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ORIGINAL RESEARCH

Impact of mitomycin-c on endoscopic dacryocystorhinostomy with lacrimal sac stent insertion

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ABSTRACT

Introduction: The occurrence of epiphora is a common clinical manifestation of nasolacrimal duct occlusion. Stasis can also result in recurrent infection, with the most likely location being the intersection of the nasolacrimal duct and the lacrimal sac. **Aims:** To assess Mitomycin-C's safety and efficacy as a supplement to endoscopic dacryocystorhinostomy (DCR) with lacrimal sac stenting, particularly in terms of enhancing surgical results and avoiding nasolacrimal duct restenosis or scarring. **Materials & Methods:** The present study was a Prospective, Randomized Controlled Trial study. This Study was conducted for two years at Medica Superspecialty Hospital Kolkata. Total 50 patients were included in this study. **Result:** All the patients presented with epiphora (100%). Ten patients presented with swelling at the medial canthus of the eye (41.67%). One patient presented with swelling at the puncta (4.17%). Two patients presented with nasal discharge (8.33%). One presented with visual disturbance, that is, ambylopia (4.17%). **Conclusion:** The success of endoscopic dacryocystorhinostomy (DCR) with lacrimal sac stenting is significantly improved by mitomycin-C, we concluded. By preventing fibroblast proliferation and scar tissue formation, two primary reasons of DCR failure, its use helps lower the incidence of post-surgical stenosis and restenosis.

Keywords: Mitomycin-C, Lacrimal Sac Stenting, Fibrosis Prevention and Surgical Success.

INTRODUCTION

The occurrence of epiphora is a common clinical manifestation of nasolacrimal duct occlusion. Stasis can also result in recurrent infection, with the most likely location being the intersection of the nasolacrimal duct and the lacrimal sac. [1]

The symptoms of epiphora are treated with a variety of methods, including dacryocystorhinostomy, silicone intubation, nasolacrimal duct syringing, and medial canthal lacrimal sac massaging. (DCR) There are two methods for performing a dacryocystorhinostomy: internal and exterior. Blockage of the common cannaliculus and synechia at the neo-dacrostoma is probably the cause of DCR's unsuccessful outcome. [2]

Silicone stents utilized to maintain patency of the dacrostoma post DCR; lead to a foreign body reaction and thereby granulation tissue.[3]

Anti-proliferative agent applied at the neo-ostium reduces the fibrosis of healing.

Hata et al 1955 developed Mitomycin-C from Streptomyces ceaspitosus with half-life 8 to 48 minutes. It is an alkylating and anti-proliferative agent (Liao et al).[4] It reduces fibroblast collagen synthesis by inhibiting DNA dependant RNA synthesis and can suppress cellular proliferation at any stage of cell cycle.[5]

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Antineoplastic mitomycin-C has become a crucial adjunct in endoscopic dacryocystorhinostomy (DCR) with lacrimal sac stenting, a treatment used to relieve obstruction of the nasolacrimal duct. Its main function is to prevent surgical restenosis by lowering the production of excessive scar tissue and blocking fibroblast activity. When used in DCR procedures, mitomycin-C has been shown to increase success rates, improve long-term patency, and decrease the need for revision surgeries. To prevent issues such mucosal toxicity, its use necessitates careful dosage and procedure consideration. The importance of mitomycin-C in enhancing the results of DCR surgery is examined in this introduction.

To assess Mitomycin-C's safety and efficacy as a supplement to endoscopic dacryocystorhinostomy (DCR) with lacrimal sac stenting, particularly in terms of enhancing surgical results and avoiding nasolacrimal duct restenosis or scarring.

MATERIALSANDMETHODS

Study site: Medica Super specialty Hospital Kolkata

Study design: A Prospective, Randomized Controlled Trial study.

Study duration: One year January 2024 to December 2024

Sample size: 50

Inclusion Criteria

1. Adults aged 18 to 80 years.
2. Diagnosed with chronic dacryocystitis or nasolacrimal duct obstruction.
3. Indication for endoscopic DCR due to failure of conservative management.
4. Symptomatic epiphora (excessive tearing).
5. Willingness to participate and provide informed consent.

Exclusion Criteria

1. Active infections (eye or sinus) at the time of surgery.
2. History of previous nasolacrimal duct surgery.
3. Severe, uncontrolled systemic diseases (e.g., diabetes, hypertension).
4. Pregnant or planning pregnancy during the study.
5. Allergy to Mitomycin-C or components of the drug.

