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Research Article

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External vs. Endonasal Endoscopic Dacryocystorhinostomy: Surgical Success and Patient Satisfaction

Rasaily S*, Limbu B and Saiju R

Rapti Eye Hospital, Dang, Nepal

***Corresponding author:** Suresh Rasaily, Rapti Eye Hospital, Dang, Nepal, E-mail: srasaly@gmail.com

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Abstract

Introduction: The aim of study was to compare and analyze surgical success and patient satisfaction in doing external dacryocystorhinostomy and endonasal endoscopic dacryocystorhinostomy for the management of primary acquired nasolacrimal duct obstruction at tertiary care referral hospital in Kathmandu, Nepal.

Methods: Hospital based prospective, comparative, non-randomized, interventional study. A total of 70 patients, 36 patients (36 eyes) in external DCR group and 34 patients (36 eyes) in endoscopic DCR group, diagnosed as primary nasolacrimal duct obstruction (PANDO) meeting inclusion criteria were enrolled in the study from 1st June 2015 to 30 May 2016 with additional 6 months and consecutive six months follow up were observed for all patients. Postoperative symptomatic improvement and patency of lacrimal passage on syringing were analysed in each follow up. The success was defined by both symptomatic improvement and patent lacrimal passage on syringing at 6 months after surgery. Intraoperative and postoperative complications were also evaluated. Patient satisfaction and quality of life were analysed using Glasgow Benefit Inventory Questionnaire. Statistical analysis was done using IBM SPSS 21 version software programme. The p-value<0.05 was considered statistically significant.

Results: Total of 72 DCR surgeries (36 in each group) were performed in 70 primary NLDO patients including 2 bilateral endoscopic DCR. Mean age of presentation in external DCR was 45.17 years ± 6.05 SD (range, 21–61 years) whereas in endoscopic DCR group was 31.28 years ± 10.54 SD (range, 15-41 years). Female preponderance was seen in both groups (F: M=27: 9 in Ex-DCR group and 28:6 in En-DCR). Overall, success rate is 95.83% (n=69 out of 72). Intergroup success rate was almost similar in both groups (Ex-DCR 35/36, 97.22% and En-DCR 34/36, 94.44% and p value=1.00). The mean total score from GBI was 46.60 ± 10.61 (95% CI, 22.22-75) and 62.89 ± 18.03 (95% CI, 22.22-91.67) in Ex-DCR and En-DCR groups respectively, p value<0.001. The mean general subscale score was 44.33 ± 13.33 (95% CI, 12.50-70.83) in Ex-DCR group and 63.77 ± 19.33(95% CI, 12.50-95.83) in En-DCR group and P-value<0.001. Social support subscale was 46.76 ± 11.14 (95% CI, 0-66.67) in Ex-DCR and 49.54 ± 18.03 (95% CI, 0-83.33) in En-DCR group and p-value=0.276. Physical health subscale score was 56.48 ± 15.57(95% CI, 50-100) in Ex-DCR group and 74.54 ± 14.95 (95% CI, -66.67-100) in En-DCR p-value<0. 001. The commonest intraoperative and post-operative complication was bleeding in both groups. However, intra-operative complication rate (En-DCR, 12 (33.33%, Ex-DCR 3 (8.33%) and p-value=0.01 and postoperative complication rate (En-DCR, 11 (30.66%), Ex-DCR 19 (52.78%) p-value=0.06.

Conclusion: Surgical success rate is almost comparable in both groups. Endoscopic DCR was found to have higher intraoperative complication but minimal post-operative complication compared to external DCR. Endoscopic DCR was found to have better patient satisfaction compared to external DCR.

