

ENDOSCOPIC DCR A COMPARATIVE STUDY BETWEEN CONVENTIONAL MUCOSAL FLAP, MITOMYCIN C APPLICATION AND SILICONE STENTING

Nishtha Saini¹, Vishal Pathania², Manpreet Kaur³, Abhey Sood⁴

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ABSTRACT: BACKGROUND/OBJECTIVES: Recurrent stenosis and closure of neostium is considered a major factor for surgical failure in endoscopic dacryocystorhinostomy (Endo DCR). The main objective of this study is to evaluate the role of mitomycin c and silicone stent in maintaining the patency of the neostium. **MATERIALS AND METHODS:** Endo DCR were done in 180 patients. Group A included 40 patients where only mucosal flap was created, group B included 40 patients where silicon tube stents were used. Group C 40 included those in whom mitomycin c was applied to the neo ostium. Group D 40 included those in whom stenting along with mitomycin c was used. All the surgeries were done under general anaesthesia. **RESULTS:** In our study, 90% success in syringing patency was seen in group A, 85% success in syringing patency was seen in group B at 6 months of follow-up. 95% success was seen in group C. 100% success rate was seen in patients with mitomycin c application and stenting. Significant difference in success rate was seen group D. **CONCLUSION:** Significant difference in EDCR success rates were seen with the use of mitomycin c along with stenting in our study.

KEYWORDS: Endonasal dacryocystorhinostomy, Silicone tube stent, Nasolacrimal duct obstruction, Neo-ostium, mitomycin c.

INTRODUCTION: Epiphora is a common presenting complaint of patients referred to ophthalmology OPD. Some of these patients are referred to ENT OPD rule out any nasal cause. Evaluation with nasal endoscopy, syringing and dacrocystogram provides insight of the underlying disorder in lacrymal appratus.

The modern external DCR, in which the lacrimal sac is opened directly into the nasal cavity, was first described in 1904 by Toti.^[1] The endonasal approach was introduced by Caldwell in 1893.^[2] With the advent of hopkin rod system the nasal and lacrimal anatomy has been elucidated in great detail. The first endo DCR was done by McDonough and Meiring.^[3] Endo DCR has better patient and cosmetic acceptability; less surgical trauma and shorter hospital stay.^[4] In a recent systematic review of outcomes after DCR in adults, the success rate of Endo DCR was found to range from 84 to 94%.^[5]

The endoscopic approach to lacrimal sac has distinct advantages regarding less trauma and better cosmetic acceptability. The mid and low lacrimal system blockage can be successfully addressed with the endo DCR. A transcanalicular silicone stent may be placed at the time of surgery to maintain patency of the DCR ostium. There has been some controversy regarding ostium closure due to granulations following stent insertion.^{[6],[7]}

Mitomycin C (MMC), derived from *Streptomyces caespitosus*, is an antineoplastic agent that inhibits the synthesis of DNA, cellular RNA, and protein by inhibiting the synthesis of collagen by fibroblasts.^[8] MMC was originally used as a systemic chemotherapeutic agent; it has been widely used in ophthalmic practice both intraoperatively and postoperatively for prevention of pterygium recurrence, enhancing the success rate of glaucoma filtration surgery.^{[9]-[11]} When it is applied topically, it prevents postoperative stenosis.^[12] It has been used in many studies to minimize synachiae or nasal adhesion formation.^[13] Role of mitomycin C in preventing granulation tissue and nasal adhesion formation is still controversial. Some studies have reported very promising results.^[12-15] But other studies have shown that use of mitomycin C at the operative site did not improve success rate significantly.^[13]

We used a topical 0.5 mg/ml solution of mitomycin intra operatively and applied the drug for 2.5 minutes. This study compares the outcome of endoscopic DCR with conventional technique, with stenting and with mitomycin c application.

PATIENTS AND METHODS: Between February 2010 and December 2013 endoscopic intranasal DCR was performed in 120 eyes. There were 78 females and 20 males ranging in age from 19 to 65 years (mean 34 year). Presenting symptoms were epiphora (94) and chronic dacryocystitis (26). Informed consent was obtained from the patients.

