

A PROSPECTIVE STUDY ON MODIFIED APPROACH TO CLASSICAL DACRYOCYSTORHINOSTOMY

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ABSTRACT

Objective: The present study was done with an aim to present the outcome of the modified technique of external dacryocystorhinostomy (DCR) with anterior flap anastomosis with the excision of posterior flaps.

Methods: Present prospective and observational study was carried out at C.U. Shah Medical College after taking permission from the ethical committee at C.U. Shah Medical College. A total of 100 participants were included in the study. All surgeries were performed by the same surgeon. All routine investigations including thorough rhinological checkup were carried out before DCR surgery. Patients were followed up for period of 1 year. Patency of lacrimal sac was considered as a successful result.

Results: Review of complications demonstrates that only four cases had intraoperative hemorrhage more than 100cc, while 96 experienced less hemorrhage. Two patients had early post-operative hemorrhage in the form of epistaxis which stopped without need for nasal repacking. Another two patients had orbital hemorrhage without seriously elevating the intraocular pressure. There was no case of orbital emphysema, cerebrospinal fluid leakage, or wound sepsis in our study. Six patients had post-operative epiphora in varying degrees.

Conclusion: Although it is simpler and easier to master the surgical technique, anterior single flap DCR shows a success rate comparable to that obtained by the more complex conventional DCR.

Keywords: Dacryocystorhinostomy, Epistaxis, Intraoperative hemorrhage, Nasolacrimal duct.

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INTRODUCTION

Nasolacrimal duct obstruction (NLDO) is one of the most common diseases upsetting the lacrimal drainage system. Persistent tearing, mucous or mucopurulent discharge from the lacrimal puncta, chronic conjunctivitis, and swelling of the lacrimal sac in the medial canthal area (acute or chronic dacryocystitis) are the symptoms that subjects may practice due to NLDO [1,2]. Chronic dacryocystitis typically occurs due to the obstruction of lacrimal passage at the junction of the lacrimal sac and nasolacrimal duct. The reconstruction of lacrimal passages in such cases can be achieved by numerous surgical methods. Classical External dacryocystorhinostomy (DCR) remains the gold standard method for the management of chronic dacryocystitis. In spite of acceptable results reported with numerous substitute methods such as nasolacrimal duct intubation, endoscopic or non-endoscopic endonasal DCR, and endonasal or transcanalicular laser DCR, external DCR remains the technique of preference for most oculoplastic surgeons [3-10].

The principle of DCR is the elimination of bone lying among the lacrimal sac and the nasal mucosa, and making an anastomosis among the medial wall of the sac and nasal mucosa. Many modifications have been illustrated for DCR, but the essential procedure has withstood the test of time and has a high success rate of 93-95%.

Watering of the eye due to obstacle of the nasolacrimal duct is called epiphora. It is a frequent dilemma about 33% of the complaints in usual ophthalmological practice. The most widespread site of obstruction is at the level of the lacrimal sac and nasolacrimal duct. Constant tearing, mucopurulent discharge uttered through the puncta while pressing on the lacrimal area, chronic conjunctivitis and swelling of the lacrimal sac in the medial canthal area are the symptoms of NLDO leading to acute or chronic dacryocystitis. The failure of external DCR has been

accredited to numerous factors. The significant factors accountable for failure are:

- Granulation tissues from the nasal mucosa closing the rhinostomy.
- Small size of the ostium.
- Fashioning of anastomotic flaps leading to kinking of the canaliculi.
- Sagging of the anterior flaps and partial thickness lacrimal sac flaps.
- Postoperative soft tissue infection.

The success of DCR depends on the sufficient anatomical exposure of the deeply seated lacrimal sac to gain a good anastomosis of the flaps and a proper sized ostium. Due to a tricky anatomical terrain, a guarded surgical field and presence of intraoperative bleeding, handling of flaps particularly posterior flaps becomes very complicated and strenuous for the surgeon. This complexity level is enhanced for those who are starting to learn the procedure. "Keeping in mind, the above-mentioned factors in present research, we have tried a simple and straightforward form of external DCR with suturing of anterior flaps only with the excision of the posterior flaps [11,12]."

Suturing of the anterior flaps only, gives analogous findings to the conventional technique with simplified suturing and less time. Regardless of all new modifications being tried modified DCR is easier, faster, and an inexpensive technique which has almost replaced the conventional method as per the modern literature accessible.

Present research was done with an aim to present the outcome of the modified method of external DCR with anterior flap anastomosis with the excision of posterior flaps.

