

# Outcome of External Dacryocystorhinostomy with Adjunctive Mitomycin C in Tertiary Care Hospital

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**Purpose:** To evaluate the role of intra-operative mitomycin C in external DCR in cases of recurrent (previously treated medically) and chronic dacryocystitis.

**Study Design:** Interventional case series.

**Place and Duration of Study:** From May 2012 to November 2014 in LRBT free base eye hospital Korangi No. 2½ Karachi, a tertiary care hospital in Pakistan.

**Material and Methods:** 150 patients (males 62, females 88), age of patients ranged from 22 to 56 years were included in the studies. All patients underwent external DCR with intubation with the adjunctive use of topical mitomycin C primarily. All Patients underwent the same surgical procedure performed by two surgeons with average follow up period of 12 months. Success was assessed objectively by irrigation of punctae, with absence of regurgitation, and subjectively by absence of epiphora and discharge.

**Results:** Out of 150 patients, 138 patients (92%) remained symptom free, while 12 patients (8%) complained of persistent watering and discharge despite an uncomplicated surgical procedure postoperatively, however out of these 12 patients, 3 patients dislodged the tube prematurely 4 months after surgery. The average operative time was 45 (SD 7.48) minutes. One patient had excessive bleeding during surgery while 3 patients were noted with delayed wound healing and 2 patients with peri-orbital ecchymosis postoperatively.

**Conclusion:** External dacryocystorhinostomy (DCR) with intra-operative Mitomycin C shows promising results.

**Key words:** Mitomycin C, External Dacryocystorhinostomy, Epiphora.

**D**acryocystitis is the infection of lacrimal sac most often as a result of obstruction of nasolacrimal duct. Watering from the eye is the presenting complain of chronic dacryocystitis. A swelling at the inner canthus, that is usually painless, is often the presenting sign in chronic dacryocystitis. Sometimes swelling may not be obvious but pressure over the lacrimal sac can result in regurgitation of mucopurulent discharge through the canaliculi.

Most ophthalmic surgeons accept DCR as a highly successful procedure in managing epiphora due to nasolacrimal duct obstruction. From previous studies,

it appears that the success rate for this procedure in adult is 90%<sup>1</sup>. Fibrous tissue growths in the flap anastomosis, obstruction at common canalicular end and closure of osteotomy site constitute the most common causes of failure of external DCR. Success rate can be increased if growth of fibrous tissue is prevented. This goal can be achieved by applying antifibrotic agents like Mitomycin C over the anastomosed flaps and osteotomy site<sup>2</sup>.

Mitomycin C derived from soil bacterium *Streptomyces Caespitosus*, is an alkylating antibiotic. It reduces fibroblast collagen synthesis by inhibiting

DNA dependent RNA synthesis and can suppress cellular proliferation in any period of cell cycle. It is used intravenously to treat upper GI tumors, anal cancer, breast cancer and bladder tumors. Mitomycin C has also been used topically rather than I/V in several areas like bladder cancers and intraperitoneal tumors. It is now well known that a single instillation of this agent within 6 hours of bladder tumor resection can prevent recurrence. In esophageal and tracheal stenosis, application of mitomycin C onto the mucosa immediately following dilatation will decrease restenosis by decreasing the production of fibroblasts and scar tissue. In eye surgery, it is applied topically to prevent recurrence in pterygium surgery, to prevent scarring in glaucoma filtering surgery and haze after PRK and Lasik.

Mitomycin C was first used in ophthalmology in 1969 in Japan where recurrent pterygium was successfully treated with the drug<sup>3</sup>. Its use and application in ophthalmology has been increasing in recent years because of its modulatory effects on wound healing.

