Role of Mitomycin-C in Endoscopic Endonasal Dacryocystorhinostomy

Vamshi Krishna Rao Koppula[1], Lingaiah Jadi[2], Deepak Kumar Phulwani[3], Boundinika Madhuri Nanduri[4], Venkata Muni Reddy[5]

[1]Assistant Professor, Department of ENT, Chalmeda Anand Rao Institute of Medical Sciences, Bommakal, Karimnagar, Telangana. [2]Professor, Department of ENT, Chalmeda Anand Rao Institute of Medical Sciences, Bommakal, Karimnagar, Telangana. [3]Postgraduate Student, Department of ENT, Chalmeda Anand Rao Institute of Medical Sciences, Bommakal, Karimnagar, Telangana. [4]Postgraduate Student, Department of ENT, Chalmeda Anand Rao Institute of Medical Sciences, Bommakal, Karimnagar, Telangana. [5]Postgraduate Student, Department of ENT, Chalmeda Anand Rao Institute of Medical Sciences, Bommakal, Karimnagar, Telangana.

ABSTRACT

BACKGROUND

Endoscopic dacryocystorhinostomy (DCR) has certain advantages over the conventional external DCR. Failures in endo DCR are mainly due to reclosure of stoma in the lateral nasal wall. Mitomycin-C is an alkylating, an antiproliferative agent which reduces fibroblast collagen synthesis by inhibiting DNA dependent RNA synthesis and suppresses cellular proliferation when topically applied to mucosal tissues inhibit excessive scar tissue and granulation tissue formation. We wanted to evaluate the role of Mitomycin-C in endoscopic endo nasal DCR as an adjunct.

METHODS

Our prospective study was performed with 104 patients in 35-75 years age group who presented with chronic dacryocystitis. The study sample was designed randomly into Group A and group B. Group A patients were treated with Mitomycin-C to the incision site and Group B patients were not administered Mitomycin-C. These patients had 6 months of follow up.

RESULTS

50 patients out of 52 in Group A had successful surgical outcome. In Group B 48 patients out of 52 were clinically free after the dacryocystorhinostomy. The results obtained had no significant difference between the Group A and Group B.

CONCLUSIONS

Use of intraoperative mitomycin-C is easy and safe but, in our study, it does not show any significant benefit in surgical outcome of endo DCR in preventing reclosure of stoma site.

KEYWORDS

Endoscopic Dacryocystorhinostomy (Endo DCR), Mitomycin-C, Chronic Dacryocystitis

Corresponding Author:
Dr. Jadi Lingaiah,
Professor,
Department of ENT,
Chalmeda Anand Rao Institute of Medical Sciences, Bommakal,
Karimnagar- 505001, Telangana, India.
E-mail: drjadi_ms@yahoo.com
DOI: 10.18410/jebmh/2019/550

Financial or Other Competing Interests: None.

How to Cite This Article:
Koppula VKR, Jadi L, Phulwani DK, et al. Role of Mitomycin-C in Endoscopic Endonasal Dacryocystorhinostomy. J. Evid. Based Med. Healthc. 2019; 6(40), 2659-2662. DOI: 10.18410/jebmh/2019/550

Submission 17-09-2019,
Peer Review 20-09-2019,
Acceptance 30-09-2019,
Published 02-10-2019.

BACKGROUND

Lacrimal pathway begins in the eye from upper and lower punctum to lacrimal canaliculi, which in turn joins to form the common canaliculus. This common canaliculus leads into lacrimal sac, and ends as nasolacrimal ducts in the inferior meatus. For a normal functional eye, lacrimal apparatus has two main functions i.e. secretory and drainage and they should work in perfect harmony. Obstruction distal to lacrimal sac or in the nasolacrimal duct cause epiphora and leads to dacryocystitis.

