



Original Research Article

The outcome of revision external dacryocystorhinostomy with or without mitomycin C: A single-center experience

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ARTICLE INFO

Article history:

Received 30-06-2022

Accepted 06-09-2022

Available online 16-10-2022

Keywords:

Failed DCR

Revision DCR surgery

MitomycinC

Surgical outcome

ABSTRACT

Objective: To compare the outcome of revision external dacryocystorhinostomy (DCR) with or without mitomycin C.

Materials and Methods: This Quasi prospective study was conducted over 30 diagnosed patients with failed external dacryocystorhinostomy came to the Oculoplasty clinic at Ispahani Islamia Eye Institute and Hospital from July 2019 to June 2020.

Results: Maximum of 40.0% of the patients were 41–50 age group in Group A (Mitomycin C) and 40.0% in 41–50 age group in Group B (without Mitomycin C). There were 7(46.7%) males, and 54–58 8(53.3%) females in Group A, 6(40.0%) male and 9(60.0%) female in Group B. 18(60%) patients underwent left-sided and 12(40%) patients underwent right-sided revision dacryocystorhinostomy respectively. Most patients had no complications in both groups of this study. Only one patient reported with corneal epithelial defect in the mitomycin C group. After six months follow up, 93.3% success rate was seen in revision external DCR with mitomycin C group and 66.7% in revision external DCR without mitomycin C group.

Conclusion: Mitomycin C has a beneficial effect in preventing reclosure of the dacryocystorhinostomy stoma after revision external dacryocystorhinostomy and no significant complications resulting from its use.

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1. Introduction

Dacryocystorhinostomy has been recommended as a highly successful procedure in dealing with epiphora from nasolacrimal duct obstruction. Surgical failure is frequently related to granulation tissue formation at the osteotomy site, technical error or closure of the anastomosis site. The use of mitomycin C inhibits fibrous tissue growth leading to improve surgical outcome.^{1,2}

In ex DCR surgery, mitomycin C will use over the osteotomy site and the anastomosed flaps to suppress fibrous proliferation and scar formation. Theoretically, this

modification should reduce the fibrous adhesion between the osteotomy site and the nasal septum and inhibit scarring around the opening of the common canaliculus. Thus, mitomycin C should prevent further shrinkage of the final surface area of the osteotomy and prevent the obstruction of the common canaliculus opening.^{3,4}

External DCR is still a safe and effective surgical procedure in primary acquired nasolacrimal duct obstruction. However, there is always a possibility of failure in all surgical procedures. Many studies have proved that for revision surgeries, usage of silicone tubes and mitomycin C and creating a proper ostium are the most critical factors for a successful surgery. This study attempt

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to assess the efficacy of mitomycin C on revision external dacryocystorhinostomy operation in our country.

2. Materials and Methods

This Quasi prospective study was conducted on over 30 diagnosed patients with failed external dacryocystorhinostomy who arrived at the oculoplasty clinic at ispahani islamia eye institute and hospital from July 2019 to June 2020.

Patients with facial anomalies, trauma, punctual agenesis, nasal pathology and those below 18 years are excluded from this study.

After enrollment, detailed history was taken from all the study subjects; they underwent thorough ocular and systemic examination and relevant investigations, including SPT with diagnostic probing. Revision external DCR surgery was done in all patients by a single competent oculoplastic surgeon. Mitomycin C was applied on a 1:1 basis with particular intention to younger age groups. They were followed up one month and six months after surgery. Patients were specially asked about epiphora at each visit. The stringency of watering and discharge was observed in each visit. Sac patency test was done during the final follow-up. The absence of watering and the patent lacrimal system was considered a successful surgery. All the relevant data were recorded in a predesigned datasheet.

Statistical analysis was carried out using SPSS (statistical package for social sciences) statistics V 26.0 Software. Data were compiled, checked edited properly before analysis. An appropriate test of significance (chi-square test) was used for the statistical analysis.

3. Results

In 30 diagnosed patients with failed external dacryocystorhinostomy Group A underwent revision external dacryocystorhinostomy with Mitomycin-C and Group B without mitomycin-C.

Maximum 40.0% of the patients were 41–50 age group in Group A (Mitomycin C) and 40.0% in 41-50 age group in Group B (without Mitomycin C). The mean age was 40.3±9.3 and 41.5±10.3 years in Group A and B, respectively (P = 0.824). The mean age of both groups was comparable (Table 1).

There were 7(46.7%) males and 8(53.3%) females in Group A, 6(40.0%) males and 9(60.0%) females in Group B (Figure 1). Age and gender-matched within groups. Out of 30 patients, 18(60%) had left-sided failed dacryocystorhinostomy, and 12 (40%) had right-sided failed dacryocystorhinostomy.

