

Effective Role of Mitomycin-C on Dacryocystorhinostomy Technique: A prospective Study

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Abstract

The research article evaluates the effectiveness of Mitomycin C (MMC) as an adjunctive therapy in endoscopic dacryocystorhinostomy (DCR) for the treatment of chronic obstruction in the nasolacrimal duct. The study included 80 patients divided into two groups of 40 patients each. 40 patients were treated with DCR alone and the other 40 patients received DCR supported with MMC (DCR+MMC group). Results were evaluated based on stoma patency and epiphora relief. The results demonstrated a higher success rate in the group that underwent DCR+MMC as compared to the DCR group. No postoperative complications were observed in either group. In conclusion, it was demonstrated that Mitomycin C application has a role in raising the success rate of endoscopic DCR.

Keywords: Nasolacrimal duct, dacryocystorhinostomy, stoma patency.

INTRODUCTION

Endoscopic dacryocystorhinostomy (DCR) is the most common technical procedure performed for nasolacrimal duct occlusion in the management of epiphora,^[1,2] and this technique was demonstrated firstly in 1904 by Toti.^[3] In general, it involves surgical anastomosis of the lacrimal sac to the nasal mucosa of the middle meatus.^[4] Epiphora is generally considered to be a common ophthalmological sign of distal acquired lacrimal obstruction.^[5] Long-term obstruction of the nasolacrimal duct causes chronic dacryocystitis and may sometimes reach a late stage, fibrosis, and obliteration of the lacrimal duct.^[6] The reason for DCR failure involves an overgrowth of fibrous tissue in the flap anastomosis and thus closure of the osteotomy site.^[7] Mitomycin C (MMC) is an alkylating antibiotic and considered a systemic chemotherapeutic agent, derived from *Streptomyces caespitosus*,^[8] and it inhibits fibroblast proliferation and reduces collagen production as it has the ability to inhibit DNA-dependent RNA synthesis.^[9] Since 1998 it has been used in dacryology to prevent excessive scarring in the ostium area after DCR technique.^[10] The intraoperative application of MMC in endoscopic DCR is safe and conducive for achieving excellent results from surgery.^[11-13] This study aims to evaluate the effectiveness of the topical application of Mitomycin C on

the surgical success rate of endoscopic DCR, with noting any complications intra and post operation.

METHODS AND PATIENTS

This prospective comparative study was carried out in the specialized (Otolaryngology) ward of Baquaba Teaching Hospital for a total of 80 patients diagnosed with chronic dacryocystitis due to blockage of the nasolacrimal duct, between January 25th and October 28th, 2022, after obtaining the approval of the Scientific Research Ethics Committee, as well as the informed consent of all patients to participate in the study. Inclusion criteria included all adult patients with nasolacrimal duct obstruction or chronic dacryocystitis of both genders. The exclusion criteria were cases of acute dacryocystitis, bleeding problems, associated systemic diseases, and malignant tumors in the nose or lacrimal sac. The typical endoscopic dacryocystorhinostomy approach using a silicone tube previously prescribed^[14] was performed for all cases by skilled surgeons under controlled hypotension local anesthesia to minimize surgical field bleeding. All 80 patients participating in this study were

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Submitted: 20th May, 2023

Received: 23rd May, 2023

Accepted: 18th June, 2023

Published: 02nd July, 2023

Access this article online	
Quick Response Code: 	Website: www.jnsbm.org
	DOI: https://doi.org/10.4103/jnsbm.JNSBM_14_1_10

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How to cite this article: Salman A L, Alkadem D H A, AL-majmaie A A. Effective Role of Mitomycin-C on Dacryocystorhinostomy Technique: A prospective Study. J Nat Sc Biol Med 2023;14:59-62

randomly separated into 2 equal groups of 40 each. In the (DCR+ MMC) group, Mitomycin C therapy was applied using a neuro pattie soaked with 0.2 mg/ml on the nasal mucosa (stoma site) of patients for three minutes. While the (DCR) group patients underwent dacryocystorhinostomy surgery without MMC application. All patients were examined on the first day after surgery with the anterior nasal packing removed. In addition, they were given antibiotics (in forms of oral systemic plus topical drops) for ten days and they were followed up for at least three months post-operatively. After two weeks of surgery, a nasal endoscopic examination was performed to inspect the patency of the stoma and to detach granular crusts, if any. The Endoscopy examination was repeated after 3 months for confirmatory follow-up. Any potential complications, either during or after surgery, were investigated. To assess outcomes, patency of the stoma was noted by epiphora

relief and categorized as success or failure. Using the SPSS statistical program (version 26), the data was analyzed descriptively, and tables were used to present the results. For categorical data, the frequency and percentage were determined. A chi-square analysis was performed to compare the results of the two groups, and a p-value of lower than 5 percent was considered significant.

RESULT

The results of the age groups analysis of the studied patients showed that the highest proportion was in the 21-30 years group (35%), followed by 31-40 years (23%), then 41-50 years (19%) as shown in Table 1. No remarkable variance was observed between both groups, and the mean age of patients in the (DCR+ MMC) group was 38.09 years, while in the (DCR) group was 37.16 years.

Table 1: Distribution of studied patients according to age groups

Age (years)	Total (80) N (%)	Study groups N (%)	
		DCR+ MMC (N=40)	DCR (N=40)
≤20	8 (10%)	4 (10%)	4 (10%)
21-30	28 (35%)	14 (35%)	14 (35%)
31-40	19 (23%)	10 (25%)	9 (22%)
41-50	15 (19%)	7 (17%)	8 (20%)
51-60	7 (9%)	3 (8%)	4 (10%)
61-70	3 (4%)	2 (5%)	1 (3%)

According to Table 2, a female predominance was observed in our study, with 57 (71%) female and 23 (29%) male.

