

Original Article

# Comparative study of dacryocystorhinostomy with and without intraoperative application of Mitomycin C



Maniah Qadir, MS; Andleeb Ahangar, MS<sup>\*1</sup>; Mohamed Ahsan Dar, MS; Sumaya Hamid, MS; Manzoor Qadir Keng, MS

## Abstract

**Aims and objectives:** To compare the outcome of dacryocystorhinostomy surgery with and without the intraoperative use of Mitomycin C.

**Methods:** Our study is a prospective comparative case study in which 50 patients of primary acquired nasolacrimal duct obstruction were divided on the basis of random sampling into the conventional dacryocystorhinostomy group and the Mitomycin C group in which Mitomycin C 0.2 mg/ml was used intraoperatively. Patients were followed on 1st postoperative day, 1st, 3rd, 6th weeks, 3rd and 6th months. Patient symptoms and satisfaction were noted. Patency of lacrimal passage was assessed by lacrimal syringing and tear meniscus height was recorded on each follow-up.

**Results:** At the end of 6 months of follow-up, 96% of patients were asymptomatic in the Mitomycin C group whereas 80% patients in the conventional group were asymptomatic. On lacrimal syringing 24 (96%) eyes had patent passage in the Mitomycin C group where as only 1 (4%) patient had complete block with regurgitation of mucopurulent fluid. In the conventional group 20 (80%) eyes had patent passage, 4 (16%) eyes had complete block with regurgitation of mucopurulent fluid and 1 (4%) eye had partially patent passage on lacrimal syringing. Out of 25 eyes, 24 had normal tear meniscus height, and 1 had high tear meniscus height in the Mitomycin C group in comparison to the conventional group in which out of 25 eyes 20 eyes had normal, 1 had moderate and 4 eyes had high tear meniscus height. Intraoperative and postoperative complications in both the groups were identical.

**Conclusion:** Although the difference between the two groups was not statistically significant, a distinctly higher success was achieved in patients undergoing dacryocystorhinostomy with intra operative Mitomycin C as compared to conventional dacryocystorhinostomy.

**Keywords:** Dacryocystorhinostomy, Mitomycin C, Lacrimal syringing

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## Introduction

Epiphora and discharge secondary to nasolacrimal duct obstruction are common and troublesome problems among patients presenting to an ophthalmologist. Primary acquired nasolacrimal duct obstruction is believed to occur secondary to a chronic inflammatory process resulting in fibrosis and obliteration of the duct. Dacryocystorhinostomy is a widely accepted treatment for nasolacrimal duct obstruction whereby

the occluded duct is bypassed by creating an alternative drainage route between the lacrimal sac and the nasal cavity through a bony ostium. This is most often performed through a skin incision which permits the creation of an epithelium lined tract. However failure to maintain the patency of this alternative drainage route results in the failure of this procedure. A failure rate of 11–28% with an average of 9.4% has been reported which necessitates improving the above technique.<sup>1</sup> The two main causes of dacryocystorhinostomy failure

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Department Of Ophthalmology, Government Medical College Srinagar, Jammu and Kashmir, India

\* Corresponding author. Tel.: +91 9419976175.

e-mail addresses: [andleebali@gmail.com](mailto:andleebali@gmail.com), [mushoodnabi@yahoo.co.in](mailto:mushoodnabi@yahoo.co.in) (A. Ahangar).

<sup>1</sup> Postal address: Post Box Number 23, General Post Office (GPO), Srinagar, Jammu and Kashmir 190001, India.



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are obstruction of common canaliculus and closure of the osteotomy site by fibrosis and scar formation. Thus by inhibiting fibrous growth and subsequent scarring of the osteotomy site by using anti-proliferative agents over the anastomosed flaps and osteotomy site, the failure rate may be decreased.<sup>1</sup> Mitomycin C is an antibiotic alkylating agent which inhibits fibroblast proliferation and alters wound healing response leading to less fibrosis and scarring around the common canaliculus and osteotomy site.<sup>1,2</sup> In this paper we evaluate the effectiveness of intra operative use of mitomycin C as an adjuvant during dacryocystorhinostomy to prevent post operative fibrosis and scarring and hence decrease in the failure rate.