In our study, we evaluate the long term success rate of dacryocystorhinostomy with intubation with adjunctive intraoperative Mitomycin C in a group of patients presenting with a complaint of epiphora and having chronic recurrent dacryocystitis

## MATERIAL AND METHODS

This prospective interventional study was conducted from May 2012 to November 2014. Average follow up period was 12 months. 150 consecutive primary cases (previously no surgical intervention) of chronic dacryocystitis with or without mucocele of adult age (22 years to 56 years) of both genders were selected from outpatient department of LRBT free base eye hospital Korangi. A complete history and thorough clinical examination were performed in each case. Inclusion criteria were adult patients between 22 years and 56 years of age of either gender, primary cases of chronic dacryocystitis. Exclusion criteria included acute on chronic dacryocystitis, previous failed DCR, punctual agenesis, common or individual canalicular obstruction, external fistula in chronic dacryocystitis, trauma, and nasal or paranasal sinuses pathology. A proforma was maintained for all the registered patients to assess post-operative results. All patients (underwent) same surgical procedures performed by two surgeons. Preoperatively, a detailed history regarding watering, mucopurulent discharge, swelling

near the medial canthus was obtained. History of eye drugs such as adrenaline or phospholine iodide and anticoagulants was also taken. Ocular as well as nasal examination was performed in all the patients. Ocular examination was done to assess entropion, trichiasis or blepharitis, punctual malposition, stenosis, agenesis or accessory puncta, canaliculitis, fistula near medial canthus, conjunctivitis, keratitis. Regurgitation test was performed and reflux of mucus and mucopurulent material through the canaliculu and puncta was noted. Assessment of tear film meniscus height, dye disappearance test, Jones I and II and dacryocystogram were performed to assess patency of lacrimal drainage system. Probing and then syringing was performed in all the case. Failure of saline to reach the throat (i-e complete NLD block) and regurgitation of mucoid and mucopurulent through canaliculi and puncti (i.e. patent canaliculi) material was noted in all the patients. Nasal cavity was examined in all the patients to exclude any nasal disease. Preoperatively patients were investigated for any bleeding diathesis, complete blood picture, ESR, blood sugar levels, bleeding and clotting time. HbsAg and anti HCV and other relevant investigations if needed were done also.

Standard surgical technique of external DCR was used in all the patients. All operations were conducted under local anesthesia. Local infiltrative anesthesia, consisting of 2% lignocaine (lidocaine) and 1:100000 adrenaline (epinephrine) was administered in the region of the medial canthus and lower lid. With the patients under local anaesthesia, the nasal cavity of the operable side was decongested for 10 minutes with cotton pledgets soaked in 2% lidocaine and 1:100000 adrenaline and packed with gauze piece. After using all aseptic measures and draping the surgical area, a curvilinear skin incision was made at the level of medial canthal tendon extending into the thin skin of the lower lid for approximately 10 – 12 mm. Blunt dissection was done to reach the periosteum overlying the anterior lacrimal crest. Exposed periosteum was incised parallel to the anterior lacrimal crest and an osteotomy of 12x12 mm wide was created with bone punch. 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 passed through the osteotomy in front of posterior flap into the nostril and it was tied to each other with 4/0 silk suture in the nasal cavity. Then a piece of cotton pledget soaked with 0.2 mg/ml

mitomycin C was placed over the anastomosed posterior flaps and osteotomy site. After 10 minutes of application the cotton pledget soaked with mitomycin C was removed and the area was irrigated with normal saline. The anterior nasal mucosal and lacrimal sac flaps were sutured together. Periosteum and orbicularis muscles were closed in separate layers. The skin incision was sutured with 6/0 prolene suture and then nasal packing soaked with antibiotic ointment was applied. Systemic oral antibiotic and topical antibiotic drops were administered to the patients in the postoperative period. The nasal packings were removed on the second postoperative day. Skin sutures were removed after one week postoperatively. The silicone tubes were removed at 6 months postoperatively in all the patients.