Nasolacrimal duct (NLD) obstruction seen in patients, of age 40 which constitute around 10 percent and patients of age 90 years are estimated to be 35-40 percent.[1] Females are mostly affected in 5th or 6th decade of life.[2,3] Most common site for obstruction is at the junction between lacrimal sac and nasolacrimal duct.[4] Local massage of the sac or probing of nasolacrimal duct may help in relieving these symptoms.[5]

The history of lacrimal disease dates back from Hammurabi (2,200 B.C.).[6] The surgical treatment for this condition is dacryocystorhinostomy (DCR). It is the surgical procedure in which lacrimal sac is opened to divert lacrimal flow directly into the nasal cavity, bypassing obstructed nasolacrimal duct. The opening of lacrimal sac may be performed by external or intranasal approach. External approach was first described by Toti in 1904.[7] Main disadvantage of this procedure is visible external surgical scar.

Intranasal or endoscopic of DCR is a scar less procedure which was first described by Caldwell in 1893.[8] Nasal endoscope revolutionised surgical treatment by producing scar less surgery in short period of time, without damaging medial canthal structures including medial fibres of orbicularis muscle which helps in lacrimal pump system.[9] McDonagh was the first to perform nasal endoscopic DCR in 1989.[8,9]

Cause of failure of DCR is due to obstruction of common canaliculus and closure of osteotomy site by synechiae or nasal adhesions.[3,10] Silicone stents were used to maintain the patency of ostium after DCR procedure, but prolonged use resulted in granulation tissue formation at the neo-ostium, resulting in failure of procedure.[5]

Antiproliferative agents applied at the created stoma may reduce the fibrosis.[1] Mitomycin-C was firstly developed in 1955 by Hata et al. From Streptomyces caespitosus with half-life 8-48 minutes, is an alkylating and antiproliferative agent.[11] It reduces fibroblast collagen synthesis by inhibiting DNA dependent RNA synthesis and can suppress cellular proliferation in any period of cell cycle.[12]

The study conducted by Selig et. al. shows application of mitomycin-C with preparation of 0.2mg per ml to the incision site has minimal post-operative scarring and adhesions.[13] The study conducted by Apuhan and team shows application of mitomycin-C with preparation of 0.5mg per ml to the incision site for about 2.5 minutes showed more successes rates of 91% and it was compared with external dacryocystorhinostomy and found success rate of 71.5%.[14] In study conducted by Goush et al[15] and also by Zilelioglu and team[16] shows no much significance difference with or without application of mitomycin-C.

We wanted to evaluate the role of Mitomycin-C in endoscopic endo nasal DCR as an adjunct.

METHODS

Present study is a prospective study carried out for a period of 2 years from November 2016 to October 2018. The patients attending to OPD of Chalmeda Anand Rao Medical College hospital with symptoms of watering of eyes were enrolled for study. The study was conducted after getting ethical approval from ethical committee of Chalmeda Anand Rao Institute of Medical Science, Karimnagar, Telangana state, INDIA, and a written consent was taken from all patients to be included in the study.

Study consists of series of 104 patients. Complaints and duration of symptoms were taken. Complete ENT examination done. Pressure is applied over the lacrimal sac to check any regurgitation of any fluid from the punctum. syringing test is done to check patency of lacrimal passage. Diagnostic nasal endoscopy done. A detailed description of the procedure was given to the patients. Almost all the patients were operated under local anaesthesia. Patients underwent endonasal DCR in which both 0^0 and 30^0endoscopes were used and lacrimal sac exposed after removal of lacrimal bone, sac wall incised, and flaps opened and patency checked.

Mitomycin-c preparations done by 0.5mg/ml and applied to stoma site for 5 mins and washed thoroughly for group A patients. All the patients were followed for a period of 6 months.

Inclusion Criteria

All patients attending OPD with watering of eyes and diagnosed to have nasolacrimal duct obstruction based on symptomatic and clinical backgrounds.

Exclusion Criteria

Patients below 35 years and above 75 years, patients having punctal block, canalicular block, common canalicular block, lacrimal sac tumours, bleeding disorders, nasolacrimal duct obstruction secondary to trauma, malignancy and who have undergone total maxillectomy and revision cases were excluded.

