International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

Evaluating Efficacy of Mitomycin-C in Dacryocystorhinostomy

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Received: 25-10-2025
Accepted: 17-11-2025
Available online: 28-11-2025

ABSTRACT

Objectives: To assess the outcomes of mitomycin-c in dacryocystorhinostomy procedure in preventing post-operative granulations, synechiae, and stenosis.
Methods: The study was conducted at a tertiary care hospital between August 2022 and January 2024, involving 30 patients with epiphora who required Endoscopic Dacryocystorhinostomy. Patients were assigned to two groups alternately. Group I had odd number patients who underwent DCR surgery without mitomycin-C application and Group II had even number patients who underwent DCR surgery with mitomycin-C application.
Results: In our study, in group I, 12 out of 15 cases were successful without mitomycin-C application and in group II, 14 out of 15 cases were successful with mitomycin-C application. The results of endoscopic dacryocystorhinostomy with mitomycin-C were 93.34% whereas endoscopic dacryocystorhinostomy without mitomycin-C was 80% after a minimum follow-up period of 6 months. However, this difference in the results is statistically insignificant.
Conclusion: With all these results, it can be concluded that endoscopic endonasal DCR proves beneficial in patients of nasolacrimal obstruction. The creation of the largest possible ostium minimizes the risk for subsequent stenosis and closure of the lacrimal ostium. Despite no statistically significant results is noted between the two groups, there is a trend towards the better outcome with use of mitomycin-C.

Keywords*: DCR, Endoscopic Dacryocystorhinostomy, Mitomycin-C, Nasolacrimal duct obstruction, Epiphora.*

INTRODUCTION

Dacryocystitis, an inflammation of the lacrimal sac due to nasolacrimal duct obstruction, leads to symptoms like epiphora, discharge, and recurrent infections. Although watering can occur for a variety of reasons, the most common pathological cause is dacryocystitis [1]. The gold standard treatment is Dacryocystorhinostomy (DCR), which establishes a drainage pathway from the lacrimal sac into the nasal cavity. While both external and endoscopic approaches are effective, endoscopic DCR (endo-DCR) offers advantages like no external scarring and preservation of the lacrimal pump mechanism [2]. Obstruction of lacrimal pathways, whether congenital or acquired is a common problem that can be corrected with Dacryocystorhinostomy [2,3]. Despite its efficacy, endo-DCR has a failure rate mainly due to post-operative fibrosis, granulation, or reclosure of the stoma. To improve the surgical outcomes, Mitomycin-C (MMC), an anti-fibrotic agent, is used intraoperatively to inhibit fibroblast proliferation [4]. This study aimed to compare the outcomes of endoscopic DCR with and without intraoperative application of MMC in terms of post-operative complications and surgical success.

METHODS

This study was conducted in the Department of Otorhinolaryngology at a tertiary care hospital and medical college in Hyderabad. This study was a hospital-based, single-centered, prospective study. A total of 30 cases of nasolacrimal duct obstruction were divided alternately into two groups, group 1 includes odd number of patients who underwent dacrocystorhinostomy without mitomycin-c application (without MMC) and group 2 includes even number of patients

who underwent dacrocystorhinostomy with mitomycin-c application (with MMC) 15 patients each after taking proper informed consent. The duration of the study was from August 2022 to January2024.

Inclusion criteria

1. Patients aged 20 years and above with complaints of epiphora.
2. Patients with complaints of epiphora along with either deviated nasal septum, septal spurs or inferior turbinate hypertrophy.
3. Patients with mucocele of lacrimal sac.

Exclusion criteria

1. Patients aged less than 20 years
2. Patients with acute dacryocystitis / pyocele of lacrimal sac
3. Patients with previous history of DCR
4. Pregnant and nursing mothers.

Methodology

All the patients attending ENT OPD in Mediciti institute of Medical Sciences with complaints of epiphora were included in the study.

After informed consent a detailed history, general examination, local Ent examination, ophthalmic examination (syringing and probing) and diagnostic nasal endoscopy has been done.

Then patients diagnosed with nasolacrimal duct obstruction along with or without deviated nasal septum or septal spur or concha bullosa or inferior turbinate hypertrophy or mucocele of lacrimal sac have been taken up for surgery and simultaneous correction of nasal pathology was done.

