Original Article

Transconjunctival dacryocystorhinostomy: An aesthetic approach

Anasua Ganguly, Kesarpu Ramarao[1], Samir Mohapatra, Suryasnata Rath

Purpose: To report the anatomical and cosmetic outcome of transconjunctival dacryocystorhinostomy (TDCR) in an Asian Indian population. **Methods:** TDCR was initially performed in cadaver eyes followed by patients with primary acquired nasolacrimal duct obstruction (NLDO). This was a prospective noncomparative case series of all consecutive TDCRs performed between April 2013 and June 2015. Outcome measures were anatomical patency, epiphora, presence of diplopia, aesthetic outcome, and health status. **Results:** A total of 17 (18 eyes) patients with a mean age 43.9 ± 11.8 years (range, 32–75) were included in the study. Eight were males, and one patient underwent TDCR in both eyes. TDCR was successfully performed in 15/18 (82%) eyes under local anesthesia. Procedure converted to transcutaneous external DCR in two and dacryocystectomy in one patient each. Mean duration of surgery was 52.6 (range, 29–110) min. Anatomical patency and relief from epiphora was achieved in all (15/15) eyes after TDCR at a median follow-up of 15.5 months. At final follow-up, objective assessment of the cosmetic outcome graded the surgical scar at the lateral canthus as invisible in all except one and conjunctival fornix as visible only after eyelid eversion in all patients. Disturbance of the medial fat pad was not seen in any patient. A questionnaire-based health status evaluation showed marked improvement in anxiety/depression before and after TDCR with an overall well-being score of 88 on a scale of 0–100 (worst–best) after TDCR. **Conclusions:** TDCR offers a promising aesthetic approach in patients with primary acquired NLDO and gives excellent functional and cosmetic outcome.

Access this article online

Website: www.ijo.in

DOI: 10.4103/0301-4738.198855

Quick Response Code:

Key words: Dacryocystorhinostomy, external, transconjunctival

Dacryocystorhinostomy (DCR) is the treatment of choice for patients with acquired nasolacrimal duct obstruction (NLDO).[1] DCR has been performed for over a century using an external transcutaneous approach. Cosmetic blemish from the surgical scar after transcutaneous external DCR is often the reason for patients as well as ophthalmologists to prefer an endonasal approach. However, disadvantages of the endonasal DCR include a long learning curve, need for expensive equipment, and sometimes a poorer outcome.[1,2]

Alternative aesthetic surgical techniques without an external visible scar at the medial canthal area have been reported.[3-6] In 2003, Adenis and Robert published a series of 11 patients where they described a retrocaruncular approach and achieved successful outcome in 82% (9/11) with no residual facial scar.[3] A subciliary approach to external DCR was described by Dave *et al*. in 16 patients with 88% of patients grading the surgical scar to be invisible or faintly visible.[4] In 2011, Kaynak-Hekimhan and Yilmaz described external transconjunctival DCR (TDCR) with no visible facial scar.[5] A more recently published larger series by the same group showed a 92.6% (25/27) success.[6] Kaynak-Hekimhan and Yilmaz had to convert in 18.2% (6/33) of patients to external transcutaneous DCR.[5,6] Despite an overall favorable outcome, some concerns about outcome in young individuals with taut eyelids, long-term aesthetic outcome due to medial fat pad disturbance, and diplopia (new onset) due to inferior oblique injury remain. We report our outcome (objective and health questionnaire based) after TDCR in an Asian Indian population for the treatment of primary acquired NLDO.

Methods

This was a prospective noncomparative series of all consecutive patients who underwent TDCR by a single surgeon (Suryasnata Rath) over 26 months (April 2013 and June 2015). All patients underwent a comprehensive examination including diagnostic irrigation and probing to establish the diagnosis of primary acquired NLDO. Only adult patients (age >18 years) diagnosed with primary NLDO were included in the study. Typically, patients who had NLDO associated with acute dacryocystitis, secondary to trauma, canalicular obstruction, eyelid malposition, lacrimal sac mass, history of nasal bleeds/polyp, anemia (hemoglobin <7 g%), and deranged coagulation profile were excluded from the study. The study received the Institutional Ethics Committee approval, was HIPAA compliant, and was in accordance with the tenets of the Declaration of Helsinki. An informed consent was obtained from all patients.