## Materials and methods

This study was conducted in the postgraduate department of ophthalmology, Government Medical College Srinagar on 50 patients of primary acquired nasolacrimal duct obstruction. This study was approved by the ethics committee and informed consent was taken from each patient prior to surgery. Exclusion criteria included pre-sacral obstructions, acute dacryocystitis, chronic granulomatous condition, long standing chronic dacryocystitis with fibrosis of sac, chronic dacryocystitis with fistula, ectropion, entropion, nasal conditions like severe deviated nasal septum, atrophic rhinitis, and previous failure of dacryocystorhinostomy. On the basis of simple random sampling these patients were divided into two groups of 25 patients each. 25 cases underwent dacryocystorhinostomy without Mitomycin C and 25 patients of dacryocystorhinostomy with intraoperative application of Mitomycin C.

Patients were followed up for a minimum of 6 months for evaluation of subjective symptoms and objective findings. Patients were followed postoperatively on 1st day, 1st, 3rd, 6th weeks, 3rd and 6th months.

Same technique of external dacryocystorhinostomy was used in patients of both groups. 5 ml of lignocaine 2% with adrenaline 1:200,000 was infiltrated around the lacrimal sac for anesthesia and hemostasis. After anaesthetizing the nasal mucosa by topical 4% xylocaine, packing of ipsilateral nasal cavity was done with roller gauze soaked in 5 ml of 4% xylocaine with adrenaline 1:200,000. A curvilinear incision of 20 mm in length was made along the anterior lacrimal crest starting 3 mm above the level of medial palpable ligament and 3 mm medial to the medial canthus. After separating the orbicularis muscle fibers, the medial canthal ligament was divided and the lacrimal sac was separated from the fossa by blunt dissection. The periosteum was elevated off and the lamina papyracea was fractured. An osteotomy of approximately 10 × 10 mm in size was created. Lacrimal sac and nasal mucosa were opened in a H fashion to form a large anterior and a small posterior flap. The posterior flap was then excised.

In the Mitomycin C group a piece of merocel surgical sponge soaked in 0.2 mg/ml of Mitomycin C was applied over osteotomy margins, undersurface of anterior flaps for 5 min. The lacrimal sac and nasal mucosal flaps were then sutured with 6/0 vicryl. Sponge was removed and normal saline irrigated through the lower punctum and over the osteotomy site. The two ends of medial palpebral ligament and incision in the orbicularis were closed with 6/0 vicryl interrupted

sutures. Skin incision was closed with 6/0 vicryl subcuticular suture or interrupted sutures. Nasal pack was placed which was removed after 24 h. Postoperatively patients received systemic antibiotics and anti inflammatory drugs for 7 days. Antibiotic eye drops were advised 6 times a day for 7 days.

To evaluate the results in both groups, both symptoms and objective findings were recorded on follow up. Patient symptoms were noted and classified as asymptomatic (symptom free), improved, and no improvement. Also on follow-up tear meniscus height was recorded and lacrimal syringing was done. Tear meniscus height was recorded by using fluorescein dye and graded on slit lamp as high (>1 mm), moderate (1 mm) and low (<1 mm). Syringing of the lacrimal passage was done and results were noted as passage patent, partially patent and complete block with regurgitation of fluid. Mann Whitney test was used for comparing the results of the two groups.

## Results

In our study there were 50 patients who underwent dacryocystorhinostomy surgeries; 25 were in the Mitomycin C group and the remaining 25 in the conventional group. Maximum number of patients belonged to the age group 31–60 years (78%). There was no significant difference in age between the two groups ( $p > 0.05$ ) (Table 1). There was a female preponderance in our study; 36 (72%) being female and 14 (28%) being male (Table 1). However sex distribution is comparable in both the groups. 37 (74%) out of 50 cases had right sided nasolacrimal duct obstruction (Table 2). On presentation 86% (43/50) cases had watering with discharge as the chief complaint. On ENT examination out of 50 cases 15 (30%) cases had mild deviated nasal septum, 7 (28%) cases in the Mitomycin C group and 8 (30%) in the conventional group (Table 2).

