method.

There are very few large scale prospective randomized controlled trials in the literature to support the benefits of the various adjunctive measures in Endoscopic

DCR. Mitomycin-C an alkylating agent with inhibitory affects on fibroblasts has been shown to cause a decrease in both the density and cellularity of nasal mucosal specimens taken from Endoscopic DCR. However, its role in preventing closure of the rhinostomy site remain uncertain.

KSC Yuen et al⁸ noticed that patients with granulation tissue were found to have a lower success rate due to closure of the rhinostomy site. They noticed granulation in 17% cases of entire lacrimal sac excised and 6.5% cases of lacrimal sac flap group. In our study granulation was observed more in conventional DCR may be because of bare bone, which correlates with other studies. Qing shan etal³ also noticed granulation in 15% cases of mucosal flap technique and 39% conventional DCR.

The surgical success rate depends upon creating a wide osteotomy and preservation of mucosa around the bony ostium. They observed that Asian patients with thicker frontal process of the maxilla have more wide region of bared bone after surgery, which can lead to unwanted formation of granulation tissue and scar tissue around the ostium, thus

result in failure of surgery. Kansu et al⁹ also noticed a success rate of 88.3% in their study of mucosal flap technique.

In our study we introduced a new technique of fashioning a V-shaped nasal mucosal flap to cover the bared bone around the sac. This technique preserved most of part of nasal mucosal flap to cover the bared bone as possible and reduced the mucosal flap mobility.

The present study shows that the success rate of group A was 75% (48/36), as apposed to group B 93.75% (48/45). We observed that the rate of granulation and scar tissue formation was lower in group A with a lower incidence of ostium failure than in control group B.

These results suggest that the preservation of the nasal mucosa and fashioning of a nasal V-shaped flap, apposing well to the lacrimal sac flap and covering the bared bone, can reduced the formation of granulation tissue and lessens the risk of subsequent scan and closure of *ostium*. SNF-superiornasal flap In all our cases we took special care to create a good exposure and removal of all small bony specules. We avoided the use of stents, so granulation tissue formation was less.

CONCLUSION

This randomized controlled study showed that the success rate was more in mucosal flap technique as compared to conventional DCR which was statistically significant. Closure of bare bone with nasal mucosal flap and apposition between the lacrimal sac mucosa and the nasal mucosa decreases the formation of granulation tissue in mucosal flap technique. So it could be a better alternative to conventional DCR in future.

Limitation

To make our results more generalized, we need to investigate higher number of patients, this is not feasible, as everybody is not doing mucosal flap technique.

DISCLOSURES:

- a) Competing interests/Interests of Conflict- None
- b) Sponsorships – None
- c) Funding - None
- d) Written consent of patient- taken
- e) Animal rights- Not applicable

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