

Research Article

A comparative study on intraoperative mitomycin-c augmented external dacryocystorhinostomy with conventional dacryocystorhinostomy

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ABSTRACT

Background: Dacryocystorhinostomy (DCR) is a commonly done surgery performed for management of epiphora due to nasolacrimal duct obstruction. Goal of the procedure is to bypass the obstructed nasolacrimal duct allowing tear drainage into the nasal cavity directly from lacrimal sac by creating an anastomosis between the lacrimal sac and the nasal mucosa via a bony ostium. Common cause of DCR failure are attributed as an end effect of fibrous tissue growth, scarring and granulation tissue formation which obstructs the new drainage channel. Mitomycin c is an antiproliferative agent and may enhance the result of DCR by inhibiting fibrous tissue proliferation. Here we aim to evaluate the results of intraoperative mitomycin C application in dacryocystorhinostomy surgery compared with the result of conventional DCR.

Methods: A prospective randomized comparative study of one year duration was done in the Department of Ophthalmology, Assam Medical College and Hospital, Dibrugarh, Assam, India. A total of 60 patients of acquired nasolacrimal duct obstruction were enrolled and divided randomly into two groups, 30 nos of patients in each group. One group had undergone conventional external DCR operation and other group was treated with DCR surgery with intraoperative mitomycin C application at the anastomotic flap and osteotomy site. Patients were reviewed after 1week, 1month, 3month and 6months postoperatively. The results of DCR surgeries were evaluated by observation of different parameters such as height of tear meniscus and patency of the nasolacrimal passage.

Results: In our study we have observed that majority of cases were in 21-30 years age group with female preponderance (male vs female; 35% vs 75%). Chronic dacryocystitis was seen in majority of cases (70%) followed by mucocele (26.67%) and lacrimal fistula (3.33%). Major difficulties encountered during surgery and postoperatively were almost identical in both the groups. There was no case of abnormal mucosal bleeding, mucosal necrosis, delayed wound healing in patients which underwent DCR with mitomycin C use. Post-operative care and follow up were done identically in both the groups. It was seen that a total success rate of 80% was achieved in conventional group where as 96.67% success was achieved in MMC group at the end of 6 months. In case of scar prone conditions like lacrimal fistula mitomycin C use has shown to be efficacious in maintaining patency of the system after surgery.

Conclusions: Distinctly higher success rate have been achieved in patients undergoing DCR with intra-operative MMC as compared to patients undergoing conventional DCR. Use of intraoperative mitomycin C can be considered safe and simple but very effective modification of conventional external DCR.

Keywords: Dacryocystorhinostomy, Nasolacrimal duct, Mitomycin-C, Antiproliferative

INTRODUCTION

Dacryocystorhinostomy or DCR is among the common oculoplastic surgeries performed for managing epiphora due to nasolacrimal duct obstruction.^{1,2} It creates an anastomosis between the lacrimal sac and the nasal mucosa via a bony ostium.³ It can be performed through an external skin incision or intranasally with or without endoscopic visualization. Success rate of external DCR has been reported between 80-99%, depending on surgeon's experience.³⁻⁷ Failure is attributed to many factors - common canalicular obstruction, scarring within anastomosis, closure of osteotomy site by membrane, adhesion or synechia formation between ostium and middle turbinate or a deviated nasal septum and malpositioned ostia.⁸⁻¹⁰ Two most frequent causes of DCR failure are common canalicular obstruction and closure of osteotomy site.¹¹⁻¹³ These common causes are attributed as an end effect of fibrous tissue growth, scarring and granulation tissue formation which sometime forms an occluding membrane, obstructing the new drainage channel.^{8,10,14} Thus if we inhibit fibrous tissue growth and scarring by applying antiproliferative agents over the anastomosed flaps and osteotomy site, failure rate may be decreased.

Mitomycin C (MMC), an antiproliferative agent extracted from "Steptomyces caespitosus" has got properties of suppressing DNA, cellular RNA and protein synthesis. It has ability to significantly suppress fibrosis and vascular ingrowth after exposure to filtration site of trabeculectomy and also in preventing recurrence after pterygium excision.^{15,16} Intraoperative application of Mitomycin C in DCR should prevent shrinkage of the final surface area of osteotomy, thereby inhibiting scarring around the common canaliculus opening and also prevent adhesion between osteotomy site and nasal septum.^{15,17,18}

A comparative study of conventional DCR and DCR with intra-operative MMC will clearly establish the efficacy of mitomycin c in improving the success rate in DCR. Hence, this prospective randomized study was undertaken to evaluate the role of mitomycin C in maintaining post-operative patency of nasolacrimal passage of DCR.