Intraoperative complications occurred in 10 cases. Injury to nasal mucosa occurred in 5 (10%) cases, sac injury in 1 (2%), and severe bleeding in 4 (8%) patients, 2 each in both groups (Table 3). Intraoperative complications in the two groups were comparable. The immediate post operative complications were epistaxis and wound infection. Epistaxis occurred in 5 (10%) patients; 3 in the conventional group and 2 in the Mitomycin C group. Wound infection was seen in 2 patients in the conventional group (Table 4).

Symptomatically 24 (96%) cases in the Mitomycin C group were asymptomatic with no symptoms whereas 1 (4%) had no improvement at the end of 6 months. In the conventional group 20 (80%) cases were symptom free; whereas 5 (20%) cases were symptomatic. There was no statistical significance between the two groups ( $p = 0.085$ ) (Table 5).

At the end of 6 months in the conventional group 20 (80%) eyes had patent passage on lacrimal syringing, whereas 1 (4%) eye had a partially patent passage; 4 (16%) eyes had complete block and regurgitation of mucopurulent fluid. In Mitomycin C group 24 (96%) eyes had patent passage on lacrimal syringing while only 1 (4%) eye had complete block with regurgitation of mucopurulent fluid. However no statistical significance was seen between the two groups ( $p = 0.088$ ) (Table 5).

On assessing tear meniscus height, 24 (96%) cases in the Mitomycin C group had normal height at the end of 6 months, only 1 (4%) case had a high tear meniscus height.

**Table 1.** Age and Gender Distribution

		Mitomycin C		Conventional		P value
		n	%	n	%	
Age (years)	<30	3	12.0	2	8.0	0.303 (NS)
	30–39	6	24.0	4	16.0	
	40–49	7	28.0	7	28.0	
	50–59	6	24.0	9	36.0	
	≥60	3	12	3	12.0	
	Mean ± SD	43 ± 12.6 (20.64)		47.3 ± 11.5 (27.64)		
Gender	Male	6	24	8	32.0	0.533 (NS)
	Female	19	76	17	68.0	

**Table 2.** Clinical Examination

		MMC		Conventional		P value
		n	%	n	%	
Laterality	Right	18	72.0	19	76.0	0.750 (NS)
	Left	7	28.0	6	24.0	
History of watering	Yes	2	8.0	2	8.0	1.000 (NS)
History of discharge	Yes	22	88.0	21	84	0.687 (NS)
ENT Deviated Nasal septum	Yes	7	28.0	8	32.0	0.760 (NS)
Tear meniscus height	Moderate	21	84	19	76.0	0.484 (NS)
	High	4	16	6	24.0	
Lacrimal sac syringing	CB + RTMF	25	100.0	25	100.0	1.000 (NS)
Clinical diagnosis	CDC	25	100.0	25	100.0	1.000 (NS)

**Table 3.** Intraoperative Complications

	MMC		Conventional		P value
	n	%	n	%	
Sac mucosal damage	1	4.0	0	0.0	0.922 (NS)
Severe bleeding	2	8.0	2	8.0	
Nasal mucosal damage	2	8.0	3	12.0	
Normal	20	80.0	20	80.0	

In comparison 20 (80%) cases had a normal meniscus height whereas 1 (4%) case and 4 (16%) cases had moderate and high tear meniscus height, respectively. Again there was no statistical difference between the two groups ( $p = 0.088$ ) (Table 5).

## Discussion

Chronic dacryocystitis is preferentially more common in adults over middle life from 5th to 7th decade.<sup>3–6</sup> In the present study maximum number of patients (46 (78%)) belonged to the middle aged group (31–60 years). In the study conducted by B.J. Goswami et al<sup>7</sup> overall age range was between 16 and 62 years (average 37.2 years) in group 1 and

15–69 (average 38.2 years) in the other group. In the present study age range in the conventional group was 27–64 years (average 47.3 years) and age range in the Mitomycin C group was 27–62 years (average 43.4 years). Thus this is comparable with previous studies with no significant difference in age between the two groups.