METHODS

Present prospective and observational research was performed at C.U. Shah Medical College after obtaining authorization from the ethical

committee at C.U. Shah Medical College. Ethical approval was taken from the institutional ethical committee and written informed consent was taken from all the participants. A total of 100 participants were included in the study.

The inclusion criteria were subjects having chronic dacryocystitis.

Exclusion criteria were subjects who had canalicular and punctal occlusion, the lower eyelid deformity, nasal mucosal pathology, bleeding diathesis, and trauma with facial fractures.

Surgical technique

The process could be performed conveniently utilizing general or local anesthesia. Complete history was taken in each case and meticulous clinical examination was performed. Topical anesthetic with decongestant was routinely applied to the nasal mucosa earlier to the surgery. Diluted adrenaline was injected in and around the area of the lacrimal sac after informing the anesthetist. A thorough rhinological checkup was done to exclude the presence of grossly deviated nasal septum, nasal polyps, hypertrophied turbinates, and atrophic rhinitis. All schedule investigations including bleeding time, clotting time, and hemogram were done. Aspirin and other nonsteroid anti-inflammatory drugs were stopped prior to the surgery.

In this modified process of external DCR, anastomosis of anterior flaps only was created by suturing anterior flaps of the lacrimal sac and the nasal mucosa, while posterior flaps was excised. This procedure for chronic dacryocystitis is normally performed in our department till date having high achievement rate and no subject having any complications regarding this method.

Orbicularis fibers were separated bluntly to expose the medial palpebral (canthal) ligament. The ligament was followed nasally to its attachment to the anterior lacrimal crest. The periosteum was vertically incised (10 mm) just anterior to the lacrimal crest; then elevated using Traquair's elevator from the whole lacrimal fossa reaching the posterior lacrimal crest and including the sac within it. Through the same elevator, the suture between the lacrimal bone and frontal process of the maxilla or that between the ethmoid and lacrimal bone was separated. The nasal mucosa was then pushed by the elevator to separate it from the bone.

The opening was enlarged with bone punches to make a rhinostomy about 15 mm in diameter (including the whole floor of the fossa). A "U" shaped incision was made in the elevated periosteum and sac to make the anterior flap of the sac. Nasal mucosa behind the rhinostomy was cut. The anterior flap was then sutured with Vicryl 6/0 to the margin of the periosteal cut near the anterior lacrimal crest. The skin was then closed with 6/0 black silk. Light bandage was put on the wound and the nasal pack was removed. Skin sutures were taken out 5-7 days after the surgery. Probing and syringing were attempted if epiphora occurs postoperatively. Absence of epiphora at the end of 1 year follow-up without the need for further surgical intervention was considered a success.

Statistical analysis

The recorded data were compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). For all tests, confidence level and level of significance were set at 95% and 5%, respectively.

RESULTS

The mean age in this study was 57.13 years. Out of 100 patients, 64 were females and 36 were males. Review of complications demonstrates that only four cases had intraoperative hemorrhage more than 100cc, while 96 experienced less hemorrhage. Two patients had early post-operative hemorrhage in the form of epistaxis which stopped without need for nasal repacking. Another two patients had orbital hemorrhage without seriously elevating the intraocular pressure.

There was no case of orbital emphysema, cerebrospinal fluid (CSF) leakage, or wound sepsis in our study. Two cases had disfigured scars in the shape of epicanthus fold. Six patients had post-operative epiphora in varying degrees. Probing and syringing were done for cases of epiphora, which led to cessation of symptoms in four of them leaving only two patients with persistent epiphora or failed DCR. The success rate of surgical procedure used in this study was 98%.

DISCUSSION

Since Toti in 1904 [13] Ohm [14] and Dupuy-Dutemps and Bouguet [15] in 1921 laid the foundation of the modern external DCR, several alternatives techniques such as nasolacrimal duct intubation endoscopic and nonendoscopic endonasal DCR, and endonasal or transcanalicular laser DCR have been proposed [13,16-21]. Intubation of the nasolacrimal duct was first described in 1944. The results obtained with this technique are poor and variable, the risk of foreign body reaction induced by the tubes is great [22-24].

The external DCR is a highly successful procedure. However, the surgical procedure is not technically easy and requires considerable experience as well as operative time. Due to the inaccessibility through a difficult anatomical terrain and a constrained surgical field the handling of posterior flaps in a double flap surgery becomes very difficult. To add the level of difficulty intra operative hemorrhage makes suturing of the posterior flaps a very strenuous job. Keeping in mind the above-mentioned factors, we hereby present a simplified way of doing DCR with anastomosis of anterior flaps along with excision of posterior flaps. This technique is a common variation of the traditional external DCR. A study by Elwan *et al.* [4] reported a success rate of 90% with excision of posterior flap and 85% with suturing; he concluded that excision of the posterior flaps of lacrimal sac may improve the success rate. A study by Zaman *et al.* reported a success rate of 98.33% by suturing only the anterior flap and engaging them in the muscle layer.

