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Research Article

NASAL MUCOSAL FLAP REPOSITIONING TECHNIQUE IN ENDONASAL ENDOSCOPIC DACRYOCYSTORHINOSTOMY- A PROSPECTIVE INTERVENTIONAL STUDY

Biban Chhabra, Tarun Ojha, Rajendra Kumar Dabaria and Kanika Sharma

Department of ENT, Mahatma Gandhi Medical College & Hospital, Jaipur

A R T I C L E I N F O

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A B S T R A C T

Endoscopic dacryocystorhinostomy (DCR) is an established procedure performed for the treatment of chronic dacryocystitis with epiphora due to blocked nasolacrimal duct. From September 2019 to February 2021, 40 endoscopic DCRs were performed. The objective was to study the technique involved in repositioning of nasal mucosal flap with lacrimal sac mucosa in endoscopic endonasal DCR. Preoperative work-up included ROPLAS test, irrigation of lacrimal pathway and nasal endoscopy. The surgical technique comprises of repositioning the nasal mucosal flaps with lacrimal sac mucosa in all cases. Serial monthly follow-up concluded that 38 patients (95%) who underwent surgery had patent lacrimal pathway with no epiphora. 39 patients (97.5%) had healthy nasal cavity at 6 months follow-up with no synechiae. Post-operative follow-up included nasal endoscopy and lacrimal irrigation to evaluate anatomical patency. Repositioning the nasal mucosal flaps over lacrimal sac mucosa has come to deliver better functional results in a long term by its ability to cause fibrosis and faster healing, eventually creating a patent pathway.

INTRODUCTION

The standard surgical treatment for nasolacrimal outflow tract obstruction is dacryocystorhinostomy (DCR) during which the lacrimal sac is connected onto the nose to permit drainage of tears.[1]The primary causes of lacrimal tract obstruction include acute or chronic inflammation, trauma or congenital malformations. The common presentations of the patients include epiphora, eyelid and lacrimal sac swelling, purulent secretion, blurred vision and facial pain.

Endonasal DCR was first introduced by Caldwell in 1893, who used an endonasal electric burr to remove the bone once a metal probe had been passed through the canaliculus and into the lacrimal sac.[2]With the advent of rigid nasal endoscopes which facilitated intranasal access to the lacrimal sac, an endoscopic approach became feasible and was first used clinically in the late 1980s.[3]An endoscopic procedure offers a well-approved alternative to external DCR for the treatment of lacrimal pathway obstruction. The advantages of endoscopic DCR include avoidance of formation of external scar, safeguarding of the pump mechanism of orbicularis muscle, better hemostasis and reduced postoperative discomfort. The success rate of endoscopic procedure is comparable to that of a traditional (external) approach, and also allows the operating surgeon to correct sinusitis, septal deviations or other nasal deformities.In this study, we present our clinical and surgical experience on endonasal endoscopic DCR, including the surgical technique, results and follow-up of patients.

Corresponding author:* **Biban Chhabra
Department of ENT, Mahatma Gandhi Medical College & Hospital, Jaipur

MATERIALS AND METHODS

From September 2019 to February 2021, 40 patients affected by chronic dacryocystitis with epiphora, consenting for surgery underwent endonasal endoscopic DCR at the Department of ENT, Mahatma Gandhi Medical College & Hospital, Jaipur. Data were collected on 40 patients (14 male, 26 female). The average patient age was 55 years (range 5–75 years). After primary surgery, two patients were affected by relapses.

In all cases, preoperative work-up was performed by an Ophthalmologist and ENT specialist. The Ophthalmologist begins with ROPLAS test {A steady pressure is applied with index finger over the lacrimal sac area and regurgitation of mucopurulent discharge from the puncta is looked for. It signifies patent canalicular system with block in nasolacrimal duct (Fig.1)}.

Fig 1 Demonstrating ROPLAS test.