Keywords: External dacryocystorhinostomy; Endonasal dacryocystorhinostomy; Success; Failure; Complication

Introduction

Under normal circumstances, the quantity of tears secreted should equal the quantity eliminated [1]. Epiphora, an overflow of tears from the eye due to imperfect drainage through the lacrimal passage, is a common annoying symptom, embarrassing the patient both socially and functionally. Nasolacrimal duct obstruction (NLDO), being one of the commonest causes of epiphora, occurs mostly at junction of lacrimal sac and nasolacrimal duct or within the bony nasolacrimal duct. Chronic inflammation leading to fibrosis and stricture is the commonest reason for the block. Retention of mucoid secretion and tears within the sac lead to frequent, recurrent inflammation and infection known as dacryocystitis [2]. Dacryocystorhinostomy (DCR) is the definitive treatment for nasolacrimal duct obstruction (NLDO). It restores patency to the lacrimal outflow system and may be performed using an external or endonasal approach. External DCR (EX-DCR) surgery was first described by Toti in 1904 and further refined in 1920 Dupuy-Dutemps and Bourget. The external DCR has remained largely unchanged since and has remained the gold standard in regard to its high success rates, rapid primary intention healing due to the suturing of mucosal flaps, and low equipment costs [3]. The presence of a cutaneous scar, potential for injury to medial canthal structures, orbicularis oculi and functional interferences with the physiological action of lacrimal pump are few disadvantages of this procedure.

The endonasal approach was introduced in 1893 by Caldwell and modified by West in 1910 and Halle in 1914. With advent of nasal endoscope by Stammberger in 1986 and functional endoscopic sinus surgery in early 1990s, there was renewed interest in endonasal DCR. In 1989, McDonough and Meiring pioneered the use of rigid endoscopes in DCR surgery, vastly improving endonasal visualization [4]. Advancement of endoscopic endonasal DCR (EE-DCR) results in limited invasiveness, less intra-operative bleeding, reduced operative time, preservation of pump function of the orbicularis oculi muscle, lack of external scar in face, shorter postoperative recovery and low complication rate. It also allows one stage procedure to correct associated nasal pathology and can be performed in cases of acute dacryocystitis. Disadvantages of this technique include lower reported success rates, the need for additional endoscopic surgical training, and higher equipment requirements and costs associated with the procedure [5-7]. Intra-operative complications include hemorrhage, damage or trauma to nasal mucosal flap or loss of nasal mucosal flap, cerebrospinal fluid leak and orbital structures damage. The overall success of any surgical intervention cannot be obtained from measures

of technical success alone and changes in patient quality of life resulting from the intervention must also be considered. In the context of Nepal, EE-DCR is new concept and to our knowledge no similar studies have been carried out so far comparing success rates, patient satisfaction. Despite the fact that NLD obstruction is relatively common problem in Nepalese population, there is no clear consensus on choice of type of surgery. So, this is the reason to conduct this particular study.

Patients and Methods

After obtaining approval from institutional review board of hospital, patients fulfilling inclusion criteria were grouped into two groups, group 1(Ex-DCR) and group 2 (En-DCR) in convenient sampling technique. Patients with previous DCR surgery done elsewhere, eyelid anomaly or abnormality, canalicular or common canalicular obstruction, congenital NLDO, suspected malignancy of lacrimal system, acute lacrimal passage inflammation (e.g. canaliculitis, acute dacryocystitis, lacrimal abscess), history of radiation therapy, posttraumatic cases, lacrimal pump failure and partial NLDO, and those who missed any stage of follow-up till up to postoperative 6 months, were excluded from present study. Detailed record of each patient that included patient's demographic profile, ocular history, pre-operative work up comprising of complete ocular and nasal cavity examination. The choice of type of surgery (Ex-DCR or En-DCR), was based on patient's preference. Surgical-outcomes were determined at six-month follow-up. Surgical success was defined by patient's resolution of symptoms with patency on irrigation at six months after surgery. Surgical failure was defined as no symptomatic reduction in epiphora and/or an inability to irrigate the lacrimal system postoperatively at six months after surgery [8]. Dye disappearance test was done 6 months after surgery. Wound scar in case of external DCR was noted. Patient satisfaction and quality of life were evaluated based on a standardized questionnaire (Glasgow Benefit Inventory, GBI) [9]. An interview based on GBI questionnaire was taken from each post-operative case from both groups on six-month follow-up. Telephone interview based on GBI questionnaire was taken from most of patients residing out of Kathmandu valley. The GBI contains 18 changes in health status questions which assess how the intervention has altered the quality of life of the person. The response to each question was based on a five-point Likert scale ranging from a large deterioration in health status through to a large improvement in health status. The GBI questionnaire was scored into a total score and also 3 subscales: -a general subscale, (12 questions), a social support subscale, (3 questions), and a physical health subscale, (3 questions). All these scores ranged from −100 to +100. A score of 1 is given to the answer with the worst change in health status and 5 to the answer with the best change in health status. Total score, the general subscale score, Social support score and Physical health score were calculated for each case by using following method.