The inclusion criteria was (1) primary and revision surgery and (2) adult patients (>18 years) with NLDO.

The following were excluded (1) paediatric cases (2) cases with co morbid medical history. All patients underwent a complete ophthalmic and endoscopic nasal examination. They had radiological assessment with dacryocystography. The operation was performed under general anaesthesia. Nasal packing soaked in 4% xylocaine and adrenaline 1: 100 000 solution was placed anterior and medial to the middle turbinate for 10 minutes. A 2% lignocaine with 1: 100 000 adrenaline solution was injected into the nasal mucosa just superior and anterior to the attachment of the middle turbinate under endoscopic visualization.

We used 30 degree endoscope for the surgery. During the surgery a mucosal flap was elevated from the region just anterior to the middle turbinate in the lateral nasal wall. The flap was elevated approx. 5mm superior to attachment of MT. The mucosal flap was elevated medially and preserved by tucking in MM. The bone underlying the flap was constituted by anterior lacrimal crest of the maxilla anteriorly and the lacrimal bone posteriorly. The groove between the lacrimal and maxilla palpated with a freers elevator. The lacrimal bone was easily dissected and removed. The thick anterior and superior hard bone was removed by means of a microdrill (10 000 cycles/minute) used in ear surgery. The bony window was enlarged to a diameter of approximately 8 mm with a DCR punch. The lacrimal puncta on the affected side were dilated and irrigated with a saline solution. A Bowman lacrimal probe was inserted through either punctum or canaliculus into the lacrimal sac to tent the mucosa of the lateral nasal wall as described by Metson.⁽¹⁶⁾ Then, a circular incision of nasal mucosa around the underlying probe tip was performed with a sickle knife. The medial wall of exposed lacrimal sac was incised with sickle knife and grasped with angled Blakesley forceps and removed to give a wide opening. Mucosal flap was repositioned around the bony ostium to cover all exposed bone in all the patients.

ORIGINAL ARTICLE

After creating the rhinostomy in 40 patients a surgical sponge, which was embedded in 0.5 mg/ml solution of mitomycin C, was applied to the mucosal border of the osteotomy site for 3 minutes under endoscopic visualisation. Maximum care was taken in order to have all circumferential mucosa in contact with the sponge. After removal of the sponge, the area was irrigated thoroughly with saline solution and aspirated with an intranasal aspirator. A change in the colour of the nasal mucosa from red to white-grey was visible immediately after application. Bicanalicular silicone intubation (Lacrimal intubation set) was performed in 40 patients. The stainless steel probes attached to the silicone tubing were retrieved under endoscopic visualisation by straight blakesley. Both ends of the tubing were knotted together stretched and cut.

Systemic oral antibiotic and topical antibiotic drops were administered to the patients in the postoperative period. In addition, nasal spraying with a steroid spray was applied. The silicone tubes were removed within 4–6 months.

RESULTS: Patients were followed up for 6 to 24 months ⁽¹⁸⁾. The operation was considered as successful if the patients had no symptoms at end of 12 months, and the lacrimal drainage system was proved to be patent by irrigation. The silicone tubes had been taken out at least 6 months before the last postoperative examination.

Groups	Patients	Success	failure
A	40	36	4
B	40	38	2
C	40	34	6
D	52 (40+ 12)	52	0

Table 1

Of the 180 procedures performed 40 patients underwent surgical procedure with just a mucosal flap, other 40 had application of mitomycin c, 40 had silicone stenting and failed cases and rest had both mitomycin c application and stenting.

All patients underwent endoscopic nasal examination during the each follow up to determine any granulation tissue or synechia formation in nose.

The success rate in 40 cases that had undergone conventional with mucosal flap endoscopic intranasal DCR was 36 (90%). 38 of 40 cases (95%) operated with mitomycin C were successful. 34 of 40 cases (85%) with stenting were successful whereas all 52 (100 %) patients with mitomycin application and stenting were succesful. Table 1.