When lacrimal pathway is blocked, lacrimal probing is performed. If a hard stop is found on probing, patient undergoes lacrimal irrigation. After lacrimal occlusion is verified, nasal endoscopy is performed in all the cases.

All procedures were performed under general anaesthesia. To provide sufficient topical decongestion and vasoconstriction, the nose was packed with cotton pledgets soaked in 4% lidocaine with adrenaline followed by infiltration of the proposed rhinostomy site with 2% lidocaine with 1:100,000 epinephrine.

The surgical technique comprises of repositioning the nasal mucosal flap with lacrimal sac mucosa in all cases. (Fig.2). A 0° rigid nasal endoscope was used. After identifying the maxillary line, the nasal mucosa is incised, harvesting a posteriorly based muco-periosteal flap in order to expose the lacrimal bone. The mucosal incision began from the axilla of the middle turbinate and continued anteriorly for 5-6 mm before it took a cranio-caudal direction parallel to the maxillary line up to insertion of the inferior turbinate. Thus, incision continued about 8-9 mm posteriorly.

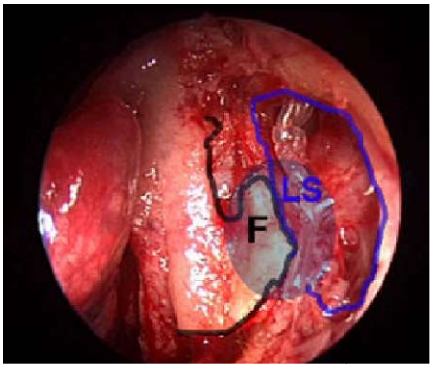

Fig 2 Repositioning the nasal mucosal flap (F) with lacrimal sac mucosa (LS) in all cases.

The bone was palpated to identify the junction between the hard bone of the frontal process and soft lacrimal bone. Removal of the soft lacrimal bone and the lower portion of the frontal process of the maxilla revealed the central and inferior regions of lacrimal sac medial wall, which can avoid postoperative ostium stenosis. Next, a Bowman's canalicular probe is introduced through the inferior punctum: the tip must be seen moving behind the sac wall and is used as a guide to make a vertical incision in the centre of the medial sac wall. After making upper and lower releasing incisions, anterior and posterior flaps are made, harvesting a reverse "H" shape. The flaps were rolled out and made to lie flat on the lateral nasal wall.

The mucosal flap was repositioned over the opened sac and cut creating an L-shaped flap encircling the new rhinostomy site. First intention healing can be obtained by ensuring contact between the lacrimal and nasal mucosa. The nose was packed after surgery in all the cases irrespective of bleeding. The packing was removed on first postoperative day.

Follow-up included nasal endoscopy and lacrimal irrigation to evaluate anatomical patency (Fig.3) Follow-up visits were performed once a week for the first month and consisted of removal of fibrin at the rhinostomy site and nasal synechiae in the nasal cavity, if any. Patient satisfaction was included in subjective postoperative evaluation criteria, while persistence or disappearance of epiphora, recurrence of dacryocystitis and lacrimal patency by lacrimal irrigation and nasal endoscopy was included in objective criteria.

Fig 3 At 4 months postoperatively, the internal opening is well formed.

Postoperatively, all patients were treated with oral antibiotics, analgesics, intranasal saline wash and antibiotic eye drops that were applied at home for a 7-day period. Saline wash was continued until the rhinostomy site was completely healed.

RESULTS

Considering the initial endoscopic procedure (n = 40), surgery was successful in 38 cases and patients no longer presented with their past complaints. All of these 40 were primary procedures. Thus, after primary endoscopic surgery, two patients were affected by relapses. The success rate was thus 95%.

Postoperative visits showed that lacrimal pathways were free at follow-up times ranging from 2 to 6 months. No patient was a revision case out of the two cases that were classified as failures after the primary endoscopic procedure. Of these, one decided not to undergo further treatment and one underwent a revision endoscopic DCR. After secondary endoscopic DCR, the procedure was successful, increasing the overall success rate to 97.50%.