RESULTS

A total of 104 patients participated in study. Females constituted 74 while males constituted 30 of total patients. In our study it shows that 16(15.4%) patients were in age group of 35-45 years,26(25%) patients were in the age group of 46-55 years,30(28.8%) patients were in the age group of 56-65 years and 32(30.8%) were in the age group of 66-75 years.

Gender	Number of Patients	Percentage
Male	30	29%
Female	74	71%
Total	104	100%

Table 1. Sex Distribution

Age (Years)	Number of Patients	Percentage
35-45	16	15.4%
46-55	26	25%
56-65	30	28.8%
66-75	32	30.8%
Total	104	100%

Table 2. Age Distribution of Patients

All patients in the study sample underwent endo DCR. Patients grouped as cases (group A) had mitomycin-C applied to the stomal opening. Patients grouped as controls (group B) did not receive mitomycin. Post-operative follow-up was done in these patients of both group A and group B for 6months. These patients have undergone syringing test and endoscopic examination for which symptomatic relief was assessed.

Group of Patients	Frequency	Surgery Success	Surgery Failure
Mitomycin-C Applied (cases)	52	50	2
Mitomycin-C not Applied (controls)	52	48	4
Total	104	98	6

Table 3. Cases (Group A) and Controls (Group B) Results

Out of 52 cases 50 patients were symptom free after surgery and out of 52 controls 48 patients were symptom free after surgery. The result after applying chi-square test showed 0.34 and it is >0.05 (p value < or = 0.05 is statistically significant) suggesting that the difference in the results of cases and controls was not statistically significant. Hence these results indicate that there is no significant benefit in using mitomycin-C as an adjunct in endo nasal DCR.

DISCUSSION

Nasal endoscopes are now widely used for almost all nasal and paranasal sinus surgeries due to precise technique and sophisticated instruments. The opening of lacrimal bone and opening of sac has less trauma to surrounding structures and minimal scaring when compare to external approach where angular vein, medial canthal ligament, and lamina papyracea. has to be taken care off.

The main cause of surgical failure is formation of granulation tissues or synechiae at operative site.[17,18] A number of different techniques were used to minimize incidence of granulation tissues or synechiae formation to improve surgical results.

Surgical methods to reduce the development of synechiae formation are complete separation of lacrimal sac from nasolacrimal duct and use of mucosal flap placement after wide resection of surrounding bone. Non-surgical methods for minimizing synechiae formation include application of mitomycin-C and use of silicone stents.

Camara et al. studies showed the success rate of mitomycin-C group was statistically significant (p=0.007) and concluded by stating that intraoperative use of mitomycin-C is safe and effective.[19] Thomas Prasanna raj et al. concluded that mitomycin-C did not appear to influence the occurrence of granulations, synechiae nor did it alter the success rate significantly.[20]

In our study, out of all operated patients females formed majority of 71% as against males which were 29% of all the cases.

The present study which is conducted in rural areas of Telangana where incidence of dacryocystitis is high revealed no benefit in using Mitomycin-C. In our experience a large stoma should be created by exposing the lacrimal sac completely by removal of lacrimal bone over it and sac should be adequately marsupialized without causing trauma and adjacent raw areas, between the lateral nasal wall and middle turbinate and preservation of nasal and lacrimal mucosal flaps is helpful.

CONCLUSIONS

In present study, patients with use of mitomycin-C over the incised lacrimal sac, mucosal flaps showed no scarring or no granulation tissue formation around the stoma and patency was maintained. Patients who underwent surgery without mitomycin-C, where lacrimal sac is widely incised and mucosal flap separated to adjacent sides showed very minimal scaring and good patency. This study of endonasal DCR with and without application of Mitomycin-C shows that there is no significant difference. Application of mitomycin-C can be considered in cases of trauma to the surroundings structures during surgery and adjacent raw surfaces so as to reduce granulation and synechiae formation.