During surgery bleeding was measured by attaching a collection jar to the suction tube. Mean intraoperative bleeding was 50.5 ml (range 15 to 60 ml). Bleeding more than 60 ml was labeled as "excessive bleeding". Postoperatively skin sutures were removed after 7 days. At the time of suture removal if wound was healed and the edges were approximated properly it was considered as "normal wound healing". Wound disruption during suture removal was noted in few cases and was considered as "delayed wound healing".

Follow up was maintained up to 12 months for the evaluation of abnormal over flow of tears and the patency of lacrimal drainage system by syringing. The 1<sup>st</sup> follow up was done on day one after surgery and then after one week and then at 1<sup>st</sup>, 3<sup>rd</sup>, 6<sup>th</sup>, 9<sup>th</sup> and 12<sup>th</sup> month postoperatively. Nasal packings of all the patients were removed on 1<sup>st</sup> postoperative day. The skin sutures were removed on 1<sup>st</sup> postoperative week. Outcome of the surgery was measured on the basis of the subjective and objective findings. The surgery was considered successful if the patients had no symptoms of tearing and lacrimal drainage system was proved to be patent by irrigation with normal saline at the final follow up. Patients with persistent epiphora with non-patent lacrimal drainage system were classified as failed dacryocystorhinostomy (DCR). At the end of follow up period of 12 months results were compiled and compared with national and international data.

## RESULTS

150 surgeries were performed in this study. Females (58.66%) outnumbered males (41.33%). The mean age group was 39 (SD 9.18) years. Out of 150 patient's 138 patients remained symptom free and showed patency

with irrigation at the end of 12 months after surgery which shows that success rate was 92%. Remaining 12 (8%) patients complained of persistent watering and not successfully irrigated at final follow up which shows that the failure rate was 8%. Out of 12 failed surgeries, 3 (2%) patients dislodged the tube before 4 months after surgery. During surgery one (0.66%) patient had excessive bleeding, 5(3.33%) patients noted with early postoperative complications in which 2 (1.33%) patients had periorbital ecchymosis noted on 1<sup>st</sup> postoperative day which later resolved and 3 (2%) patients showed delayed wound healing. Fortunately, the wound healed within 2-3 weeks after DCR surgery leaving a barely visible scar with a successful result.

## DISCUSSION

External dacryocystorhinostomy is highly successful procedure in managing epiphora secondary to nasolacrimal duct obstruction<sup>4,5</sup>. The reported success rate varies between 85% and 99%.<sup>6</sup> In our study the success rate of DCR with MMC and intubations was found to be 92%. Various other studies have previously been conducted to assess the surgical outcome of DCR with silicone tube. Zaman M et al showed success rate of 97.5%<sup>7</sup> whereas Iliff reported 90%<sup>8</sup> and Tarbatand Custer reported 95% success results<sup>9</sup>. In a comparative study Hussain et al<sup>10</sup> reported 94.7% success results in intubated series. Similarly Advani et al<sup>11</sup>, reported success rate of 95% in intubated cases. A study by YM Denaley and R Khooshabeh showed that patent DCR system to irrigation and a positive dye test was achieved in 90% of procedures<sup>12</sup>. Nawaz et al were successful by 93.33%<sup>13</sup>. The DCR with MMC group showed a success rate of 95.4% and failure rate of 4.6%. From amongst the various studies previously conducted to assess the surgical outcome of DCR with MMC, Shu L Liao et al showed 95.5% success rate<sup>2</sup>, Yildirim et al gave a success rate of 95% and Rehman et al achieved a success rate 97.7%<sup>14,15</sup>. Kao et al showed 100% success with MMC in maintaining patency and a large osteotomy site.<sup>7</sup> In other studies conducted by You in 2001, Roozitalab in 2004 and Akhund in 2005 applied MMC over the anastomosed flaps and achieved success rate of 100%, 90.50% and 99% respectively<sup>16,17</sup>. Our study also compared with previous studies of endoscopic DCR. Selig et al (2000) reported 87.5% success rate in endoscopic DCR, with application of topical Mitomycin C, but the series was a small one and did not have any control<sup>18</sup>. Liao et al, (2000) found 95.5% success rate with topical Mitomycin C, as