All patients had chronic dacryocystitis with epiphora. In 16 cases, we found a mucopurulent secretion from lacrimal pathway. Concerning causes of nasolacrimal canal obstruction, in our series, we had two cases of stenosis secondary to surgery for mucormycosis.

The mean operative time for DCR was about 45 min (range 30–60 min). Postoperative complications included eyelid oedema in three cases, which were treated with topical anti-inflammatory therapy. Concerning delayed complications, in four cases, patients presented with nasal synechiae that were treated under local anaesthesia.

Taking into consideration the outcome criteria, there was a direct correlation between subjective and objective parameters. If anatomical patency is reached, in most cases, patients no longer presented with epiphora and dacryocystitis, and were satisfied.

DISCUSSION

To establish correct diagnosis and management of nasolacrimal obstructions before surgery, in our opinion, patients require irrigation of the lacrimal system, ROPLAS test and nasal endoscopy. Lacrimal irrigation is an easy, safe and low cost examination that can lead to correct diagnosis. The success rates of endoscopic DCR reported in the literature range from 79.4 to 96%.[4–10]In our study, endoscopic DCR

showed a success rate of 95% after the primary surgery, with complete resolution of symptoms and an open lacrimal pathway.

There are many advantages of endoscopic approach over traditional approach which include less skin trauma and scar tissue formation, preservation of lacrimal pump function, reduction of intraoperative bleeding and better visualization of anatomical structures. In the present study, the time required for DCR was approximately 45 min. Our surgical procedure includes repositioning of nasal mucosal flap with lacrimal sac mucosa in endoscopic endonasal DCR. The complete exposure of the sac, its marsupialization into the lateral nasal wall and the mucosa preservation with fashioning of a mucosal flap permit the nasal and lacrimal mucosa to be apposed with first intention healing.[11] The apposition between nasal and lacrimal mucosa and the recutting of an L-shaped mucosal flap encircling the opened sac ensure the patency of the new rhinostomy and also decrease the risk of granulations and scar tissue formation thus providing reproducible surgical results.[11]The co-presence of an ophthalmologist during the preoperative work-up and intraoperatively is helpfulfor better understanding of the practical aspects of the lacrimal pathways.

Some authors have described the use of topical application of mitomycin-C within the marsupialized lacrimal sac during endoscopic procedures.[3, 7, 12, 13]This anti- metabolite, reduces scar formation and is generally considered a safe adjunct to endoscopic DCR. However, the use of agent is controversial. Local instillation of mitomycin-C has no systemic side effects, although local side effects such as conjunctival irritation, excessive lacrimation and mild superficial punctate keratitis have been described.

Follow-up time is another crucial step when interpreting the results of DCR. Endoscopic controls using a 0° rigid endoscope allow removal of granulation tissue, scars and nasal secretion at the rhinostomy site as well as irrigation of lacrimal pathways. Follow-up at defined intervals are the easiest means of observing patients during the postoperative period and analyzing outcome.

Moreover, if not adequately followed up, a successful endoscopic DCR can become a failure, and good surgical procedure is only part of successful DCR.

CONCLUSION

Endoscopic DCR is a highly efficacious method with a high success rate in nasolacrimal obstructions. Repositioning the nasal mucosal flaps over lacrimal sac mucosa has come to deliver better functional results in a long term by its ability to cause fibrosis and faster healing, eventually creating a patent pathway. It is necessary to emphasize the important role of rigorous follow-up in preventing adhesions and obstruction of rhinostoma. Meticulous technique and assuring anatomical patency are keys to avoid surgical failure.

Conflict(s) of Interest None.

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Ethical Standards: This article does not contain any studies which experiments with human participants or animals and all institutional and international ethical standards have been followed.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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