REFERENCES

[1] Fergie N, Jones NS. Dacryocystorhinostomy. In: Gleeson M, Browning GG, Burton MJ, et al. eds. Scott-Brown's otorhinolaryngology, head and neck surgery. 7th edn. London: Hodder Arnold 2008:1689-1698.

[2] Dubey SP, Munjal VR. Endoscopic DCR: how to improve the results. Indian J Otolaryngol Head Neck Surg 2014;66(2):178-181.

[3] Leong SC, Macewen CJ, White PS. A systematic review of outcomes after dacryocystorhinostomy in adults. AM J Rhinol Allergy 2010;24(1):81-90.

[4] Sharma BR. Non endoscopic endonasal dacryocystorhinostomy versus external dacryocystorhinostomy. Kathmandu Univ Med J (KUMJ) 2008;6(24):437-442.

[5] Agarwal S. Endoscopic dacryocystorhinostomy for acquired nasolacrimal duct obstruction. J Laryngol Otol 2009;123(11):1226-1228.

[6] Onerci M. Dacryocystorhinostomy. Diagnosis and treatment of nasolacrimal canal obstructions. Rhinology 2002;40(2):49-65.
[7] Jones LT. The cure of epiphora due to canalicular disorders, trauma and surgical failures on the lacrimal passages. Trans Am Acad Ophthalmol Otolaryngol 1962;66:506-524.
[8] McDonough M, Meiring JH. Endoscopic transnasal dacryocystorhinostomy. J Laryngol Otol 1989;103(6):585-587.
[9] Ishio K, Sugasawa M, Tayama N, et al. Clinical usefulness of endoscopic intranasal dacryocystorhinostomy. Acta Otolaryngol Suppl 2007;559:95-102.
[10] Karkos PD, Leong SC, Sastry A, et al. Evidence-based applications of mitomycin C in the nose. Am J Otolaryngol 2011;32(5):422-425.
[11] Liao SL, Kao SC, Tseng JH, et al. Results of intraoperative mitomycin C application in dacryocystorhinostomy. Br J Ophthalmol 2000;84(8):903-906.
[12] Zilelioglu G, Ugurbas SH, Anadolu Y, et al. Adjunctive use of mitomycin-C on endoscopic lacrimal surgery. Br J Ophthalmol 1998;82(1):63-66.
[13] Selig YK, Biesman BS, Rebeiz EE. Topical application of mitomycin-C in endoscopic dacryocystorhinostomy. Am J Rhinol 2000;14(3):205-207.
[14] Apuhan T, Yildirim YS, Eroglu F, et al. Effect of mitomycin-C on endoscopic dacryocystorhinostomy. J Craniofac Surg 2011;22(6):2057-2059.
[15] Ghosh S, Roychaudhury A, Roychaudhuri BK. Use of mitomycin-C in endo-DCR. Indian J Otolaryngol Head Neck Surg 2006;58(4):368-369.
[16] Zilelioglu G, Ugurbas SH, Anadolu Y, et al. Adjunctive use of mitomycin C on endoscopic lacrimal surgery. Br J Opthalmol 1998;82(1):63-66.
[17] Korkut AY, Teker AM, Ozsutcu M, et al. A comparison of endonasal with external dacryocystorhinostomy in revision cases. Eur Arch Otorhinolaryngol 2011;268(3):377-381.
[18] Araujo Filho BC, Voegels RL, Butugan O, et al. Endoscopic dacryocystorhinostomy. Braz J Otorhinolaryngol 2005;71:721-725.
[19] Camara JG, Bengzon AU, Henson RD. The safety and efficacy of mitomycin C in endonasal endoscopic laser assisted dacryocystorhinostomy. Ophthamicl Plast Reconstr Surg 2000;16(2):114-118.
[20] Prasannaraj T, Kumar BY, Narasimhan I, et al. Significance of adjunctive mitomycin C in endoscopic dacryocystorhinostomy. Am J Otolaryngol 2012;33(1):47-50.