A total of 30 patients diagnosed with nasolacrimal duct obstruction has been included in the study. They are divided into 2 groups and have been allotted alternatively to group 1 (without MMC) and group 2 (WITH MMC).

Instrumentation: 0ºand 30º Hopkins 4mm endoscope with 14 cm length was used during the procedure.
Position: Patient in supine position with head end elevated 10°

Surgery: Under general anesthesia, nasal decongestion was done with ribbon gauze soaked in mixture of 4% Xylocaine and 1:1000 adrenaline. Local infiltration is done using 2% xylocaine in a 1:100000 dilution of adrenaline given in the lateral nasal wall anterior to the uncinate bone and axilla of the middle turbinate [Fig 1A].

A reverse C-shaped mucosal incision approximately 10 mm x 10 mm was made at the lateral wall anteriorly and slightly superiorly to the insertion of the middle turbinate with the help of unipolar cautery forceps or an insulated ball probe or with a sickle knife. A square-shaped mucosal flap is elevated with a Freer periosteum elevator and is reflected back on the middle turbinate.

The anterior lacrimal crest was identified. Using 1 mm Kerrison bone punch, the frontal process of maxilla and lacrimal bone were removed for exposing the lacrimal sac from fundus to the origin of the nasolacrimal duct. Using a 12 no. blade, a sharp incision was made over the sac in inferior to superior direction, taking care not to damage the lateral wall of sac [Fig 1 B]. The medial wall of the sac was then excised using a 45degree angled scissors. Once the lumen is visualised, sac syringing is done through the punctum to see the drainage. The nasal flap mucosa and lacrimal sac mucosa are trimmed with scissors and both are approximated so as to make continuous lining.
Endo-nasally once an opening was made in the lacrimal sac, which was widened.

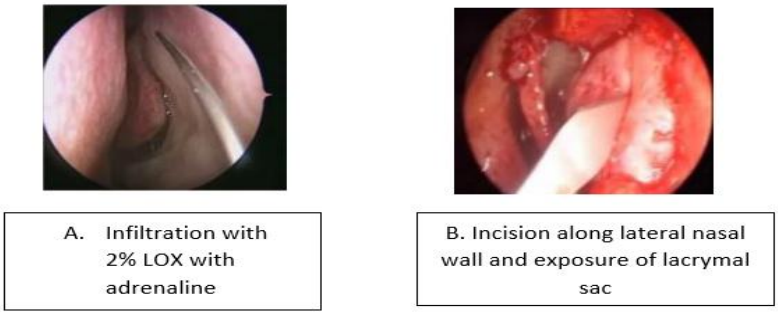

Fig 1: Surgical illustrations of DCR surgery

For group 2 patients, a surgical sponge embedded in Mitomycin C has been applied to the raw area of the lacrimal sac in a dose of 0.2 mg/ml for 5 minutes [Fig 2]. After removal of the sponge the area was been irrigated thoroughly with saline solution. Our preparation of MMC includes mixing of 2mg of MMC powder with 10ml of sterile water diluent to achieve concentration of 0.2 mg/ml.

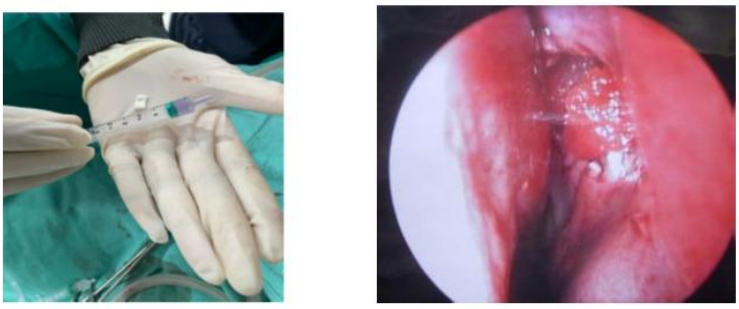

Fig 2: Application of mitomycin-c

Nasal packing was done with soframycin soaked ribbon gauze. Pack removal was done 48hrs post operatively and cleaning done.