Table 2: Proportions of studied patients according to gender for both groups

Gender	Total N (%)	Study groups N (%)	
		DCR+ MMC	DCR
Male	23(29%)	13 (32%)	10 (25%)
Female	57(71%)	27 (68%)	30 (75%)

As shown in Table 3, majority of the patients' complaints were epiphora (100%) in both study groups. About 29 (36%) patients complained of nasal obstruction: 18 cases

(45%) in the DCR+MMC group compared to 11 cases (27%) in the DCR group.

Table 3: Distribution of patients studied according to the chief complaints

Complaint	Total N (%)	Study groups N (%)	
		DCR+ MMC	DCR
Epiphora	80 (100%)	40 (100%)	40 (100%)
Nasal obstruction	29 (36%)	18(45%)	11(27%)

Diagnostic endoscopy for nasal examination was performed for a total of 80 patients, 48 (60%) were normal, 17 (42%) in (DCR+ MMC) patients, and 31 (77%) in DCR patients. Besides, 25 (31%) had nasal septum deviations,

18 (45%) in (DCR+ MMC) patients, and 7 (18%) in DCR patients. On the other hand 7 (9%) had concha, 5(13%) in (DCR+ MMC) patients and, 2 (5%) in DCR patients as shown in Table (4).

Table 4: Findings of nasal endoscopic examination of both groups studied

Noted findings	Total N (%)	Study groups N (%)	
		DCR+ MMC	DCR
Normal) None)	48(60%)	17 (42%)	31 (77%)
Deviation of nasal septum	25(31%)	18(45%)	7 (18%)
Concha	7(9%)	5(13%)	2 (5%)

No complications were recorded during surgery for all patients of both groups, whether injuries or bleeding. Also, postoperative complications such as epistaxis, wound infection, and local stenosis or adhesions were not proven. Based on success measures (potency of stoma and epiphora resolution), the results showed that

95% (38 out of 40) patients had complete relief epiphora versus 2 (5%) failed in (DCR+MMC) group. In DCR group, 33 (82%) patients demonstrated success while there were 7 failure cases (18%), there was no notable statistical variation between both groups ($p=0.34$) as illustrated in Table (5).

Table 5: Surgical outcomes for both studied groups

Outcome measure	DCR+MMC N (%)	DCR N (%)	P-value
Success	38 (95%)	33 (82%)	0.34
Failure	2 (5%)	7 (18%)	

After completing the surgery, patients in both groups were undergone syringing at 3 months to inspect the patency of the stoma. In the 3-month follow-up period, 38 (95%) patients had epiphora resolutions as well as

stoma patency in the (DCR+MMC) group versus 35 (87%) patients in the (DCR) group. In both groups, one case with granulation was observed (3%) as shown in Table (6).

Table 6: Follow-up at 3rd month postoperatively for patients studied

Follow-up	Study groups N (%)	
	DCR+ MMC	DCR
Epiphora resolution	38 (95%)	35 (87%)
Stoma patency	38 (95%)	35 (87%)
Non granulation	39 (97%)	39 (97%)

DISCUSSION

According to the updated data, dacryocystorhinostomy (either external or endoscopic) can be considered as the treatment of choice.^[15,16] Endoscopic DCR is superior to the external approach by being less cutaneous invasive.^[17] However, it has been reported that the failure rate of this approach has reached 18%, due to the closure of the ostium site as well as forming of adhesions in the nasal cavity.^[18,19] In our study, the same rate of failure was observed for patients of the DCR group. There are supportive medical therapies that can be applied to improve surgical outcomes, including the Mitomycin-C solution.^[13,20] In this study, Mitomycin-C was applied intraoperatively to inhibit postoperative ostium site blockage. In a previous comparative study conducted by Gupta (2016) and colleagues on 80 patients over a four-year period, they reported that the success rate with MMC application was higher (90%) than without MMC (85%), and statistically not significant.^[21] In a previous study conducted by Qurban and colleagues (2020), 50 patients underwent syringing of the lacrimal sac to investigate the patency state. They found that the application of 0.02% MMC during external dacryocystorhinostomy surgery led to a decrease in surgical failure after surgery.^[19] In 2017, Ozsutcu et al conducted a retrospective study of 68 patients; all patients underwent DCR with a biaxial silicone tube. On evaluation at the 12-month postoperative follow-up, no complications correlating to the use of MMC over the course of the study were observed. Besides, the success rates were around 80% in the DCR plus MMC group versus 78.8% in the DCR without MMC group, and no significant difference was observed between both groups.

^[22] In a case-series comparative study conducted by Do *et al.*^[23] on 160 cases of endoscopic DCR for nasolacrimal duct occlusion, they demonstrated no reverse actions associated with the application of topical 0.02% MMC during or postoperatively, and thus MMC application was considered a safe and efficacious adjuvant approach to raise the success value of endoscopic DCR.^[23] Kar *et al.*^[24] in their retrospective study comparing 96 patients divided by age group, found higher success rates for DCR with MMC group than for DCR without MMC group in different age groups. However, no statistically significant differences were recorded.^[24]

CONCLUSION

The study suggested that the application of MMC in endoscopic DCR contributes to higher success rates in terms of stoma patency and resolution of epiphora. However, further research with larger sample sizes, longer follow-up periods, and comprehensive outcome measures is necessary to validate these findings and determine the optimal role of MMC in endoscopic DCR.

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