

Efficacy of External Dacryocystorhinostomy (DCR) with and without Mitomycin-C in Chronic Dacryocystitis

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ABSTRACT

Objective: To compare the efficacy of external dacryocystorhinostomy (DCR) with and without intraoperative application of mitomycin-C in patients with chronic dacryocystitis.

Study Design: An experimental study.

Place and Duration of Study: Department of Ophthalmology, Bahawal Victoria Hospital (BVH), Bahawalpur, from September 2009 to December 2010.

Methodology: One hundred and sixty patients with chronic dacryocystitis undergoing external DCR were divided into two groups comprising of 80 patients each. Group A included patients, who underwent external DCR with intraoperative use of mitomycin-C. Group B included those patients who were not administered intraoperative mitomycin-C. Socio-demographic information and the data regarding the patency of the lacrimal drainage system by irrigation with normal saline were collected at the end of the third month after the surgery. Chi-square test was used, at 95% confidence level, as the test of significance to compare the success of surgery between the two groups.

Results: Surgical success rate (efficacy) in group 'A' was found to be 97.5% and 86.25% in group 'B'. The difference in success rate was statistically significant ($p=0.017$).

Conclusion: External dacryocystorhinostomy with intraoperative mitomycin-C is more efficacious in achieving lacrimal system patency than external dacryocystorhinostomy without mitomycin-C.

Key Words: Dacryocystitis. External dacryocystorhinostomy. Intraoperative mitomycin-C. Lacrimal drainage system patency.

INTRODUCTION

Dacryocystitis is the infection of lacrimal sac most often as a result of obstruction of nasolacrimal duct.¹ This disease may be acute or chronic. Watering from the eye is the presenting complaint of chronic dacryocystitis.² A swelling at the inner canthus, that is usually painless, is often the presenting sign in chronic dacryocystitis.³ Sometimes swelling may not be obvious but pressure over the lacrimal sac can result in regurgitation of mucopurulent discharge through the canaliculi.¹

For the management of epiphora, as a result of nasolacrimal duct obstruction, external dacryocystorhinostomy (DCR) is the most popular procedure.^{2,4} In this procedure, a surgical anastomosis is done between the lacrimal sac to the nasal mucosa of middle meatus by creating an opening in the intervening bone.⁵ Fibrous tissue growth in the flap anastomosis, obstruction at common canalicular end and closure of osteotomy site⁶ constitute the most common causes of failure of external DCR. Success rate can be increased if growth of fibrous tissues is prevented. This goal can be achieved by applying anti-fibrotic agents like mitomycin-C.⁷

Mitomycin-C is an alkylating antibiotic, derived from *Streptomyces caespitosus*. It inhibits DNA-dependent RNA synthesis⁸ and prevents collagen synthesis. Mitomycin-C use during external DCR surgery is safe and effective and it results in good outcome of DCR surgery.^{9,10}

Races with higher level of melanin in body tissues are more prone to develop tissue fibrosis during wound healing.¹¹ Same is the case with most of the Pakistani population. By using mitomycin-C in external DCR in Pakistani patients, better surgical results may be obtained in stopping the epiphora.

The objective of this study was to compare the efficacy of external dacryocystorhinostomy with and without intraoperative mitomycin-C in a group of patients presenting with the complaint of epiphora having chronic dacryocystitis secondary to the nasolacrimal duct obstruction.

METHODOLOGY

This experimental study was conducted for a period of 16 months from September 2009 to December 2010 in the Department of Ophthalmology, Bahawal Victoria Hospital, Bahawalpur. Study was approved by the Ethical and Research Board of the Hospital. One hundred and sixty patients were selected from the outpatient department (OPD) of ophthalmology, who had undergone external DCR for chronic dacryocystitis and had come to OPD for follow-up after 3 months of

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surgery. Two groups of patients were made by lottery method. Group A (the study group) included patients of chronic dacryocystitis, who underwent external dacryocystorhinostomy with intraoperative use of mitomycin-C. Group B (the control group) included those patients of chronic dacryocystitis, who underwent external dacryocystorhinostomy without intraoperative use of mitomycin-C. Inclusion criteria were adult patients between 20 and 60 years of age with chronic dacryocystitis of either gender. Exclusion criteria included history of previous dacryocystorhinostomy surgery or trauma, or nasal and paranasal sinuses pathology. There were 80 patients in each group.

