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ORIGINAL ARTICLE

Endoscopic Ostium Assessment Following Endonasal Dacryocystorhinostomy with Mitomycin C Application

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Abstract: *Aim:* The aim of the study is to visualize the patency and measure the *ostium size* at the end of Endonasal DCR with mitomycin C (MMC) versus control and to assess the role of Mitomycin C in maintaining patency of nasolacrimal drainage system. *Design:* Prospective randomized controlled study *Participants:* Sixty patients who consented for this study was subjected to endonasal DCR and randomised into 2 groups (30 cases with mitomycin – C and 30 cases without MMC). *Methods:* Mitomycin-C 0.2mg/ml was applied intra-operatively for 5mins to the ostium site at the end of endonasal DCR in the MMC group. *Results:* In the mitomycin C group, 97% (29/30) of the ostium was found to be patent while in the control group 87% (26/30) were found to be patent. It was found that there was statistically significant difference in the osteotomy surface area between the MMC group and control group ($p < 0.001$).Both groups had a mean follow-up of 24-36 months. No complications were associated with use of Mitomycin-C. *Conclusion:* Intra-operative use of Mitomycin- C in endonasal DCR is safe and effective in maintaining the ostium size and thereby increasing the success rate.

Keywords: Chronic dacryocystitis, Endonasal endoscopic dacryocystorhinostomy, Mitomycin C, Ostium.

Introduction

Dacryocystorhinostomy (DCR) can be done via external approach or endonasal endoscopic approach. Endonasal DCR is now preferred over external DCR with added advantages of reduced risk of interference with lacrimal pump function, decreased operative time with no cutaneous scar. The main problems of endonasal DCR are doubts about long term patency and osteotomy closure by granulation tissue [1]. Mitomycin- C is derived from streptomyces caespitosus, is an alkylating agent with anticancer property. It reduces fibroblast collagen synthesis by inhibiting DNA-dependant RNA synthesis and can suppress cellular proliferation in any period of the cell cycle. In order to prevent excessive scar formation Mitomycin-C has been used as a surgical adjuvant in glaucoma filteration surgery and pterygium excision. More recently its use has been described in primary lacrimal drainage surgery [2]. The beneficial effect of MMC as a surgical adjuvant is thought to be related to its potent inhibition of fibroblast proliferation [1-2]. Intraoperative use of Mitomycin C in endonasal DCR may possibly improve the success rates over the traditional dacryocystorhinostomy procedures.

Mitomycin C when used in appropriate doses minimizes post operative fibrosis, synechiae and granulations thereby maintaining a bigger ostium size in the post operative period [2]. The aim of this study is to endoscopically assess the ostium size and patency in endonasal DCR with and without Mitomycin C application in cases of chronic dacrocystitis secondary to primary post saccal stenosis.

Material and Methods

From August 2008 to August 2011, 60 patients with primary post-saccal stenosis were selected for this study as confirmed by lacrimal syringing at KLES Dr. Prabhakar Kore Hospital & Medical Research Centre, Belgaum. Thirty patients were randomly assigned into each MMC endonasal DCR group (MMC group) and conventional endonasal DCR group (control group). Exclusion criteria were patients with presaccal obstruction, noticeable lower lid laxity, age under 15 years, suspicion of malignancy, radiation therapy to the head and neck area, post-traumatic bony deformity or bone diseases affecting the nose and orbit. Institutional ethical clearance was obtained.

Figure-1: 4mm olive tipped suction seen on the right of the figure was used to measure the horizontal & vertical dimensions of the ostium.