Most of the patients had no complications in both groups. Only one patient reported with corneal epithelial defect in the mitomycin C group. Postoperative care and follow up were done identically in both groups. After six months of

Table 1: Comparison of age between two groups (N=30)

| Age (in years) | Group A (n=15)No. (%) | Group B (n=15)No. (%) | p value |
|----------------|-----------------------|-----------------------|---------|
| 21-30 | 2(13.3%) | 2(13.3%) | 0.824 |
| 31-40 | 5(33.3%) | 5(33.3%) | |
| 41-50 | 6(40.0%) | 6(40.0%) | |
| 51-60 | 2(13.3%) | 2(13.3%) | |
| Mean±SD | 40.3±9.3 (24 – 57) | 41.5±10.3 (27 – 59) | |

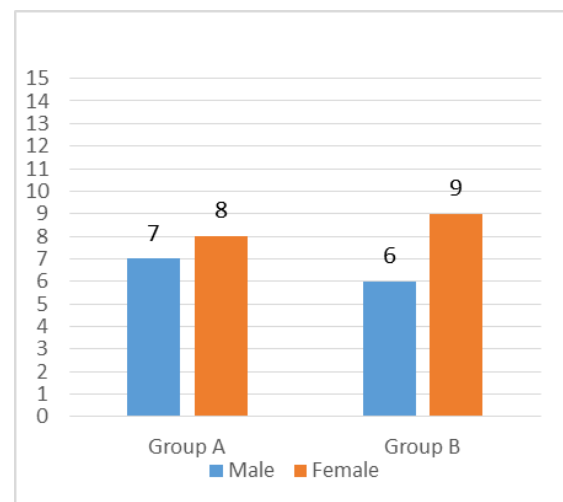


Fig. 1: Gender distribution between two groups

follow up, 93.3% of patients had success in revision external DCR with mitomycin C group, and 66.7% of patients had success in revision external DCR without mitomycin C group. (P = 0.068, Chi-square test: Table 2).

Table 2: Distribution of study patients by sac patency test after surgery at 6 month (N=30)

| | Group A (n=15)No. (%) | Group B (n=15)No. (%) | p value |
|------------|-----------------------|-----------------------|---------|
| SPT-Patent | 14(93.3%) | 10(66.7%) | 0.068 |
| SPT-Block | 1(6.7%) | 5(33.3%) | |

4. Discussion

Dacryocystorhinostomy is a surgical procedure that creates an alternative route for tear drainage between the lacrimal sac and nasal cavity, bypassing the nasolacrimal duct. Dacryocystorhinostomy can be performed either by an external approach called external dacryocystorhinostomy or through the nasal cavity using an endoscope called endonasal dacryocystorhinostomy.⁵

The external DCR technique was initially described in 1904 by Toti and was subsequently modified in 1921 by Dupuy-Dutemps and Bourguet by the addition of suturing of

the nasal and lacrimal mucosal flaps to form an epithelium-lined fistula with a success rate of 80-95%.¹

Fibrous tissue and granulation formation are associated with surgical failure because they diminish ostium size and lead to non-patency. Loss is frequently related to granulation formation at the osteotomy site or common canaliculus, technical error, or closure of the anastomosis site. Efforts should focus on inhabiting granulation tissue over the osteotomy site and anastomosed flaps to increase the surgical success rate.²

Mitomycin-C (MMC) has significantly contributed to the improvement of DCR surgery. MMC is a systemic chemotherapeutic agent derived from *Streptomyces caespitosus* that inhibits the synthesis of DNA, cellular RNA, and protein by inhibiting collagen synthesis by fibroblasts. The cellular changes in the human nasal mucosal fibroblasts induced by MMC at an ultrastructural level have been documented. Most studies have found that intraoperative MMC application seems to be safe; furthermore, no deleterious effects were noted with MMC application. Mere eyeballing the data suggests that MMC plays a role in reducing the closure rate of the osteotomy site after a DCR surgery.⁶

At the present maximum of 40.0% of the patients were 41–50 age group in both Groups A and B. The mean age was 40.3±9.3 and 41.5±10.3 years in Group A and B, respectively. There were 7(46.7%) males and 8(53.3%) females in Group A. 6(40.0%) male and 9(60.0%) females in Group B. Age and gender-matched within groups. By the present study, Shaikh et al.⁷ reported mean age of the patients of external DCR with mitomycin-C Group were 37.77±11.96 years, while the mean age of external DCR with mitomycin-C was 39.96±09.05 years. Among the 100 patients of the mitomycin-C Group, male patients were 32(32%), female patients were 68(68%), and out of 100 patients without mitomycin-C, 24(24%) patients were male, and 76(76%) patients were female. In one study by Mukhtar et al.⁸ the similar mean age of the patients undergoing External Dacryocystorhinostomy with mitomycin-C and without mitomycin-C was as 38.77±10.96 years and 40.96±10.05 years, respectively. Other study reported female preponderance in their study.⁹ In the present study, we found the male and female ratio was almost similar.