Statistical Analysis

Data were entered into Excel and analyzed using SPSS and GraphPad Prism. Numerical variables were summarized using means and standard deviations, while categorical variables were described with counts and percentages. Two-sample t-tests were used to compare independent groups, while paired t-tests accounted for correlations in paired data. Chi-square tests (including Fisher's exact test for small sample sizes) were used for categorical data comparisons. P-values ≤ 0.05 were considered statistically significant.

RESULTS

Table 1: Chief complaints on presentation (N=50).

Chief complaints	Group I		Group II		Total	
	Cases	%	Cases %		Cases	%
Epiphora	24	100	24	100	50	100
medial canthus	6	25	4	16.66	10	20
Swelling at puncta	8	33.33	7	29.16	15	30
Nasal discharge	4	16.66	3	12.5	7	18
Visual disturbance	6	25	10	41.66	16	32

Table 2: Findings on dacrocystogram (N=50).

	DCG Group I		Group II		Total	
	Findings	Cases %	Cases	%	Cases	%
B SC	2	8	4	16	6	12
B CC	15	60	12	48	27	54
B NLD	8	32	7	28	15	30
Mucocele	0	0	2	8	2	4
Total	25	100	25	100	50	100

Table 3: Success in terms of patent dacrostoma (N=50).

Results	Group I		Group II		Total	
	Cases	%	Cases	%	Cases	%
Success	22	88	19	76	41	82
Failure	3	12	6	24	9	18

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Table 4: Complications or late sequel (N=50).

Complications	Group I		Group II		Total	
	Cases	%	Case	%	Case	%
Granulations	6	24	4	16	10	20
Synechiae	6	24	12	48	18	36
Orbital	6	24	2	8	8	16
Visual	0	0	0	0	0	0
Epiphora	2	8	7	28	9	18
None	5	20	0	0	5	10

Figure 1: Endoscopic visualization of lacrimal sac after removing lacrimal bone and frontal process of maxilla over the lacrimal sac by the Kerrison punch.

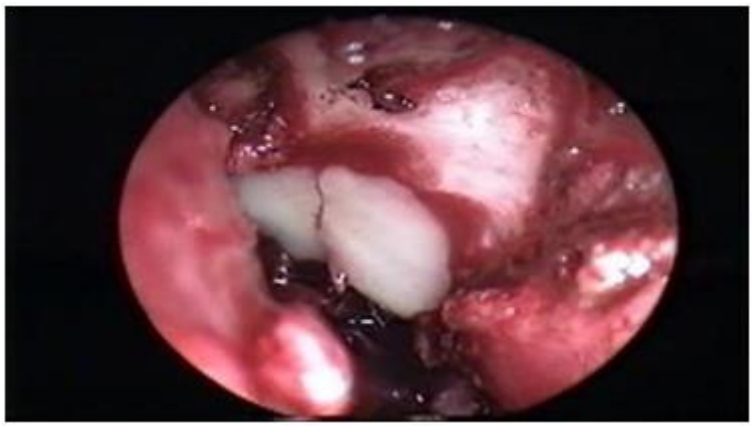

Figure 2: Purulent discharge seen after opening of lacrimal sac.

Figure 3: Stenting of lacrimal sac.

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Epiphora was the most common chief complaint, reported by 100% of patients in both Group I and Group II. Other complaints included swelling at the puncta, seen in 33.33% of Group I and 29.16% of Group II, and medial canthus involvement, reported by 25% in Group I and 16.66% in Group II. Nasal discharge was less frequently reported, occurring in 16.66% of Group I and 12.5% of Group II. Visual disturbance was more common in Group II (41.66%) compared to Group I (25%).

Dacryocystography (DCG) findings revealed that the most common abnormality in both groups was blockage at the common canaliculus (B CC), observed in 60% of Group I and 48% of Group II. Blockage at the nasolacrimal duct (B NLD) was the next most frequent finding, seen in 32% of Group I and 28% of Group II. Blockage at the sac (B SC) was noted in 8% of Group I and 16% of Group II. Notably, mucoceles were present only in Group II (8%) and absent in Group I. Overall, both groups showed a similar distribution of DCG abnormalities, with B CC being the predominant finding.