Total score

- Sum all the responses (Qu. 1-18)
- Divide by 18 (to obtain an average response score)
- Subtract 3 from the average response score
- Multiply by 50.

General subscale score

- Sum 12 of the responses (Qu. 1,2,3,4,5,6,9,10,14,16,17 and 18)
- Divide by 12 (to obtain an average response score)
- Subtract 3 from the average response score
- Multiply by 50.

Social support score

- Sum 3 of the responses (Qu. 7,11,15)
- Divide by 3(to obtain an average response score)
- Subtract 3 from the average response score
- Multiply by 50.

Physical health score

- Sum 3 of the responses (Qu. 8,12,13)
- Divide by 3(to obtain an average response score)
- Subtract 3 from the average response score
- Multiply by 50

Technique of surgery

External DCR: Surgeries were performed under local anesthesia and endoscopic DCR surgeries were performed under general anesthesia. Preoperatively, all the patients were screened for systemic disorders (such as, diabetes, hypertension, bleeding disorders, HIV, Hepatitis B and C), and blood thinners (anticoagulants, low dose aspirin) were discontinued 5 days before surgery for patients taking such medicines. Ex-DCR: Routine standard Ex-DCR surgery was performed in all the cases. Infraorbital, anterior ethmoidal nerve block and local infiltration at incision site using 2% Lidocaine with Adrenaline 1: 100,000 and 0.5% Bupivacaine was done. Nasal packing with gauge ribbon soaked in 4% Lidocaine with Adrenline 1:100,000 and Oxymetazoline 0.05% was done. During surgery special attention was given on adequate hemostasis, minimal use of sharp instrument, careful blunt dissection respecting the anatomical planes with least disruption of anatomical structure(s), and creation of at least 1.5 cm × 1.5 cm bony ostium was targeted. In all the cases, medial canthal tendon (MCT) was not severed, anterior flaps were sutured. The orbicularis was closed with vicryl 6-0 and an interrupted skin suture was given with vicryl 6-0. Nasal packing with ribbon gauge soaked in 4% Lidocaine with Adrenline 1:100,000 and Oxymetazoline 0.05% was done. Wound was covered with steristrip.

Endoscopic DCR: Nasal packing with ribbon gauge soaked in 4% Lidocaine with Adrenaline 1:100,000 and Oxymetazoline 0.05% was done for at least five minutes. A bowman probe was inserted through the upper punctum and the common canaliculus into the lacrimal sac and was pricked through the lacrimal bone bringing it out from the sac through the mucosa of the lateral wall of the nasal cavity anterior to the middle turbinate. A local infiltration with 2% Lidocaine with Adrenaline 1:100,000 and 0.5% Bupivacaine above and anterior to middle turbinate was given. A C-shaped nasal flap was created for exposing frontal process of maxilla. The frontal process of maxillary bone and thin lacrimal bone was removed to a create bony ostium of about 15 mm × 15 mm with a Kerrison rongeur of size 2 mm, 3 mm and oscillating diamond burr respectively. Lateral wall of lacrimal sac was opened and widened with sickle blade with radial incisions superiorly and inferiorly. A Silicon tube was intubated from the upper and lower puncta and fixed onto the nasal mucosa near the nostril with a 5-0 polypropylene. A gel foam pack was applied to the lacrimal sac ostium. One ml of 40 mg triamcinolone acetonide was injected to the gel foam.

Oral antibiotics, analgesic and chymoral Fort were given to patients on same day of operation. Each post operated case was advised to

elevate head while sleeping, avoid nose blowing, hard food. The cases were followed up at postoperative day one, one week, six weeks, three months, and six months. Saline syringing was done at all follow up visits, in both the groups. Stitches were removed at 1 week after Ex-DCR surgery. Bicanalicular silicon tube was removed at 3 months 'follow-up. Surgical-outcomes was determined at six-month follow-up. Dye disappearance test was done 6 months after surgery. Statistical analysis was performed using IBM SSPS software version 21.0 (IBM, USA), to compare the numerical variables. Chi-square (χ^2), Mann Whitney test and Fisher's exact test (FT) were performed wherever applicable. P value<0.05, were considered statistically significant.