Age and gender distribution of patients in this study generally complies with figures in literature (Table 1). The surgical outcome of single flap DCR in this study showed minimal complications. Epiphora was resolvable by

Table 1: Age and gender distribution

Age group (Years)	Males		Females		Total	
	No	Percentage	No	Percentage	No	Percentage
21-30	2	5.5	5	7.8	7	7
31-40	5	13.8	11	17.18	16	16
41-50	5	13.8	12	18.75	17	17
51-60	6	16.6	11	17.18	17	17
61-70	8	22.2	10	15.62	18	18
71-80	5	13.8	7	10.93	12	12
81-90	3	8.3	5	7.8	8	8
More than 90	2	5.5	3	4.68	5	5
Total	36	36	64	64	100	100

simple probing and syringing. The success rate is comparable with best results reported in the previous studies using different flap designs.

Possible post-operative complications of DCR include hemorrhage, wound sepsis, surgical emphysema, CSF leakage, and recurrence of epiphora [25]. It has been widely suggested that creation and suturing of both anterior and posterior mucosal flaps increase the possibility of primary healing of the new tract and reduce the mucosal scarring, complying with the general surgical principle of edge-to-edge approximation of tissues [26-28]. Although a sutured anastomosis of both anterior and posterior mucosal flaps appears to better achieve this goal, alternative techniques of external DCR with variations in the mucosal flap design have been described and success rates have been reported to be comparably high. However, there are only few randomized studies comparing the outcomes of DCR performed with different mucosal flap design [12,14,15].

On the other hand, suturing the posterior flaps often constitutes a difficulty and may take a considerable amount of time, particularly in the presence of hemorrhage in DCR surgery. Several options have been described for management of the posterior flaps. The posterior flaps can be anastomosed, excised, or not fashioned at all. A study by Elwan found statistically similar success rates by the end of a mean follow-up period of 11 months when comparing excision of the posterior flaps to posterior flaps not is fashioned at all.

CONCLUSION

Although it is simpler and easier to master the surgical technique, anterior single flap DCR shows a success rate comparable to that obtained by the more complex conventional DCR. This gives this procedure an advantage over the conventional one. However, a randomized trial is needed to statistically compare between the two procedures and validate this conclusion.

AUTHORS' CONTRIBUTIONS

Dr Nikunj Amin: Concept and design of the study, prepared first draft of manuscript; interpreted the results; reviewed the literature and manuscript preparation. Dr Kishan Makwana: Concept, Coordination, Preparation of Manuscript, Statistical analysis and Interpretation, Preparation of Manuscript and Statistical Analysis and Interpretation.

CONFLICTS OF INTEREST

None.