METHODS

Here we did a prospective randomized comparative study of one year duration in the Department of Ophthalmology, Assam Medical College and Hospital, Dibrugarh, Assam, India. A total of 60 patients of acquired nasolacrimal duct obstruction were enrolled and divided randomly into two groups, 30 nos of patients in each group. Conditions like Obstruction prior to lacrimal sac level, acute dacryocystitis, chronic granulomatous conditions of lacrimal sac, malignancy of lacrimal sac, long standing chronic dacryocystitis with fibrosis of lacrimal sac in very old individuals, ENT pathologies etc were excluded. One group had undergone conventional DCR operation and other group was treated with DCR with intraoperative mitomycin C application. The surgical procedure in both the groups were similar, except the use of mitomycin C. A piece of merocel surgical sponge soaked with 0.2mg/ml mitomycin C was applied to the osteotomy site for 5 minutes. Patients were reviewed postoperatively at 1 week, 1 month, 3 month and 6 months.

Analysis of the result was performed using standard statistical methods. Data were analysed using SPSS and Graphpad Prism. Student's t test was employed to compare the means of two independent groups. The Chi-square test was used to compare the frequency distributions of categorical variables across groups. Fisher's exact (two tailed) probability was computed when the requirements for the Chi-square (χ^2) were not met.

RESULTS

Out of total 60 study patient, 45 cases (75%) were female and 15 cases (25%) were male. The mean age in one group (conventional) 38.83±9.92 years and in MMC group is 35.73±12.58 years.

Table 1: Sex distribution.

Sex	n	%
male	15	25%
female	45	75%
total	60	100%

Table 2: Etiological distribution.

Diagnosis	Conventional group		MMC group		Total	
	n	%	n	%	n	%
Chronic dacryocystitis	22	73.33	20	66.67	42	70.00
Mucocele	7	23.33	9	30.00	16	26.67
Chronic dacryocystitis with fistula	1	3.33	1	3.33	2	3.33
Total	30	100.00	30	100.00	60	100.00

Table 3: Intraoperative complications.

Complications	Conventional group		MMC group	
	n	%	n	%
bleeding	2	6.67	3	10.00
Injury to nasal mucosa	1	3.33	0	0
Injury to the sac	0	0.00	0	0
others	0	0.00	0	0

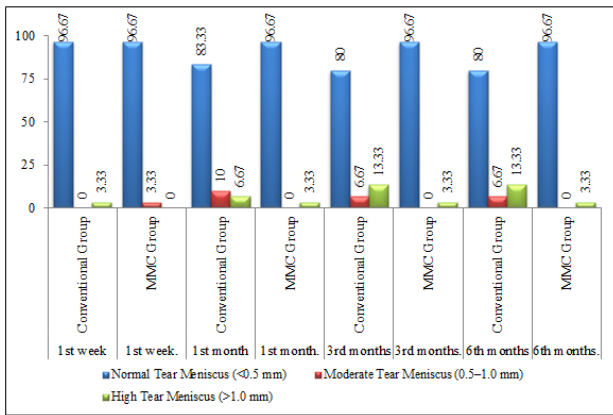


Figure 1: Post-operative tear meniscus height at the end of 1st week, 1st month, 3rd month and 6 months.

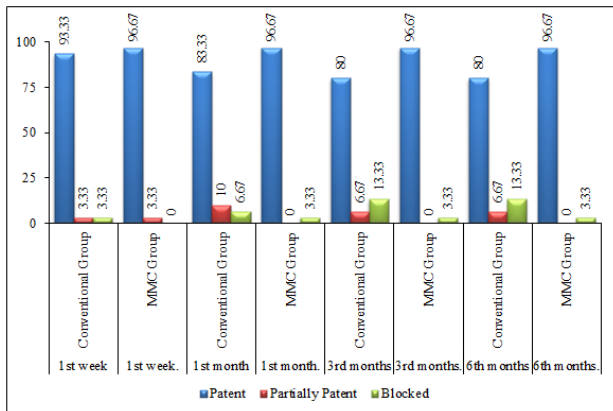


Figure 2: Post-operative irrigation patency at the end of 1st week, 1st month, 3rd month and 6th months.

DISCUSSION

Dacryocystorhinostomy has been accepted as a highly successful procedure in dealing with epiphora from nasolacrimal duct obstruction. Dacryocystitis, the inflammation of lacrimal sac is the most common cause of lacrimal passage obstruction.¹⁹ It may be congenital or acquired. Acquired variety presents as acute or chronic dacryocystitis. Chronic dacryocystitis is the most common cause of epiphora (about 87%).²⁰ It can occur in all age group, more commonly in fifth to seventh decade of life, affecting women three times more than men.^{11,21,22} Medical treatment with topical antibiotic administration and massage over lacrimal sac area is helpful for most