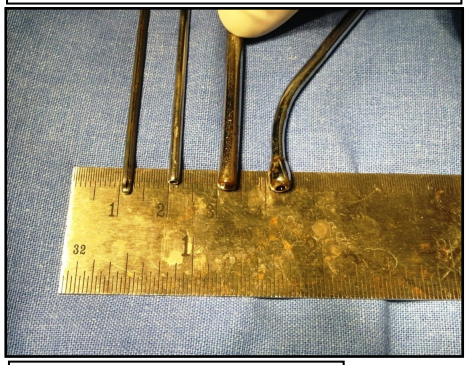
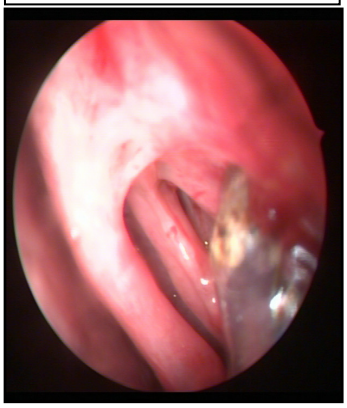


Figure-2: The 4mm olive tipped suction being used to measure the ostium size.



All patients who underwent endonasal DCR were performed under local anaesthesia. The operated side of the nasal cavity was packed with ribbon gauge soaked with 4% xylocaine and adrenaline 1: 100,000 prior to surgery for surface anaesthesia and vasoconstriction. Later, the mucosa of lateral wall of nose was infiltrated with 2% xylocaine and adrenaline. Using 0^0 endoscope and a sickle knife, $1cm^2$ incision was made in the lateral wall of nose starting just anterior to the axilla of the middle turbinate. The 2 mm Kerrison's punch was used to remove the frontal process of maxilla and the lacrimal bone. The lacrimal sac was identified, using sickle knife the medial wall of the sac was incised vertically and excised with Kerrison's punch or cauterised. Any abnormality of the septum or middle turbinate likely to increase the risk of failure due to occlusion of the ostium or synechiae formation were corrected endoscopically. At the end of the procedure in the MMC group, mitomycin C 0.2 mg/ml was applied at the rhinostomy site for 5 minutes soaked in gelfoam and washed with normal saline later. The lacrimal syringing was done to confirm the free flow of saline and nasal packing was done with medicated ribbon gauze for 24 hours.

Endoscopic assessment of ostium size was done by measuring the height and width with the help of 4 mm olive – tipped suction at the end of 1 week, 4 weeks, 6 months and 1 year. (Figure 1 & 2) The data obtained was analysed using student unpaired t – test.

Results

Of the 60 patients undergoing endonasal DCR, there were 15 males and 45 females with a male to female ratio of 1: 3. The mean age was 45.62 years. The majority of the patients, i.e.78.3% (47/60) were from poor socio economic background. In this study disease involvement was equal on both sides. In both groups, epiphora was the main symptom in 75% cases (45/60) while epiphora with discharge was seen in 25% cases (15/60). There were 2 cases of gross deviated nasal septum (DNS) in the disease side in each MMC group and control group and all of them underwent endoscopic septoplasty. Seventy five percent of cases in the endonasal DCR group were performed within 60 minutes. All 60 cases had bleeding score of grade 1 and grade 2 according to Boezaart's grading scale [3].

Table-1: Endoscopic visualisation of ostium at the end of 4 weeks

Results	**MMC group**		**Control group**	
Endoscopic visualisation of Ostium	No.	%	No.	%
Patent	29	97	26	87
Blocked	1	3	4	13

In the mitomycin C group, 97% (29/30) of the ostium was found to be patent while in the control group 87% (26/30) were found to be patent. (Table 1) The surface area of the osteotomy site at the end of surgery, 4 weeks, 6 months and 1 year in MMC group was 45.5 $\pm$ 4.3, 32.4 $\pm$ 3.6, 31.6 $\pm$ 3.4 and 30.9 $\pm$ 3.72 respectively while in the control group was 45.2 $\pm$ 4.3, 26.1 $\pm$ 1.7, 25.7 $\pm$ 1.9 and 25.0 $\pm$ 2.2 respectively. It was found that there was statistically significant difference in the osteotomy surface area between the MMC group and control group ($p < 0.001$). (Table 2)