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REFERENCES

1. Tanenbaum M, McCord CD. The lacrimal drainage system. In: Tasman W, Jaeger EA, editors. *Duane's Clinical Ophthalmology*. Vol. 4. Philadelphia PA: Lippincott Williams & Wilkins; 2001. p. 1-34.
2. Hirschbein MJ, Stasior GO. Lacrimal system. In: Chen WP, editor. *Oculoplastic Surgery: The Essentials*. 1st ed. New York: Thieme Medical Publishers; 2001. p. 263-88.
3. Older JJ. Routine use of a silicone stent in a dacryocystorhinostomy. *Ophthalmic Surg* 1982;13:911-5. doi: 10.3928/1542-8877-19821101-04, PMID 7155512
4. Elwan S. A randomized study comparing DCR with and without excision of the posterior mucosal flap of the posterior mucosal flap. *Orbit* 2003;22:7-13. doi: 10.1076/orbi.22.1.7.14011, PMID 12759862
5. Yu HH, Deng JY, Zheng XN, Lu L, Zeng D. Comparative study of silicone reverse intubation versus dacryocystorhinostomy for nasolacrimal drainage obstruction. *Int J Ophthalmol* 2007;7:1456-7.
6. Simon GJ, Joseph J, Lee S, Schwarcz RM, McCann JD, Goldberg RA. External versus endoscopic dacryocystorhinostomy for acquired nasolacrimal duct obstruction in a tertiary referral center. *Ophthalmology* 2005;112:1463-8. doi: 10.1016/j.ophtha.2005.03.015, PMID 15953636
7. Gonnering RS, Lyon DB, Fisher JC. Endoscopic laser-assisted lacrimal surgery. *Am J Ophthalmol* 1991;111:152-7. doi: 10.1016/s0002-9394(14)72252-4, PMID 1899536
8. Baldeschi L, Nardi M, Hintschich CR, Koornneef L. Anterior suspended flaps: A modified approach for external dacryocystorhinostomy. *Br J Ophthalmol* 1998;82:790-2. doi: 10.1136/bjo.82.7.790, PMID 9924373
9. Behnawi KH, Ali NA, Al Sirhy EY, Elias NR. Anterior single flap external dacryocystorhinostomy outcome in 200 Sudanese patients. *Int J Ophthalmol* 2009;2:162-4.
10. Dubey A, Jain S, Chandra VL, Tirky ER, Jain SC. A comparative study of single flap versus double flap external dacryocystorhinostomy. *Natl J Dent Res* 2014;3:8-13.
11. Hurwitz JJ, Rutherford S. Computerized survey of lacrimal surgery patients. *Ophthalmology* 1986;93:14-9. doi: 10.1016/s0161-6420(86)33779-5, PMID 3951812
12. Becker BB. Tricompartment model of the lacrimal pump mechanism. *Ophthalmology* 1992;99:1139-45. doi: 10.1016/s0161-6420(92)31839-1, PMID 1495795
13. Halle M. Zur intranasalen operation am transsack. *Arch Laryngol Rhinol* 1914;28:256-66.
14. Ohm J. Bericht über 70 totische operationen. *Z Augenheilkd* 1921;46:37-45.
15. Dupuy-Dutemps L, Bourguet M. Procédé plastique de dacryocystorhinostomie et ses results. *Ann Ocul* 1921;158:241-61.
16. Summerskill WH. Dacryocystorhinostomy by intubation. *Br J Ophthalmol* 1952;36:240-4. doi: 10.1136/bjo.36.5.240, PMID 14925294
17. West J. Eine neue method zur operation des transsaches von der nase aus. *Arch Laryngol Rhinol* 1911;24:62-4.
18. Rice DH. Endoscopic intranasal dacryocystorhinostomy results in four patients. *Arch Otolaryngol Head Neck Surg* 1990;116:1061. doi: 10.1001/archotol.1990.01870090077012, PMID 2383391
19. Steadman MG. Transnasal dacryocystorhinostomy. *Otolaryngol Clin North Am* 1985;18:107-11. doi: 10.1016/S0030-6665(20)31898-3, PMID 3991199
20. Jokinen K, Karjä J. Endonasal dacryocystorhinostomy. *Arch Otolaryngol* 1974;100:41-4. doi: 10.1001/archotol.1974.00780040045009, PMID 4842611
21. Massaro BM, Gonnering RS, Harris GJ. Endonasal laser dacryocystorhinostomy-a new approach to nasolacrimal ducts obstruction. *Arch Ophthalmol* 1990;108:1172-6. doi: 10.1001/archophth.1990.01070100128048, PMID 2383207
22. Singh DS, Garg RS. Polyethylene intubation of the naso lacrimal duct in chronic dacryocystitis. *Br J Ophthalmol* 1972;56:914-18. doi: 10.1136/bjo.56.12.914, PMID 4651985
23. Von Below H, Rose GE. Adult nasolacrimal duct bypass tubes: Where do they go? *Br J Ophthalmol* 1993;77:449-50. doi: 10.1136/bjo.77.7.449, PMID 8343476
24. Rizzo S, Baldeschi L, Frezzotti P, Torrazza C, Nardi M, Rose GE. A case of a late complication after naso lacrimal duct intubation. *Eye (Lond)* 1995;9:801-2. doi: 10.1038/eye.1995.199, PMID 8849554
25. Harris GJ, Sakol PJ, Beatty RL. Relaxed skin tension line incision for dacryocystorhinostomy. *Am J Ophthalmol* 1989;108:742-3. doi: 10.1016/0002-9394(89)90881-7, PMID 2596564
26. Mat E, Okumus S, Zorlu F, Koçluk Y, Sozen T. Comparison of the results in external dacryocystorhinostomy with single flap and double flap techniques. *Gaziantep Med J* 2013;19:40-2. doi: 10.5455/GMJ-30-2012-106
27. Dolman PJ. Comparison of external dacryocystorhinostomy with nonlaser endonasal dacryocystorhinostomy. *Ophthalmology* 2003;110:78-84. doi: 10.1016/s0161-6420(02)01452-5, PMID 12511350
28. Hornblass A. *Oculoplastic, Orbital and Reconstructive Surgery*. Vol. 2. Baltimore: Lippincott Williams and Wilkins; 1990.