compared to 70.5% in non-Mitomycin group and have strongly recommended its use<sup>14</sup>. Zilelioglu et al (1998), on the other hand, reported 77.3% success in Mitomycin group 77.8% in non-Mitomycin group.<sup>19</sup> Liu et al (2003) and Beloglazov et al (1999) also noted similar observations with no beneficial effects of Mitomycin C and hence have not recommended its use<sup>20,21</sup>. Our study showed better results (92%) as compared to above endoscopic DCR studies. They observed that with appropriate operative techniques and in experienced hands the success rates of Endo-DCR are practically equal to those of classical external approach. The major advantages of Endo-DCR are shorter operative times, lower complication rates, reduced patient morbidity and absence of external scars.

In our study, there were 52.6% females. In the study by Zamanet al there were 62% females<sup>7</sup>, by Rehman et al there were 76% females<sup>15</sup>, by Ali et al, there were 79% females<sup>22</sup>. The female preponderance is possibly due to the narrow lumens of bony lacrimal canals and NLD in women, osteoporosis, hormonal changes and heightened immune response<sup>23</sup>.

Many complications due to mitomycin C application have been reported in both pterygium and glaucoma filtration operations. Severe secondary glaucoma, corneal perforation, corectopia, secondary cataract and scleral calcification are documented as complications in using topical mitomycin C as a medical adjunct to pterygium surgery<sup>24</sup>. Hypotony related maculopathy, infection and endophthalmitis have been found in patients undergoing glaucoma surgery after exposure to mitomycin C<sup>25</sup>. In our study, one patient had excessive bleeding during surgery. Five patients were noted with postoperative complications out of which two patients had periorbital ecchymosis noted on 1<sup>st</sup> postoperative day which later resolved. Periorbital ecchymosis may be due to excessive manipulation during surgery. Three patients showed delayed wound healing. Wound disruption was noted during skin suture removal about seven days after surgery, it may be due to the result of accidental contact of mitomycin C soaked sponge on the skin wound could have been prevented by carefully managing the sponge.

## CONCLUSION

DCR with intraoperative mitomycin C soaking over the osteotomy site and anastomosed flaps can minimize the adhesion around the septo-osteotomy as well as the opening of the common canaliculus.

Mitomycin C soaking during DCR surgery is a useful modified procedure to improve the success rate of external DCR.

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## REFERENCES

1. **Tarbet KJ, Custer PL.** External dacryocystorhinostomy: surgical success, patient satisfaction economic cost. *Ophthalmology*. 1995; 102: 1065-7.
2. **Liao SL, Kao SCS, Tseng JHS, Chen MS, Hou pk.** Results of intraoperative Mitomycin-C application in dacryocystorhino-stomy. *Br J Ophthalmol*. 2000; 84: 903-6.
3. **Kunitomoro N, Mori S.** Studies on pterygium: Part 4,a treatment of pterigium by Mitomycin-C installation. *Acta Soc Ophthalmol Jpn*. 1969; 67: 601-7.
4. **Tarbet KJ, Cluster PL.** External dacryocystorhinostomy: Surgical success, patient satisfaction and economic cost. *Ophthalmology*. 1995; 102: 1065-70.
5. **Welham RA, Henderson PH.** Results of dacryocystorhinostomy: Analysis of causes for failure. *Trans Ophthalmol Soc UK*. 1973; 93: 601-9.
6. **Cokkesser Y, Everklioglu C.** Comparative external versus endoscopic dacryocystorhinostomy. Results in