In the present study 36 (72%) patients were female and 14 (28%) were male, thus showing female dominance. This is in total agreement with all the previously done studies which demonstrate female predilection of dacryocystitis with male: female ratio 1:3.<sup>3,4</sup> This may be attributed to the presence of narrower lumen of bony lacrimal canal and lower nasolacrimal fossa in females.<sup>3,4,8</sup>

Contrary to previous studies, majority of the cases (37 (74%)) in our study had dacryocystitis on the right side. Dacryocystitis has been noted to occur more frequently on the left side than right.<sup>8</sup> Probably a larger sample would have shown similar results as quoted in the literature. All the patients had uncomplicated chronic dacryocystitis. 15 (30%) cases in our study had mild deviated nasal septum where as failure was seen in 4 (11.4%) cases out of 35 patients without deviated nasal septum; this demonstrates that failure of surgery cannot be attributed to mild deviated nasal septum. In our study severe intraoperative bleeding was seen in 4 (8%) cases, 2 cases in each group, respectively, and was due to injury to

**Table 4.** Immediate Postoperative Complications

	MMC		Conventional		P value
	n	%	n	%	
Epistaxis	3	12.0	2	8.0	0.760 (NS)
Wound infection	0	0.0	2	8.0	
Normal	22	88.0	21	84.0	
Syringing day 1 (passage patent)	25	100.0	25	100.0	1.000 (NS)

**Table 5.** Postoperative follow up.

		Syringing			Tear meniscus height			Symptoms		
		Complete block + regurgitation	Partially patent	Passage patent	Normal	Moderate	High	Asymptomatic	Improved	No improvement
1st Week	MMC	0 (0.0%)	1 (4.0%)	24 (96.0%)	24 (96.0%)	1 (4%)	0 (0%)	24 (96%)	0 (0%)	1 (4%)
	Conventional	0 (0%)	3 (12%)	22 (88%)	22 (88%)	3 (12%)	0 (0%)	22 (88%)	1 (4.0%)	2 (8%)
	P value	0.303 (NS)			0.303 (NS)			0.312 (NS)		
3rd Week	MMC	0 (0.0%)	1 (4.0%)	24 (96.0%)	25 (100%)	0 (0%)	0 (0%)	24 (96%)	0 (0%)	1 (4%)
	Conventional	0 (0.0%)	4 (16%)	21 (84%)	21 (84%)	4 (16%)	0 (0%)	21 (84%)	1 (4.0%)	3 (12%)
	P value	0.162 (NS)			0.039 (NS)			0.168 (NS)		
6th Week	MMC	1 (4.0%)	0 (0%)	24 (96%)	24 (96%)	0 (0%)	1 (4.0%)	24 (96%)	0 (0%)	1 (4.0%)
	Conventional	1 (4.0%)	4 (16%)	20 (80%)	20 (80%)	3 (12%)	2 (8%)	20 (80%)	0 (0%)	5 (20%)
	P value	0.099 (NS)			0.095 (NS)			0.085 (NS)		
3rd Month	MMC	1 (4.0%)	0 (0%)	24 (96%)	24 (96%)	0 (0%)	1 (4.0%)	24 (96%)	0 (0%)	1 (4.0%)
	Conventional	3 (12%)	2 (8%)	20 (80%)	20 (80%)	2 (8%)	3 (12%)	20 (80%)	0 (0%)	5 (20%)
	P value	0.092 (NS)			0.092 (NS)			0.085 (NS)		
6th Month	MMC	1 (4.0%)	0 (0%)	24 (96%)	24 (96%)	0 (0%)	1 (4.0%)	24 (96%)	0 (0%)	1 (4.0%)
	Conventional	4 (16%)	1 (4.0%)	20 (80%)	20 (80%)	1 (4.0%)	4 (16%)	20 (80%)	0 (0%)	5 (20%)
	P value	0.088 (NS)			0.088 (NS)			0.085 (NS)		

angular vein, during punching of lacrimal bone and during incising the nasal mucosa. The injured angular vessels were clamped and ligated to stop further bleeding. Identification and retraction of angular vessels with the help of retractors can prevent injury to the angular vessels. Bleeding occurring during punching of lacrimal bone was managed by mechanical pressure from swabs soaked with botrocrot solution. Nasal repacking with gauze moistened with 2% lignocaine with adrenaline was also done to stop bleeding. Bleeding from nasal mucosa was controlled in a similar manner.