Results

A total of 70 patients were enrolled in the study. If fellow eye of enrolled patient was also affected then it was also operated during study period and was also included in the study. This study showed that NLD obstruction is more common with age group 26-45 years. Female constituted 78.57% and male 21.42% with male: female ratio of 1:3.6. In Ex-DCR group, there were total 36 patients (F:M=27:9), in En-DCR group total 34 patients (F:M=28:6). This intergroup gender ratio difference, was statistically insignificant (p=0.21; χ^2). Mean age for Ex-DCR was 45.17 ± 16.05 (SD) whilst mean age for En-DCR was 31.28 ± 10.53 (SD). This difference was found to be statistically significant (p<0.001; Mann-Whitney U test) Overall success rate after 6 months of surgery for External DCR is 97.22% and that of Endoscopic DCR is 94.44% (Table 1), intergroup success rate is statistically not significant (p value>0.05, Fisher's exact test)

Mean total score from GBI in external DCR group was 46.60 ± 10.61 (95% CI, 22.22-75), mean general subscale score was 44.33 ± 13.33(95% CI, 12.50-70.83), social support subscale was 46.76 ± 11.14 (95% CI, 0-66.67), physical health subscale score was 56.48 ± 15.57(95% CI, 50-100). Whereas in Endoscopic DCR group, mean total score from GBI was 62.89 ± 18.03 (95% CI, 22.22-91.67), mean general subscale score was 63.77 ± 19.33(95% CI, 12.50-95.83), mean social support subscale score was 49.54 ± 18.03 (95% CI,0-83.33) and physical health subscale score was 74.54 ± 14.95 (95% CI,-66.67-100). The difference in mean total score, general subscale score, and physical health score in between the two groups is statistically significant p-value<0.001 whereas the difference in mean social support score is statistically not significant p-value>0.05 (Table 2).

Classification	**External DCR (Group 1)**		**Endonasal DCR (Group 2)**	
	No of patients	**%**	**No of patients**	**%**
Surgical success	35	97.22	34	94.44
Surgical failure	1	2.78	2	5.56
Total	36	100	36	100

Table 1: Surgical outcomes in both groups.

GBI scoring scale	External DCR		Endonasal DCR		p-value
	Mean (SD)	**95%CI(Range)**	**Mean (SD)**	**95%CI(Range)**	
GBI Total	46.60(10.610	22.22-75	62.89(18.03)	22.22-91.67	<0.001a
General score	44.33(13.33)	12.50-70.83	63.77(19.33)	12.50-95.83	<0.001a
Social support	46.76(11.14)	0-66.67	49.54(18.03)	0-83.3	0.276b
Physical health	56.48(15.57)	50-100	74.54(34.84)	-166.67	0.001b

Table 2: Glasgow Benefit Inventory (GBI) Scoring.

Discussion

The presenting study showed that most of patients were in both age group 26-35 (25.71%) years and

36-45 years (25. 71%). This indicates that acquired nasolacrimal duct obstruction is more common in middle age group. There is a declining trend towards both extremes of age. This may be due to the fact that amount of lacrimal secretion is less in extremes of ages [10]. We observed majority of the younger population preferring En-DCR over Ex-DCR. This was possibly because of the comfort of surgery, lesser hours of stay at the hospital, and devoid of ugly scar formation. Out of 70 patients, 55 (78.57%) were female and 15 (21.42%) were male and ratio was 3.6:1, which was similar to other studies Iliff[10] 199610. Duwal et al. [11]. Surgical success in our study was 97.22% in Ex-DCR (n=35), and 94.44% in En-DCR (n=34). Cokkeser et al. [5] reported the success rate of external and endoscopic DCR to be 89.8% and 88.2% respectively. Goel et al. [12] in their study found full success rate of 95% and 90.9% for external DCR and endoscopic DCR respectively with no statistically significant difference, whereas partial success rate of 4.55% for endonasal DCR. Duwal et al. [11] in their comparative study reported surgical success rate of 94.1% and 90.3% for external and endoscopic DCR group respectively. Dasgupta et al. [13] in their comparative study reported surgical success rate of 94.54% in EX-DCR (n=52), and 91.07% in EN-DCR (n=51) which is similar to our study.