Department of Ophthalmic Plastic and Reconstructive Surgery, Orbit and Ocular Oncology, L V Prasad Eye Institute, [1]Department of Anatomy, Kalinga Institute of Medical Sciences, Bhubaneswar, Odisha, India

Correspondence to: Dr. Suryasnata Rath, Department of Ophthalmic Plastics, Orbit and Ocular Oncology, L. V. Prasad Eye Institute, Bhubaneswar, Odisha, India. E-mail: drsuryasnata@gmail.com

Manuscript received: 22.08.16; Revision accepted: 11.11.16

Cite this article as: Ganguly A, Ramarao K, Mohapatra S, Rath S. Transconjunctival dacryocystorhinostomy: An aesthetic approach. Indian J Ophthalmol 2016;64:893-7.

Surgical technique

The technique was initially performed on cadaver [Fig. 1a] and then in human participants. All procedures were performed under local anesthesia. The nose was packed with ribbon gauze soaked in 0.05% oxymetazoline nasal drops, and the conjunctival site was infiltrated with 2% lignocaine and epinephrine (1 in 200,000). A corneal shield was applied to protect the cornea. After a lateral canthotomy and cantholysis, a blunt-tipped retractor was applied. An inferomedial conjunctival fornix incision was made, and the medial fat pad and inferior oblique muscle were retracted. After identification of the anterior lacrimal crest, the periosteum was incised and reflected to expose lacrimal sac fossa. Fracture of the thin lacrimal bone and enlargement of bony ostium were done as in a standard external transcutaneous DCR. A Bowman's lacrimal probe was introduced through the upper canaliculus to tent the lacrimal sac before making the large anterior flap [Fig. 1b]. The redundant posterior flap was excised. A U-shaped incision created a large anterior nasal mucosal flap [Fig. 1c]. Anastomosis of the anterior flaps of sac and nasal mucosa was done with 6/0 polyglactin sutures. None of the patients received any antifibrotic agent or intubation. Conjunctiva was sutured with 6/0 polyglactin sutures, and the lateral canthus was reformed.

Topical antibiotic and steroid was instilled for 1 week. Routine follow-up included visits at 2 weeks and 3, 6, 9, and 12 months after surgery. Endoscopic evaluation of the TDCR ostia could be performed in select patients [Fig. 1d]. Primary outcome measure was anatomical patency on irrigation. Secondary outcome measures were epiphora, new-onset diplopia, aesthetic outcome, and a questionnaire-based health status evaluation. Aesthetic outcome was evaluated by an independent observer by grading the conjunctival scar (Grade 0 - invisible on eyelid eversion, Grade 1 - visible with eyelid eversion, Grade 2 - visible without eyelid eversion, and Grade 3 - disfiguring scar), lateral canthal scar (Grade 0 - invisible, Grade 1 - minimally visible, Grade 2 - moderately visible, and Grade 3 - disfiguring scar), and medial fat pad disturbance (Grade 0 - no disturbance, Grade 1 - minimal puffiness, Grade 2 - moderate puffiness, and Grade 3 - severe puffiness) from high-resolution 45° profile digital photographs of the face taken 1 month after surgery or later. The operated side was compared with the contralateral side in patients after unilateral TDCR. Both operated sides were independently graded in one case with bilateral TDCR. A questionnaire-based evaluation of the health status (EQ-5L-3D) before and after TDCR was done by the independent observer.[7] Patients were asked to grade the degree of difficulty (no difficulty/some difficulty/extreme difficulty) in mobility, self-care, usual activities, pain/discomfort, and anxiety/depression before and after TDCR. An overall health status was assessed on a scale of 0–100 (0 - worst imaginable and 100 - best imaginable) at the final visit.