Tarbet and Custer<sup>9</sup> have reported post operative epistaxis in 3.9% cases of external dacryocystorhinostomy. In our study epistaxis was seen postoperatively in 5 (10%) cases, 3 in the Mitomycin C group and 2 in the conventional group; this was noticed after removal of nasal pack on the 1st post operative day. None of the cases required anterior nasal packing and were managed conservatively on tablet ethamsylate 3 times a day for 3 days. 2 (4%) cases of post operative wound infection were seen in the conventional group. One of these cases also had severe intraoperative bleeding. It was managed conservatively with systemic antibiotics, and topical antibiotics. Response to treatment was good. No case of wound infection was seen in the Mitomycin C group. Goswami and colleagues<sup>7</sup> in their study have reported delayed wound healing in 2 patients and recurrent epistaxis in one patient as complications due to Mitomycin C use. Shu Liao and colleagues<sup>1</sup> have reported only one case of delayed wound healing due to Mitomycin C use however no Mitomycin C induced complications such as severe nasal bleed, mucosal necrosis, wound infection and delayed wound healing were seen in our study.

In our study there were 4 (16%) cases who had high tear meniscus height (>1 mm) at the end of 6 months in the conventional group. 1 (4%) eye had moderate tear meniscus height (1 mm) and 20 eye samples (80%) had normal tear meniscus height (<1 mm). In the Mitomycin C group 1 eye (4%) had high tear meniscus height at the end of 6 months and 24 eyes (96%) had normal tear meniscus height. The objective finding of tear meniscus although does not show statistical significance demonstrates the efficacy of Mitomycin C application. Shu Liao et al<sup>1</sup> in their study have reported 32 (72.7%) eyes having normal tear meniscus height, 7 (16%)

having moderate tear meniscus height and 5 (11.3%) eyes having high tear meniscus height in the conventional group. In the Mitomycin C group out of 44 eyes in their study, 41 (93.1%) eyes had normal tear meniscus height, 1 eye (2.3%) had moderate and 2 eyes (4.6%) had high tear meniscus height. This is in total agreement with the present study demonstrating the high efficacy of Mitomycin C.

At the end of 6 months, 20 (80%) cases in the conventional group and 24 (96%) cases in the Mitomycin C group had patent passage on lacrimal syringing. Failed cases showed either clear fluid regurgitation or mucopurulent regurgitation on lacrimal sac syringing. In the study conducted by Seyhmus Ari et al<sup>10</sup> on lacrimal sac syringing 96% had patent passage in the Mitomycin C group and 84% in the conventional group had patent passage at the end of 1 year. Our results are also comparable to the study conducted by Shu Liao et al<sup>1</sup> where 88.4% of cases in the conventional group and 95.5% of cases in the Mitomycin C group had patent passage on lacrimal sac syringing. This indicates the efficacy of Mitomycin C in increasing the patency rate of the lacrimal drainage system, although the statistical difference is not significant.

All failed cases in both the groups were subjected to ENT evaluation. All 6 patients showed narrowed ostium and soft tissue scar and membrane across the ostium on anterior rhinoscopy. Medical management with nasal decongestants and probing of lacrimal tract was done in these cases. Repeat dacryocystorhinostomy was done in 3 cases in the conventional group and one case in the Mitomycin C group, but resurgery was very difficult because of dense scarring.

Although the success rates did not reach statistical significance a distinctly higher success has been achieved in patients undergoing dacryocystorhinostomy with intraoperative Mitomycin C cases compared to patients undergoing conventional dacryocystorhinostomy. Thus it can be concluded from our present study intraoperative use of Mitomycin C improves the success rate of external dacryocystorhinostomy and hence can be considered as a safe and effective modification of conventional dacryocystorhinostomy. As our study involved a small sample size and follow-up period of 6 months, studies involving larger sample size and a longer follow-up period would be required for better evaluation of

efficacy of intraoperative Mitomycin C during dacryocystorhinostomy. Mitomycin C is likely to be more helpful in repeat dacryocystorhinostomy but since this subset was excluded, this study cannot comment on it.

### Conflict of interest

The authors declared that there is no conflict of interest.

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