Treatment outcomes showed a higher success rate in Group I, with 88% (22 cases) achieving successful results compared to 76% (19 cases) in Group II. Conversely, the failure rate was lower in Group I at 12% (3 cases), while Group II had a higher failure rate of 24% (6 cases), indicating better overall outcomes in Group I.

Complications were more frequent in Group II compared to Group I. Synechiae were the most common in Group II (48%) versus 24% in Group I. Granulations and orbital complications were each observed in 24% of Group I, while these occurred in 16% and 8% of Group II, respectively. Epiphora persisted in 28% of Group II compared to 8% in Group I. Notably, no visual complications were reported in either group. Additionally, 20% of patients in Group I experienced no complications, whereas none in Group II were complication-free, indicating a comparatively better safety profile in Group I.

DISCUSSION

The therapeutic modality of choice for nasolacrimal duct obstruction, irrespective of the cause, is dacryocystorhinostomy.

Toti (1904) promoted the external dacrocysto-rhinostomy, while Caldwell (1893) promoted the intranasal. In 1989, McDonagh was the first to conduct internal DCR using a nasal endoscope.[6]

The success rates of both the endoscopic and conventional external approaches are high. The external technique has the drawback of leaving an external scar, which can make revision surgery very challenging in addition to having poor cosmesis. The endoscopic method has the extra benefit of improving cosmesis by preventing an external scar. It also has the benefit of being a one-step process that allows for the treatment of any coexisting nasal pathology. Under endoscopic vision, the stoma can be fashioned more precisely. The orbicularis occuli muscle, which supports the lacrimal pump, sustains little damage during this short, scarless procedure. [7] Under direct endoscopic vision, the stoma can be sufficiently enlarged and properly positioned to increase the likelihood of continued patency.

The late untoward sequel is the formation site of granulation tissue or synechiae at the operative and recurrence of epiphora.[8] To reduce synechiae, non-surgical methods include silicone stents or topical mitomycin-C treatment, whereas surgical methods include extensive bone excision, particularly in the superior extent, and mucosal flaps.

Selig et al found intra operative use of mitomycin-C 0.2 mg/ml, minimizes post-operative granulations, fibrosis and scarring. Apuhan et al study using 0.5 mg/ml application for 2.5 minutes showed a success rate of 91% in endodcr. Camara et al found a statistically significant (p=0.007) success with mitomycin-C.[9] Thereby maintaining a bigger post-operative stoma throughout the post-operative observation period and they emphasized that its intra operative use is easy and safe.

Dolmetsch et al noted that children with congenital nasolacrimal duct blockage were successfully treated with non-laser endonasal dacryocystorhinostomy with mitomycin-C. Its benefits included retaining the medial canthal structures and causing no scarring. They achieved a 94.4% success rate. [10]

Yim and Wormald et al highlighted that mitomycin-C, when used as an adjuvant for nasolacrimal duct probing at low concentrations (0.4 mg/ml), can enhance subjective and objective results without posing appreciable extra hazards. [11]

Ghosh et al and Zilelioglu et al reported no significant difference with or without application of mitomycin-C. [12] Prasanna et al concluded that it did not influence occurrence of granulations and synechiae nor did it alter the success rates significantly.[13]

Group I (with Mitomycin-C application) had a 91.67% success rate in our study, whereas group II had a 75% success rate. Group I experienced one failure (8.33%). In group II, there were three failures (16.67%). Our study's findings were found to be almost identical to those of other professionals.

The current investigation found no significant intraoperative or postoperative problems. Synechiae development was the most frequent complication, occurring in 37.5% of cases, followed by granulations in 20.83%.

CONCLUSION

The success of endoscopic dacryocystorhinostomy (DCR) with lacrimal sac stenting is significantly improved by mitomycin-C, we concluded. By preventing fibroblast proliferation and scar tissue formation, two primary reasons of DCR failure, its use helps lower the incidence of post-surgical stenosis and restenosis. It has been demonstrated that using Mitomycin-C increases the nasolacrimal duct's long-

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term patency rates and reduces the need for revision surgery. Despite its well-established effectiveness, the dosage and application method need to be carefully considered in order to reduce any potential side effects, such as mucosal toxicity. All things considered, mitomycin-C is a useful adjuvant in DCR treatments, especially for patients who have recurrent or chronic nasolacrimal duct obstruction. This ensures better results and lowers the risk of surgical failure.

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