Table-2: Surface areas of Ostium at the end of surgery, 4 weeks, 6 months and 1 year

Surface area of ostium in mm^2	**Ostium Surface area in MMC group**	**Ostium Surface area in Control group**	***p* value**
At end of surgery	45.5 $\pm$ 4.3	45.2 $\pm$ 4.3	----------
4 weeks	32.4 $\pm$ 3.6	26.1 $\pm$ 1.7	$p < 0.001$
6 months	31.6 $\pm$ 3.4	25.7 $\pm$ 1.9	$p < 0.001$
1 year	30.9 $\pm$ 3.72	25.0 $\pm$ 2.2	$p < 0.001$

In this study there were no complications with the use of Mitomycin C in the MMC group.

Discussion

According to present study, the overall success rate for endonasal DCR was 92 % (55/60). The ostium was blocked 1 case of MMC group while it was blocked in 2 cases in the control group. The success rates for endonasal DCR has been reported 82-95 % [4]. The success rate in this study in the endonasal DCR group with MMC application was 97%. The reported success rates of EnDCR with Mitomycin C varied between 77.3% and 99.2% [4-5]. The success rate depends upon creating a wide intranasal stoma with removal of adequate bone. This study has shown that there is a small reduction in the size of the lacrimal ostium in the first 4 weeks which corresponds to the initial stages of healing. However, after 4 weeks there was no significant change in ostium size. Our study correlates with the findings of Mann et al [6]. It also contradicts study by Ezra et al [7] in which they showed that the ostium contracted by 50% at 6 months. Kao et al [8] studied the effect of MMC on the maintenance of size of osteotomy site after external DCR. They showed that the mean surface area of osteotomy site in MMC group was 27.10 ± 5.78 mm^2 at the end of 6^{th} post operative month was statistically significant compared to 10.63 ± 3.37 mm^2 of the control group. They stated that intra-operative MMC is effective in maintaining larger osteotomy site and the surface area in their study was measured using computer aided digitiser. In our study, the mean surface area of osteotomy site was 31.6 ± 3.4 in MMC group compared to 25.7 ± 1.9 in the control group at the end of 6 months.

Mann et al [6] had studied the ostium size after routine endoscopic DCR. The osteotomy surface area in their study at the end of surgery, 4 weeks, 6 months and 12 months was 88.4 mm^2, 68.3 mm^2, 67.4 mm^2 and 68.8 mm^2 respectively. The mean vertical height at surgery in their study was 11.8 mm compared to 8.5 mm in our study at the end of surgery. The significant difference in the surface area therefore corresponds to the author's practice of exposing the whole lacrimal sac along its vertical height. The optimal dosage and exposure time of Mitomycin C is controversial. In the present study, 0.2 mg/ml was applied for 5 minutes, but in the study by You and Fang published in 2001 [9], they have compared the two Mitomycin C groups, one in which 0.2 mg/ml was applied in 16 patients while in the other group of 16 patients, 0.5 mg/ml was applied topically at the osteotomy site and found that there was no statistically significant difference between the two MMC groups. There is need for further randomized studies involving various dosage regimens and long term follow up visits would help to elucidate the optimum drug regimen. Theoretically, MMC is an anticancer drug which reduces the fibrous adhesion between the osteotomy site and nasal septum and also inhibits scarring around the opening of the common canaliculus. There was statistically significant difference in the osteotomy surface area between the endonasal MMC group and control group in our study ($p < 0.001$) while Kao et al [8] had also found statistically significant difference in the endoscopically measured osteotomy surface area between the external MMC group and control group. Thus application of MMC has a definitive role in preventing shrinkage of the osteotomy site along with reducing synechiae and adhesion formation.

Conclusion

Thus the use of Mitomycin C in endoscopic DCR is safe and successful technique. It has a definitive role in maintaining long term patency of the osteotomy site. Therefore, we recommend endoscopic DCR with MMC application as a better alternative to external DCR.

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