All post-op patients included in the study have been followed up at 1,2 weeks, and the 1st month and 6th months, respectively to check for patency of the stoma, adhesions, granulations and stenosis. Sac syringing has been done through the canaliculus every 3 days at regular intervals for the first 2 weeks' post-surgery and repeated again at 1 month, 3 months and 6 months [Fig 3].

A B C

Fig 3: Post-operative examination (A) DNE showing open stoma (B), (C) Lacrymal syringing test

Data Analysis: Data collected was imported into MS-Excel (2010), then data was exported to SPSS and analysed. Continuous variables were summarized as mean and standard deviation. Categorical variables were summarized as proportions. Tests of significance for difference in proportions was performed by using Chi-square test.

RESULTS

This prospective study included 30 patients with nasolacrimal duct obstruction who were divided into two equal groups: Group 1 (without MMC) and Group 2 (with MMC). The majority were middle-aged adults (41–50 years), and there was a female predominance (70%). The left eye was more commonly affected (60%) [Table 2]. Presenting complaints included epiphora (100%), swelling at the medial canthus (53.3%), and nasal obstruction (33.3%). Diagnostic nasal endoscopy revealed that nearly half of the patients had a deviated nasal septum, and many had additional findings such as concha bullosa and turbinate hypertrophy [Table 1].

S.NO	FINDINGS	NO OF CASES	PERCENTAGE
1	NORMAL	16	53.33%
2	SPUR	8	26.66%
3	CONCHA BULLOSA	4	13.33%
4	TURBINATE HYPERTROPHY	5	16.67%
5	DEVIATED NASAL SEPTUM	14	46.67%

Table 1: Pre-operative diagnostic nasal endoscopy findings

PATENCY	RIGHT EYE	LEFT EYE
PATENT	**18**	**12**
NON -PATENT	**12**	**18**
TOTAL	**30**	**30**

Table 2: Pre-operative syringing results

Postoperative assessments showed surgical success (defined as patent lacrimal passage and symptomatic relief) in 93.34% of patients in the MMC group versus 80% in the non-MMC group [Fig 4]. Complications such as synechiae, granulation, and regurgitation were fewer in the MMC group [Fig 5. Although the difference in success rates was not statistically significant (p=0.376), the trend favored MMC in reducing post-operative morbidity.