cases of congenital dacryocystitis within first 12 months of age.²³ Small number of the patients with catarrhal type of chronic dacryocystitis respond to broad spectrum antibiotics both locally and systemically. Syringing of lacrimal passage with antibiotic solution, pressure syringing etc. may be helpful in some cases. But definitive treatment of chronic dacryocystitis in adult is dacryocystorhinostomy. Success rate of external DCR has been reported between 80-99% and average failure rate as reported in literature is 9.4%.^{3-8,15,17,24} Failure is generally defined as having symptoms of excessive tearing with the inability to irrigate. Mc Pherson and Egelston noted that three out of seven patients in their study who underwent a second operation were found to have dense scar tissue present at the osteotomy site.²⁵ Allen and Berlin in 1989 reported 20 failed DCRs with the postoperative obstruction distal to common canaliculus. In their study, there were 13 cases with cicatricial closure of rhinostomy with granulation tissue and three cases with scarring of the osteotomy to the turbinate or septum.²⁶ Mc Lachlan et al, proposed the higher incidence of common canicular obstructions as cause of DCR failures.²⁷ From the literature described above, we see that fibrous tissue growth, scarring and granulation tissue formation during the healing process will decrease or compromise surface area of osteotomy site leading to surgical failure. The healing process also promote adhesion of osteotomy to the turbinate and septum, or induce obstruction of the common canaliculus. Linberg et al showed that an appropriately large osteotomy made during surgery can narrow down to a final size of approximately 2 mm due to tissue growth and scarring.²⁸ Thus if we can inhibit fibrous tissue growth and scarring by applying antiproliferative agents over the anastomosed flaps and osteotomy site, failure may be decreased. Mitomycin C, which is an anticancer agent has ability to significantly suppress fibrosis and vascular in growth after exposure to filtration site of trabeculectomy and also in preventing recurrence after pterygium excision.^{15,16} Thus in DCR surgery application of mitomycin C at the anastomotic flap and osteotomy site should reduce the fibrous adhesion between the osteotomy site and the nasal septum as well as inhibit scarring around the opening of common canaliculus. Hence this prospective randomized study was undertaken to evaluate the role of mitomycin C in maintaining post operative patency of nasolacrimal passage after DCR for primary acquired duct obstruction or chronic dacryocystitis.

The study was done in Department of Ophthalmology Assam medical college, Dibrugarh, Assam, India for a period of 1 year. A total of 60 cases were randomized into two groups using simple random sampling technique. Conventional group included external dacryocystorhinostomy without MMC (n=30) and MMC group included external dacryocystorhinostomy with intraoperative mitomycin C (n=30). In our study we have observed that majority of cases were in 21-30 years age group with female preponderance (male vs female; 35%

vs 75%). Chronic dacryocystitis was seen in majority of cases (70%) followed by mucocele (26.67%) and lacrimal fistula (3.33%). Major difficulties encountered during surgery and postoperatively were almost identical in both the groups. There was no case of abnormal mucosal bleeding, mucosal necrosis, delayed wound healing in patients which underwent DCR with mitomycin C use. Post-operative care and follow up were done identically in both the groups. It was seen that a total success rate of 80% was achieved in conventional group where as 96.67% success was achieved in MMC group. In case of scar prone conditions like lacrimal fistula mitomycin C use has shown to be efficacious in maintaining patency of the system after surgery. Ahmed SS et al conducted a prospective randomised controlled study taking 44 eyes with primary nasolacrimal duct obstruction to evaluate the long term result of intraoperative mitomycin C application in DCR surgery. They found that satisfaction rate in the mitomycin C group was 95.45% while in conventional group, it was 72.72%.³⁰ Another study conducted by Rahman A et al taking 90 patients to evaluate the success rate and complications of intraoperative mitomycin C in DCR surgery found that success rate in the procedure was 97.77%. They concluded that intraoperative mitomycin C application in external DCR is safe, effective and helps to achieve good result in DCR surgery.³¹ Yildirim C et al in a prospective randomized controlled study found that success rate in MMC group was 95% compared with 85% in the control group.³² Ari Seyhmus et al, conducted a prospective, double masked, randomised controlled trial on 100 Turkish patients to assess the efficacy of intraoperative adjunctive MMC treatment in external DCR surgery. The success rate was significantly greater in the MMC group (96%) than the control group (84%).³³ Iqbal A et al, conducted prospective randomized controlled study in 60 eyes to compare the results of external DCR with and without intraoperative mitomycin C application. Success rate in DCR with MMC was 96.7% compared to 80% in conventional group.¹¹

CONCLUSION

In summary, distinctly higher success rate have been achieved in patients undergoing DCR with intra-operative MMC as compared to patients undergoing conventional DCR. Utilizing the antifibroblastic activity of mitomycin C in preventing scarring at osteotomy site in external DCR can go a long way in preventing the blockage and maintaining the postoperative patency of passages. MMC is an useful adjunct to external DCR in conditions having high risk for scarring and failure like lacrimal fistula. Use of intraoperative Mitomycin C can thus be considered safe and simple but very effective modification of conventional external DCR.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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