Intraoperative application of mitomycin C has not caused any systemic problems since it is not absorbable from gastrointestinal tract. No nasal or gastrointestinal irritation has been observed during application.

DISCUSSION: Analysis of our study indicates the application of mitomycin c along with stenting is significantly better than conventional technique and stenting. Application of mitomycin c prevents postoperative granulations in stented and nonstented cases.

The main advantages over external approaches are, scar less surgery, least traumatic, precise technique and less morbidity. The added advantage of performing endoscopic DCR is also preservation of medial canthal ligament of eye. So lacrimal pump function is also preserved. Success rate of endo-DCR is about 90%, which is comparable to external DCR.

Linberg et al¹⁷ showed that a mean intranasal ostium size of 1.8 mm was enough to be successful in external DCR. This finding favoured endoscopic laser assisted DCR, but the success rate of endoscopic surgery was lower than the conventional method. The lower success rate was most probably due to inability of a direct suturing between nasal mucosa and the mucosa of the lacrimal sac. Since the maintenance of a patent surgical fistula requires an epithelial anastomosis within the fistula and a continuous pressure or flow of fluid.¹⁷ A silicone stent was needed for some time after endoscopic procedures.

The decrease in the size of the healed intranasal ostium after surgery is the result of a normal wound healing response.¹⁸ Mitomycin C is the most popular antifibrotic agent used intraoperatively. It is highly toxic when used systemically in antitumour therapy. Intraoperative application of mitomycin C in lacrimal surgery is a new indication. When used as a 0.5 mg/ml concentration for 3 minutes, intraoperative application of mitomycin C favourably affected the wound healing process.¹⁹ The application period of the drug was shortened for this relatively benign disease. This variation was thought to decrease the possible penetration of drug beyond the surgical borders.

Analysis of Boush et al's²⁰ series showed that the majority of the surgical failures occurred within 4 months after endoscopic surgery. A similar finding was also seen in Konget al's study.²¹

They reported that the average onset of ostium closure after the primary operation was 6 to 26 weeks (mean 12.7 weeks).²¹ Woog et al²² also reported that the average onset of failure was 7.5 weeks postoperatively (2–14 weeks). No patient in this series had osteum closure after 16 postoperative weeks. All of these findings indicated that the critical period was 4–6 months after endoscopic surgery. We left the silastic tubes 4–6 months if they were not prematurely lost. However, antifibrotic mitomycin C was thought to be effective in the inhibition of the wound healing process and the prevention of excessive scar formation in the rhinostomy site.

Closure of the osteotomy site with granulation tissue occurred in 12 cases, causing failure of surgery. These patients were taken up for revision surgery with mitomycin c application and stenting, all had a patent nasolacrimal flow postop.

The success rates of endoscopic endonasal DCR must attain those of external DCR to become an effective alternative. Various methods such as silicone sponge implant, Gelfoam-thrombin stent, and C flex catheters were used to increase the success of dacryocystorhinostomies.²¹ Woog et al reported that the use of C flex catheters in endoscopic DCR increased their success rate. Boush et al described the use of mitomycin C in endoscopic DCR, although those cases were not included in their series.

CONCLUSION: Application of a wound healing inhibitor is a new treatment modality in endoscopic lacrimal surgery. Its intraoperative use seems to be easy and safe and results of this study prove that mitomycin c application along with stenting is significantly better in primary and revision cases.

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ORIGINAL ARTICLE

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AUTHORS:

1. Nishtha Saini
2. Vishal Pathania
3. Manpreet Kaur
4. Abhey Sood

PARTICULARS OF CONTRIBUTORS:

1. Assistant professor, Department of Ophthalmology, SHKM Government Medical College, Mewat.
2. Assistant Porfessor, Department of ENT, SGT Medical College.
3. Associate Professor, Department of Ophthalmology, SHKM Government Medical College, Mewat.

4. Professor & HOD, Department of ENT, SGT Medical College.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Vishal Pathania,
101/ Tower7,
CHD Avenue 71,
Gurgaon-122001.
E-mail: drvpathania@gmail.com

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