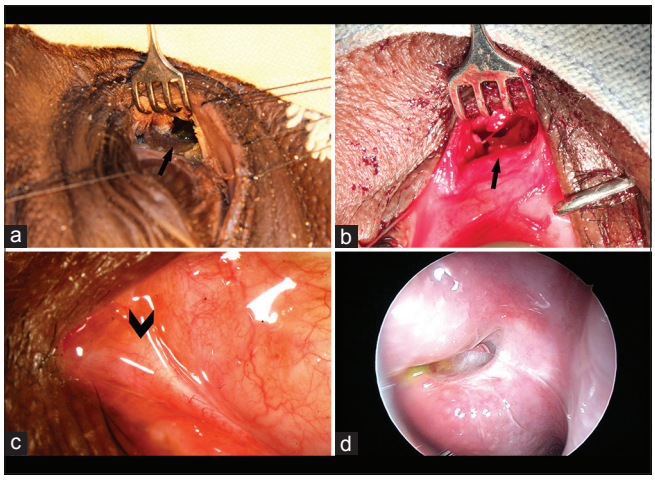

Figure 1: (a) Photograph shows the inferomedial fornix incision for transconjunctival dacryocystorhinostomy in a cadaver. Black arrow shows the ostium with the anterior flap anastomosis. (b) Same inferomedial fornix incision in a 45-year-old male shows the anterior lacrimal sac flap overlying the Bowman's lacrimal probe (black arrow). (c) Slit-lamp photograph under diffuse illumination shows a linear conjunctival scar (arrowhead) at the site 4 months after transconjunctival dacryocystorhinostomy. (d) Endoscopic photograph of the transconjunctival dacryocystorhinostomy ostium with fluorescein in a 42-year-old female after transconjunctival dacryocystorhinostomy

Results

A total of 17 patients (18 eyes; 9 females) underwent TDCR and were included in the study. Mean age of the group was 43.9 ± 11.8 (range, 28–75) years. Mean duration of epiphora was 16 months, and all except one patient had regurgitation of purulent material on the application of pressure over lacrimal sac region.

In cadaveric eyes, TDCR was difficult because of the taut skin. A lateral canthotomy and cantholysis was performed. After swinging the lower eyelid, an inferomedial conjunctival fornix incision was made. Retraction of the medial fat pad and inferior oblique muscle was done to expose the anterior lacrimal crest, and TDCR performed [Fig. 1a].

In patients, TDCR could be successfully performed in 15/18 (82.7%) eyes. All surgeries were performed under local anesthesia, and mucosal anastomosis of anterior flaps was achieved in all patients. Mean duration of surgery was 52.6 (range, 29–110) min, and none of the patients had mitomycin C application or bicanalicular intubation. Surgical approach was converted to standard external transcutaneous DCR in two patients because of anteriorly placed ethmoid air cells. A small fibrosed lacrimal sac necessitated conversion to transcutaneous dacryocystectomy (DCT) in one patient. Both patients after transcutaneous DCR were asymptomatic and had patent fistula on irrigation was present at the final follow-up. The patient who underwent DCT had continued epiphora at 1 month but declined further intervention. One patient developed a lateral canthal granuloma which needed excision in minor surgical setting.

Among those who successfully underwent TDCR [Table 1], anatomical patency and relief from epiphora was achieved in all (15/15; 100%) eyes at median follow-up of 15.5 (range, 1–27) months. No patient had diplopia either immediately after surgery or at the final follow-up visit. Aesthetic outcome was evaluated in eight patients who had high-resolution digital photographs of the face taken at 45° profile. The scars at the lateral canthus, conjunctival fornix, and disturbance if any of the medial fat pad in ipsilateral lower eyelid were compared with the contralateral eye. The surgical scar at the conjunctival fornix was visible only on eyelid eversion (Grade 1) in all, and the scar at the lateral canthus was invisible (Grade 0) in all