In this study, we aimed to compare patient's satisfaction in two groups using the Glasgow Benefit Inventory (GBI). From the 36 questionnaires in each group analyzed, the mean total score from the GBI in external DCR group was 46.60 ± 10.61 (95% CI, 22.22-75) whereas in endoscopic DCR group was 62.89 ± 18.03 (95% CI, 22.22-91.67). The difference of 16.29 in between external and endoscopic groups reached statistical significance p-value<0.001(Independent samples T test was used), suggesting that although both operations produce positive post-interventional change in health status, the difference between two procedures is statistically significant. The general subscale score in external DCR was 44.33 ± 13.33 (95% CI, 12.50-70.83), whereas in endoscopic DCR group was 63.77 ± 19.33 (95% CI, 12.50-95.83), the difference in two groups was statistically significant p-value<0.001. Social support scale in external DCR group resulted in a mean of 46.76 ± 11.14 (95% CI, 0-66.67), whereas in endoscopic DCR group resulted in a mean of, 49.54 ± 18.03 (95% CI, 0-83.33), the difference in two group was statistically not significant p-value>0.05 (Mann Whitney test was used). Similarly, physical health score in external DCR group was 56.48 ± 15.57 (95% CI, 50-100), whereas in endoscopic DCR group was 74.54 ± 14.95 (95% CI, -66.67-100), the difference between two groups is statistically significant p-value<0.001 (Mann Whitney test was used). Although both operations produce positive post interventional change in social

support subscale and physical health subscale, the difference between two is not significant. Hii et al. [14] have prospectively evaluated adults treated with external or EE-DCR, analyzing patient satisfaction with the GBI. The questionnaire was posted 6 weeks postoperatively and the mean GBI scores were +16.1 and +24.1, respectively. The difference of 8 between the scores did not reach statistical significance, suggesting that although both operations produce positive post interventional change in health status, the difference between both is negligible.

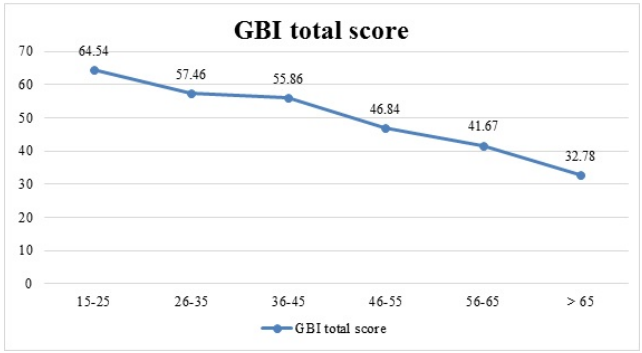

Figure 1: Mean GBI total score distribution by age group.

In our study, young age group 15-25 had highest mean GBI total score of 64.54(SD 17.02) whereas in age group>65 had 32.78(SD 7.95) (Figure 1). The younger patients had improved general perception of well-being compared with older patients. This is a consistent finding in the literature. Tripathi et al. [15] showed a statistical correlation between complete resolution 12 month post endoscopic laser DCR (EL-DCR) in 46 patients and the younger the age of the patient. Tarbet and Custer [16] found that 62% of all patients with patent DCR's to irrigation still had persistent epiphora clinically. Furthermore, Delaney et al. [17] described only 38% of patients with patent DCRs clinically classed themselves as completely asymptomatic through questionnaire.

Conclusions

This study showed that NLD obstruction is more common with age group 26-45 years. Female constituted 78.57% and male 21.42% with male: female ratio of 1:3.6. External DCR was found to have success rate of 97.22% and endoscopic DCR with comparable success rate of 94.44%. However endoscopic DCR was found to have minimal complication rate 11 (30.56%) compared to external DCR 19 (52.78%). Endoscopic DCR was found to have better patient satisfaction compared to external DCR. The mean total score from GBI in Endoscopic DCR was 62.89 ± 18.03 (95% CI, 22.22-91.67) and that of external DCR was 46.60 ± 10.61 (95% CI, 22.22-75).

Limitations

This is non-randomized study and consists of small sample size of 70 patients (72 eyes) only. This study has short follow up duration of 6 months only. There was no further investigation for cause of failure in both groups

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