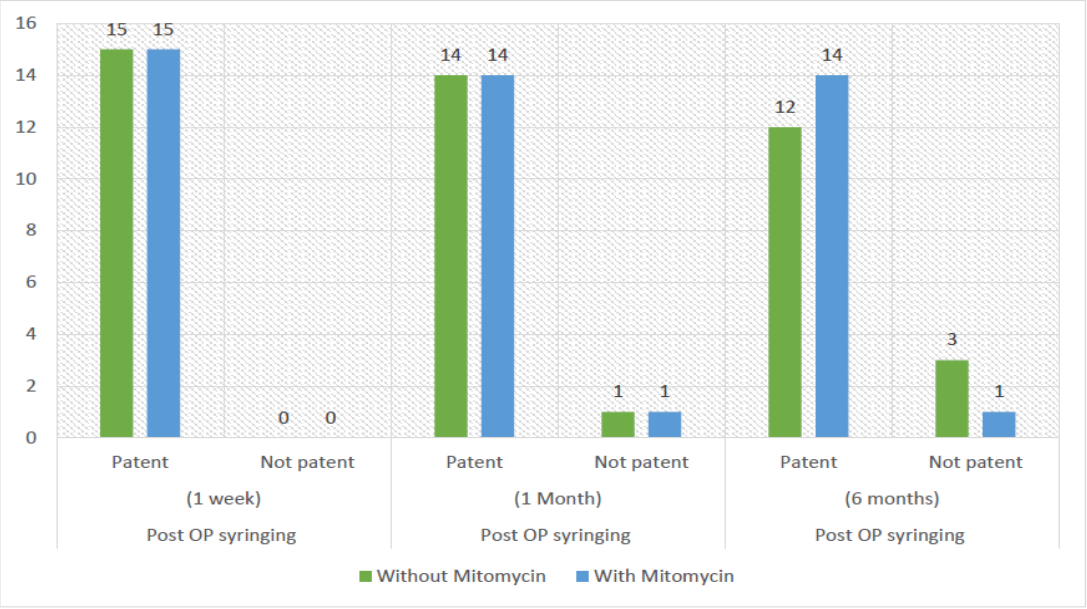

Fig 4: Post-operative syringing results

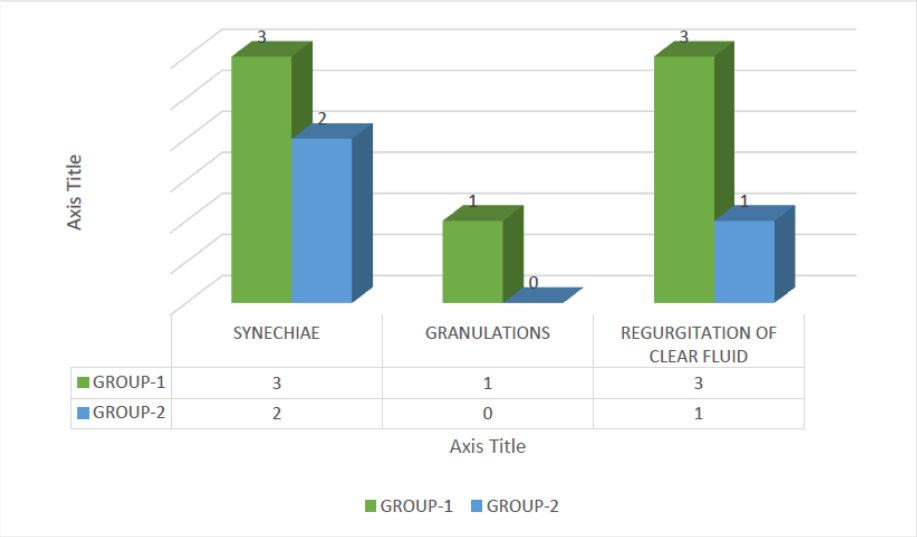

Fig 5: Post-operative complications

DISCUSSION

Endoscopic dacryocystorhinostomy (DCR) is more preferred for its minimally invasive nature and better cosmetic and functional outcomes. Despite this, restenosis due to fibrosis or granulation tissue remains a major challenge, prompting exploration of adjunctive measures such as mitomycin-C (MMC). In our study, intraoperative usage of MMC was associated with a higher anatomical success rate (93.34% vs 80%) and fewer complications, including synechiae (13.34% vs 20%) and granulations (0% vs 6.67%). Although statistically the results are insignificant, the findings are in support of previous reports by Camara et al. [5], Cheng et al. [6], and Deka et al. [7] , which suggested the benefit of MMC in improving ostium patency and reducing fibrosis.

The action of MMC IS by inhibiting fibroblast proliferation, which is a key factor in surgical site restenosis. Studies by Camara et al. [5], Cheng et al. [6], and Deka et al. [7] have reported better outcomes with intraoperative MMC. A meta-analysis by Shi-Ming Cheng et al. [6] showed a significant increase in success rates with the use of MMC. On the other hand, studies such as those by Wadhera et al. [8] and Reddy et al. [9] have reported no statistically significant benefit, suggesting surgical precision may outweigh pharmacologic adjuncts.

Our findings also throw a light on the role of concurrent nasal pathology. About half of the patients required septoplasty or turbinoplasty, suggesting that addressing nasal abnormalities contributes to surgical success [10,11]. The safety profile of MMC was also established by our study in concurrence with others [12,13], reaffirming its utility in selected high-risk cases. Small sample size and short follow up of 6 months are the major limitations of this study, which may underestimate late failures. Further large-scale, and long-term studies are needed to establish the role of MMC in routine DCR.

In conclusion, intraoperative mitomycin-C appears to offer benefit in enhancing surgical success and minimizing complications in endoscopic DCR. It can be used in patients at high risk for fibrosis or in those undergoing revision procedures.

CONCLUSION

The use of mitomycin-C intraoperatively may reduce complications and improve surgical outcomes in endoscopic DCR, although the difference was not statistically significant. It can be used as a safe adjunct and can be considered especially in revision cases or high-risk patients. Larger randomized trials are required to confirm these findings.

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