Table 1: Demographics and outcome of swinging eyelid dacryocystorhinostomy

Age (years)	Sex	Diagnosis	Aesthetic outcome (grade)			Final anatomical outcome	Follow-up (months)	Complication
			Conjunctival scar	Lateral canthal scar	Medial fat disturbance			
55	Female	PANDO	Grade 1	Grade 1	Grade 0	Patent	28	
59	Female	PANDO	NA	NA	NA	Patent	4	
41	Female	Mucocele	Grade 1	Grade 0	Grade 0	Patent	27	
33	Male	PANDO	NA	NA	NA	Patent	29	
45	Male	PANDO	Grade 1	Grade 0	Grade 0	Patent	26	
75	Male	PANDO	NA	NA	NA	NA	27	Converted to DCT
40	Female	PANDO	Grade 1	Grade 0	Grade 0	Patent	17	
40	Female	PANDO	NA	NA	NA	Patent	1.5	Converted to DCR
45	Male	PANDO	Grade 1	Grade 0	Grade 0	Patent	12	
39	Male	PANDO	NA	NA	NA	Patent	26	
42	Female	PANDO	Grade 1	Grade 0	Grade 0	Patent	16	
42	Female	PANDO	Grade 1	Grade 0	Grade 0	Patent	15	
65	Male	PANDO	NA	NA	NA	Patent	16	Lateral canthal granuloma
40	Female	PANDO	NA	NA	NA	Patent	1	Converted to DCR
35	Female	PANDO	NA	NA	NA	Patent	15	
32	Male	SALDO	NA	NA	NA	Patent	3	
35	Male	PANDO	NA	NA	NA	Patent	1	
28	Male	PANDO	Grade 1	Grade 0	Grade 0	Patent	1	

PANDO: Primary acquired nasolacrimal duct obstruction, SALDO: Secondary acquired nasolacrimal duct obstruction, DCR: Dacryocystorhinostomy, DCT: Dacryocystectomy, NA: Not available

except one patient. None showed a disturbance of medial fat pad in lower eyelid (Grade 0).

Nine patients completed the health status questionnaire (EQ-5D-3L) in local language before and after TDCR. An improvement (moderate to no difficulty) in mobility, self-care, usual activities, and pain/discomfort was found in all patients. This was most marked (extreme difficulty to none) in the anxiety levels before and after TDCR. Overall health status score was 61% before surgery and improved to 88% after TDCR.

Discussion

Aesthetic approaches to DCR may hold promise in patients keen to undergo the procedure without a visible scar at the medial canthus. Endonasal DCR offers comparable outcome without a scar but is yet to have wide popularity among ophthalmologists owing to their poor familiarity with nasal anatomy and the need for expensive equipment.[1,4] Transconjunctival/retrocaruncular approaches to external DCR offer promise, especially in young patients who are keen to avoid a visible scar.[3-6] These techniques involve surgery at a site familiar to most ophthalmologists. TDCR was feasible in our population with conventional instruments under local anesthesia. Mucosal anastomosis without bicanalicular intubation gave an excellent anatomical and aesthetic outcome at a median follow-up of 15.5 months.

Surgical techniques alternative to standard transcutaneous external DCR have been described in the literature.[3,5] Kaynak-Hekimhan and Yilmaz acknowledge that the technique is difficult in taut eyelids owing to a narrow surgical field.[5,6] This is significant as TDCR offers promise in young patients who are more likely to have taut eyelids. They reported prolapse of fat in 20% of patients which needed conversion to transcutaneous surgery. One of our concerns was possibility of diplopia as the surgical site was in proximity to origin of inferior oblique muscle.[8] Our modification to the described surgical technique consisted of a lateral canthotomy with cantholysis.[4] This was primarily done to overcome the inherent tone in the eyelid and allow adequate retraction of the medial fat pad and inferior oblique muscle and hence the technique is akin to swinging eyelid orbitotomy.[8] Lateral canthus is reformed at the conclusion of the procedure. The resulting scar at lateral canthus in our patients was faint as it aligned well with facial skin tension lines of Langer and gave an excellent cosmetic outcome [Fig. 2a-e]. The conjunctival scar at the inferomedial fornix was visible only after eyelid eversion in all patients. In contrast to reports by Kaynak-Hekimhan and Yilmaz and Adenis and Robert, TDCR was performed under local anesthesia in all patients, and none received adjuvants such as mitomycin C and bicanalicular intubation.[3,4]