All patients were explained the merits and demerits of this study and their consents were taken. All the patients were operated by the same surgeon.

Standard surgical techniques of an external DCR were used in all patients of both groups. Local infiltrative anaesthesia, consisting of 2% lignocaine (lidocaine) and 1:100 000 adrenaline (epinephrine), was administered in the region of the medial canthus and lower lid.

The nasal mucosa was anaesthetized and vaso-constricted with pledgets saturated with a mixture of 2% lignocaine (lidocaine) and 1:100 000 adrenaline. A skin incision was performed. Blunt dissection was done to reach the periosteum overlying the anterior lacrimal crest. The periosteum was elevated off the lacrimal sac fossa and osteotomy was created through which anastomosis of mucosal flaps of lacrimal sac and nasal mucosa was performed. The lacrimal sac was opened to form anterior and posterior flaps. The nasal mucosa was cut in a similar fashion to the lacrimal sac. Then, the posterior nasal and lacrimal sac flaps were joined with 5 - 0 Vicryl suture. A silicone tube was used to intubate the lacrimal system and it was tied together with a 4 - 0 silk suture in the nasal cavity. In the mitomycin-C group, a piece of cellulose sponge attached with a long thread, saturated with 0.2 mg/ml mitomycin-C was placed over the anastomosed posterior flaps and osteotomy site with the long thread passing out through the nostril. After 10 minutes of application, the cellulose sponge soaked with MMC was removed through the nostril. The anterior nasal and lacrimal sac flaps were sutured together. Periosteum and orbicularis muscle were closed in separate layers. The skin incision was sutured with subcuticle 6 - 0 prolene suture. In the other group, the same procedures were performed but intraoperatively MMC was not used. Silicone tubes were removed at 6 weeks after surgeries in all patients.

Patients were followed-up for 3 months for the patency of lacrimal drainage system.

The data was collected through a pre-designed proforma. For the final outcome, data regarding the patency of the lacrimal drainage system by irrigation with normal saline was collected at the end of 3 months after

the surgery. Patency of the lacrimal drainage system was checked by dilating lacrimal puncta (upper and lower) with punctum dilator and inserting a blunt tipped cannula, on a 2 ml saline filled syringe, into the lower punctum and saline pushed forcefully. After pushing saline if patient told that it has come into his/her nose or throat, it confirmed that the drainage system was patent; this indicated that surgery was successful. If saline regurgitated from the upper punctum, it indicated that the drainage system was blocked. It showed that surgery was not successful.

Collected data was entered and analyzed by Statistical Package for Social Sciences (SPSS) version 17. Frequencies with percentages for the patency of the lacrimal drainage system and gender were calculated. Chi-square test was used, at 95% confidence level, as the test of significance to compare the success of surgery between the two groups.

RESULTS

One hundred and sixty subjects were included in this study. They were followed-up for the patency of lacrimal drainage system. The final outcome about the patency was determined at the end of 3 months after the surgery (external dacryocystorhinostomy). It was found that out of 160 patients, 66 (41.25%) were males, 33 in each group and 94 (58.75%) females, 47 in each group. Mean age in group A was 38.77 ± 10.96 years while the mean age in group B was 40.96 ± 10.05 years. Patients out of 80 in group A (external dacryocystorhinostomy with mitomycin-C), showed patency at the end of 3 months after the surgery which shows that the success rate (efficacy) was 97.5%. In group B (external dacryocystorhinostomy without mitomycin-C), 69 patients out of 80 showed patency of the lacrimal drainage system at the end of 3 months after surgery which indicates that the success rate in group B was 86.25% (Table I).