In the present study, out of 30 patients, 18 (60.0%) had left-sided failed DCR and 11 (40.0%) had right-sided failed DCR. Previous studies by Qadir et al. reported the majority of the cases 37(74%) had failed DCR on the right side.¹⁰

Most of the patients had no complications in the present study in both groups. Only one patient resolved a corneal epithelial defect in the mitomycin-C Group. The conventional Group underwent DCR without mitomycin C and the MMC group with intraoperative MMC (0.5% for 3 mins) application. The results showed that after a

period of follow up of 1 month, 100% of cases were successfully treated according to the symptoms (watering & discharge) in both groups. After a period of follow up of 6 months, 93.3% of cases were successfully treated according to the symptoms (watering & discharge). The lacrimal sac syringing (Patency) in Group A and 66.7% in Group B. Comparing the results we obtained to the study by Liao and others,⁵ their conventional Group showed 70.5% success against 95.5% success in the MMC group. Satish et al.¹¹ showed a success rate in traditional groups (75%), while a higher success rate in the MMC group (90%) compared to their study. The studies done by Kao et al.¹² and Goswami et al.¹³ both showed lower success rates in both groups compared to our research.

MMC is thought to be beneficial in revision lacrimal surgery.¹⁴ However, there are only a few studies investigating the use of adjunctive MMC in revision Ex-DCR.¹⁵

In previous studies, the application time and concentration of intraoperative MMC varied. Zilelioglu et al. applied MMC intraoperatively in 0.5-mg/mL solution for 2 minutes with a 75% success rate.¹⁶ Yeatts et al. operated on eight patients with intraoperative MMC in 0.3-mg/mL solution for 3 minutes, and all procedures were successful.¹⁷ In the present study, we used MMC (0.5%) solution for 3 minutes with a 93.3% success rate. Penttila et al.¹⁸ showed that the overall results were better in the Group with intraoperative MMC.

Postoperative care and follow up were done identically in both groups. After six months of follow up, 93.3% of patients had success in r-Ex DCR with mitomycin-C Group, and 66.7% of patients had success in r-Ex DCR without mitomycin-C Group. No significant difference in success rate between the two groups. A similar study done by Puzari et al.¹⁹ showed a success rate of 80% was achieved in a conventional group, whereas 96.67% success was performed in the MMC group. In the case of scar-prone conditions like lacrimal fistula, mitomycin C use has been efficacious in maintaining the system's patency after surgery. Ahmed et al.²⁰ conducted a prospective randomized 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 the satisfaction rate in the mitomycin C group was 95.45%, while in the conventional Group, it was 72.72%. Another study conducted by Rahman et al.²¹ taking 90 patients to evaluate the success rate and complications of intraoperative mitomycin C in DCR surgery, found that the success rate in the procedure was 97.77%. They concluded that intraoperative mitomycin C application in external DCR is safe, effective, and helps achieve a good result in DCR surgery. Yildirim et al.²² found that the success rate in the MMC group was 95% compared with 85% in the control group.²³

Ari S et al.³ conducted a prospective, double-masked, randomized 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%). Iqbal et al.²⁴ conducted a prospective randomized controlled study in 60 eyes to compare the results of external DCR with and without intraoperative mitomycin C application. The success rate in DCR with MMC was 96.7% compared to 80% in the conventional Group. We found a 93.3% success rate. That is, patients were symptoms free, and SPT was patent in patients of Group A (r Ex-DCR with MMC). Here MMC has a beneficial effect on revision external dacryocystorhinostomy operation.

5. Conclusion

In the present study, the results of revision external dacryocystorhinostomy with Mitomycin- C were 93.3%, whereas in revision external dacryocystorhinostomy without Mitomycin-C, it was 66.7%. The frequency of postoperative complications was found to be more when Mitomycin C was used; however, this was not found to be statistically significant. Hence, we conclude that Mitomycin-C has a beneficial effect in preventing reclosure of the dacryocystorhinostomy stoma after revision external DCR. Meticulous, atraumatic surgical technique is paramount in achieving a successful surgical result. An adequate bony window, marsupialization of the lacrimal sac, and preservation of nasal and lacrimal sac mucosa help ensure an excellent surgical outcome.

6. Abbreviation

MMC: Mitomycin C, DCR: Dacryocystorhinostomy, rEx-DCR: Revision External dacryocystorhinostomy, SPT: Sac Patency Test

7. Ethical Approval

The study received ethical clearance from the Ispahani Islamia Eye Institute & Hospital, Dhaka, Bangladesh.

8. Source of Funding

None.

9. Conflict of Interest

The authors declare that they have no conflict of interest.

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Cite this article: Nipa FA, Sultana S, Rashid R, Afzal F, Ul Kadir SM. The outcome of revision external dacryocystorhinostomy with or without mitomycin C: A single-center experience. *Indian J Clin Exp Ophthalmol* 2022;8(3):320-324.