Excellent anatomical and functional outcome was achieved in all patients who underwent TDCR. This was better than the outcome in series reported by Adenis and Robert (82%) and comparable to Kaynak-Hekimhan and Yilmaz (92.6%).[3-6] The average follow-up of patients in the series reported by Adenis and Robert was only 2.8 months compared to 24 months for Kaynak-Hekimhan and Yilmaz and 15.5 months in our series [Table 2]. A high success rate in DCR is attributed to mucosal anastomosis which heals by primary intention.[9] In the series reported by Kaynak-Hekimhan and Yilmaz, anastomosis of anterior and posterior flap was done in 58% (19/33) of patients.[5,6] In our series, anastomosis of the anterior flap of lacrimal sac and nasal mucosa was done without bicanalicular intubation in all cases with excellent outcome. Owing

Table 2: Outcome in retrocaruncular and transconjunctival DCR technique

Series (Year)	DCR Technique; No of eyes; [Conversion ratio*(CR)]	Mean Duration of Surgery (Range) in minutes	Outcome Patency	Average Follow up (months)	Complications
Adenis (2003)	Retrocaruncular DCR; *n*=11 (CR=1/10)	-	9/11 (82%)	2.8	Failure - 20%, Conversion - 10%
Kaynak (2011 and 2014)	Transconjunctival DCR with Intubation; *n*=33 (CR=6/33)	65 (45-125)	25/27 (92.6%)	24	Ecchymosis - 45%, Conversion - 18%, Failure - 7.4%, Granuloma – 7.4%, Fat Prolapse - 12%, Canalicular laceration -5%
Current series (2015)	Modified Transconjunctival DCR; *n*=17 (CR=3/18)	52.6 (29-110)	15/15 (100%)	11	Conversion - 18%, Granuloma - 5%

*Conversion ratio: Number of patients when difficulty in technique forced conversion to external transcutaneous DCR

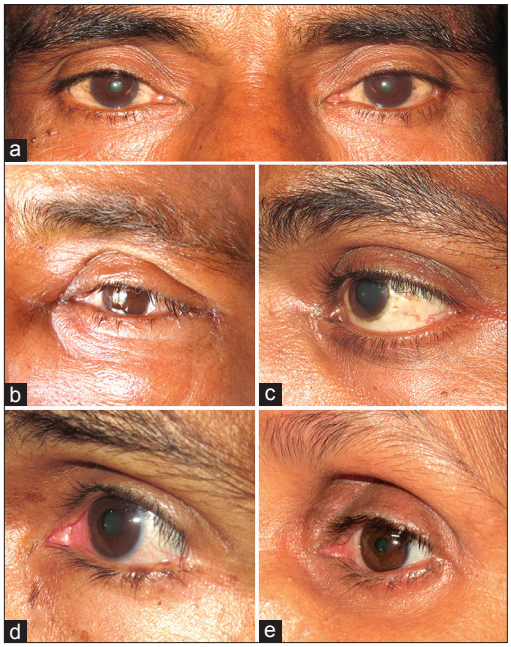

Figure 2: (a) Photograph of the face of a 45-year-old male (case 5) at 1 year after left transconjunctival dacryocystorhinostomy shows excellent cosmetic outcome. (b) Same patient as above on the 1st postoperative day shows mild edema of the eyelids and 6/0 polyglactin sutures at the lateral canthus. (c and d) Forty-five-degree profile photographs of the face of patients at their final visit show no disturbance of medial fat pad at the final visit and an acceptable scar at the lateral canthus. (e) Forty-five-degree profile photographs of the face of a 42-year-old female show deep set eyes with acceptable cosmesis. This patient underwent bilateral transconjunctival dacryocystorhinostomy

to a narrow and deep surgical site in TDCR, we believe anastomosis of anterior flaps may be sufficient and easier to achieve than both anterior and posterior flap anastomosis. Several authors have previously reported that anastomosis of the posterior flaps does not seem to enhance the outcome in external DCR.[9-14]

Complications faced with TDCR could be attributed to the deep and narrow surgical field at surgery. Conversion to external transcutaneous DCR was comparable in TDCR and that reported by Kaynak-Hekimhan and Yilmaz.[5,6] Kaynak-Hekimhan and Yilmaz found conversions were fewer over time and attributed this to the learning curve. We believe TDCR may, therefore, be offered as an aesthetic alternative in patients with primary NLDO who are keen to avoid a surgical scar. However, they must be counseled of a one in five chances of conversion to external transcutaneous DCR. Other complications reported in the series by Kaynak-Hekimhan and Yilmaz include ecchymosis of the eyelids in 45%, orbital fat prolapse in 12%, and eyelid marginal laceration in 3.7% eyes.[5,6] Orbital fat prolapse and eyelid/canalicular laceration were not seen after TDCR. This may be attributed to a relatively better exposure of the surgical site in TDCR.