Table I: Patency of lacrimal drainage system at the end of 3 months after surgery (n=160).

Patency	Group A n (%)	Group B n (%)	Total n (%)	p-value
Present	78 (97.5)	69 (86.25)	147 (91.875)	0.017
Absent	02 (2.5)	11 (13.75)	13 (8.125)	

A: Patients of chronic dacryocystitis, who underwent external DCR with intraoperative use of mitomycin-C.

B: Patients of chronic dacryocystitis, who underwent external DCR without intraoperative use of mitomycin-C.

DISCUSSION

External dacryocystorhinostomy (DCR) is a gold standard procedure in the treatment of epiphora secondary to nasolacrimal duct obstruction.¹⁰ In a study on endoscopic revision of external dacryocystorhinostomy failure, the cause of DCR failure in 76% patients was scar tissue at the osteotomy site.¹² In another study, causes of DCR failure in 30.76% patients

were intranasal adhesions, abnormal fistula size in 22.30% patients, and close ostium in 6.15%.¹³ It is clear that fibrous tissue growth, scarring and granulation tissue formation during the wound healing process results in stenosis of common canaliculus opening or closure of osteotomy in the lateral wall of the nose, culminating in failure of DCR surgery.

Mitomycin-C is a very potent antifibrotic agent. By inhibiting the multiplication of cells it prevents scar tissue formation. Mitomycin-C is being used in several ophthalmic surgical procedures to enhance the success rate.¹⁴⁻¹⁷ In a study conducted by Ari and co-authors,¹⁸ it was shown that significantly more eyes in the MMC group than the control group remained symptom-free throughout the one year follow-up period (45/50 [90%] versus 33/50 [66%]; $p=0.005$). Significantly more patients in the control group than the MMC group had an improvement in symptoms at one year follow-up. Based on the patency of the drainage system, the success rate was significantly greater in the MMC group than the control group (48/50 [96%] versus 42/50 [84%]; $p=0.005$).

In this study, 78 patients out of 80 of group A showed patency at the end of 3 months after surgery. It shows the success rate (efficacy) as 97.5%. While in the group B, 69 patients out of 80 showed patency of the lacrimal drainage system at the end of 3 months after surgery. It indicates the success rate in group B as 86.25%. The results were statistically significant which means that the external dacryocystorhinostomy with mitomycin-C is more efficacious as compared to external dacryocystorhinostomy without mitomycin-C. In another study conducted by Liao and co-authors,⁷ it was concluded that external DCR surgery with intraoperative use of MMC was associated with higher success rates than with DCR surgery without use of MMC. Moreover, use of MMC did not result in increase in complications. In this study, the use of MMC was also not associated with increased complications.

External dacryocystorhinostomy with intraoperative mitomycin-C soaking over the osteotomy and anatomized flaps can minimize the adhesions around the osteotomy area as well as the opening of common canaliculus.⁸ In this way, mitomycin-C soaking during DCR surgery is a useful modified procedure to improve the success rate of external DCR.¹⁹ Recently, intraoperative application of mitomycin-C in Nonlaser Endoscopic Endonasal Dacryocystorhinostomy (NLEDCR) is proven to be useful in improving the success rate.^{20,21}

The main limitation of this study is its short follow-up. Studies with longer follow-up may be performed to find long-term outcome of intraoperative use of MMC in external DCR. In short-term follow-up intraoperative use of MMC during external DCR surgery increase the success of the procedure.

CONCLUSION

Using 0.2 mg/ml mitomycin-C for 10 minutes intraoperatively in external dacryocystorhinostomy (DCR) provided much better surgical results regarding the lacrimal drainage system patency, than conventional external dacryocystorhinostomy without mitomycin-C.

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