- 115 patients. *Otolaryngol Head Neck Surg.* 2000; 123: 488-1.
7. **Zaman M, Babar TF, Abdullah A.** Prospective randomized comparison of Dacryocystorhinostomy (DCR) with and without intubation. *Pak J Med. Res.* 2005; 44: 75-8.
  8. **ILIFF CE.** A simplified dacryocystorhinostomy 1954-1970. *Arch Ophthalmol.* 1971; 85: 586-91.
  9. **Tarbet KJ, Custer PL.** External dacryocystorhinostomy: surgical success, patient satisfaction, and economic cost. *Ophthalmology.* 4; 102: 1065-70.
  10. **Hussain M, Akhtar S, Awan S.** Dacryocystorhinostomy with or without intubations. *Ann King Edward Med Uni.* 1998; 4: 34-6.
  11. **Advani RK, Halepota FM, Shah SIA, et al.** Comparative results of dacryocystorhinostomy with and without silicon intubation. *Pak J Ophthalmol.* 2004; 86: 533-5.
  12. **Khushabeh R.** External dacryocystorhinostomy for the treatment of acquired partial nasolacrimal duct obstruction in adults. *Br J Ophthalmol.* 2002; 86: 533-5.
  13. **Nawaz M, Sultan MS, Hanif Q et al.** Dacryocystorhinostomy; a comparative study of the results with and without silicon intubation in Pakistani patients of chronic dacryocystitis. *Professional Med J Mar.* 2008; 15: 81-6.
  14. **Yildirim C, Yaylali V, Esme A.** Long-term results of Rahman A, Channa S, Niazi JH, et al. Dacryocystorhinostomy without intubation with intraoperative Mitomycin-C. *J Coll Physicians Surg Pak.* 2006; 16: 476-8.
  15. **Rahman A1, Channa S, Niazi JH, Memon MS.** Dacryocystorhinostomy without intubation with intraoperative Mitomycin-C. *J Coll Physicians Surg Pak.* 2006; 16: 476-
  16. **You YA, Fang CT.** Intraoperative mitomycin C in dacryocystorhinostomy. *OphthalPlast Recons Surge.* 2001; 17: 115-9.
  17. **Roozitalab MH, Amirahmedi M, Namazi MR.** Results of the application of intraoperative mitomycin-C in dacryocystorhinostomy. *Eur J Ophthalmol.* 2004; 14: 461-3.
  18. **Selig YK, BiesmanBS, Rebeiz EE.** (2000): Topical Application of Mitomycin C in endoscopic dacryocystorhinostomy. *Am J Rhinol.* 2000; 14: 205-7.
  19. **Zilelioglu G, Ugurbas SH, Anadolu Y, Akiner M, Akturk T.** Adjunctive use of mitomycin C on endoscopic lacrimal surgery. *Br. J. Ophthalmol.* 1998; 82: 63-6.
  20. **Liu D, Bosley TM.** Silicone nasolacrimal intubation with mitomycin C- a prospective, randomized, double-masked study. *Ophthalmology.* 2003; 110: 306-10.
  21. **Beloglazov VG, Grusha OV, Saad-EY din NM, Alkova EL, Malaeva LV.** The prevention and treatment of recurrences after dacryocystorhinostomies. *Vestin Oftalmol.* 1999; 115: 14-7.
  22. **Ali A, Ahmed T.** Dacryocystorhinostomy (A review of 51 cases). *Pak J Ophthalmol.* 2001; 17: 122-8.
  23. **Mortimore S1, Banhegy GY, Lancaster JL, Karkanevatos A.** Endoscopic dacryocystorhinostomy without silicon stenting. *J R Coll. Surg Edinb.* 1999; 44: 371-3.
  24. **Rubinfeld RS1, Pfister RR, Stein RM, Foster CS, Martin NF, Stoleru S, Talley AR, Speaker MG.** Serious complications of topical mitomycin-C after pterygium surgery. *Ophthalmology,* 1992; 99: 1647-54.
  25. **Kupin TH, Juzych MS, Shin DH, Khatana AK, Olivier MM.** Adjunctive mitomycin C in primary trabeculectomy in phakic eyes. *Am J Ophthalmol.* 1995; 119: 30-9.