Limitations of the current study are primarily related to the small study population. This report demonstrates that TDCR has an excellent anatomical and aesthetic outcome in our population. Health questionnaire-based evaluation showed maximum benefit in anxiety levels before and after TDCR with corresponding improvement in the overall health status. Future large prospective studies are warranted to prove the long-term benefits.

Acknowledgment

The Odia version of the EuroQOL-5D is available at www.euroqol.org/eq-5d-products/eq-5d-3l.html. This version has been tested and validated in the local population by Tripathy *et al*.[7]

Financial support and sponsorship

The study was financially supported by Hyderabad Eye Research Foundation.

Conflicts of interest

There are no conflicts of interest.

References

1. Dolman PJ. Comparison of external dacryocystorhinostomy with nonlaser endonasal dacryocystorhinostomy. Ophthalmology 2003;110:78-84.
2. Preechawai P. Results of nonendoscopic endonasal dacryocystorhinostomy. Clin Ophthalmol 2012;6:1297-301.
3. Adenis JP, Robert PY. Retrocaruncular approach to the medial orbit for dacryocystorhinostomy. Graefes Arch Clin Exp Ophthalmol 2003;241:725-9.

4. Dave TV, Javed Ali M, Sravani P, Naik MN. Subciliary incision for external dacryocystorhinostomy. Ophthal Plast Reconstr Surg 2012;28:341-5.
5. Kaynak-Hekimhan P, Yilmaz OF. Transconjunctival dacryocystorhinostomy: Scarless surgery without endoscope and laser assistance. Ophthal Plast Reconstr Surg 2011;27:206-10.
6. Kaynak P, Ozturker C, Karabulut G, Celik B, Yilmaz OF, Demirok A. Transconjunctival dacryocystorhinostomy: Long term results. Saudi J Ophthalmol 2014;28:61-5.
7. Tripathy S, Hansda U, Seth N, Rath S, Rao PB, Mishra TS, *et al.* Validation of the EuroQol five-dimensions – Three-level quality of life instrument in a classical Indian language (Odia) and its use to assess quality of life and health status of cancer patients in Eastern India. Indian J Palliat Care 2015;21:282-8.
8. Paridaens D, Lie A, Grootendorst RJ, van den Bosch WA. Efficacy and side effects of 'swinging eyelid' orbital decompression in Graves' orbitopathy: A proposal for standardized evaluation of diplopia. Eye (Lond) 2006;20:154-62.
9. Tsirbas A, Wormald PJ. Endonasal dacryocystorhinostomy with mucosal flaps. Am J Ophthalmol 2003;135:76-83.
10. Bukhari AA. Meta-analysis of the effect of posterior mucosal flap anastomosis in primary external dacryocystorhinostomy. Clin Ophthalmol 2013;7:2281-5.
11. Katuwal S, Aujla JS, Limbu B, Saiju R, Ruit S. External dacryocystorhinostomy: Do we really need to repair the posterior flap? Orbit 2013;32:102-6.
12. Türkcü FM, Oner V, Tas M, Alakus F, Iscan Y. Anastomosis of both posterior and anterior flaps or only anterior flaps in external dacryocystorhinostomy. Orbit 2012;31:383-5.
13. Pandya VB, Lee S, Benger R, Danks JJ, Kourt G, Martin PA, *et al.* The role of mucosal flaps in external dacryocystorhinostomy. Orbit 2010;29:324-7.
14. Serin D, Alagöz G, Karsloglu S, Celebi S, Kükner S. External dacryocystorhinostomy: Double-flap anastomosis or excision of the posterior flaps? Ophthal Plast Reconstr Surg 2007;23:28-31.