A Comparative Study between Endoscopic Dacryocystorhinostomy and External Dacryocystorhinostomy – A Hospital-Based Study

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ABSTRACT

BACKGROUND

Dacryocystorhinostomy (DCR) can be performed via two approaches either external approach or endonasally. Earlier, external approach was preferred but with the recent introduction of endoscopy, the focus has shifted to endoscopic DCR as it is a less invasive procedure. This study was conducted to compare both the approaches.

METHODS

50 patients were selected from patients attending eye and ENT OPD of a medical college in Kolkata with complaints of watering and / or discharge or with other features of chronic dacryocystitis e.g., mucocele, pyocele etc. They were then allocated in to two groups, group A (patients who will undergo endo DCR) and group B (patients who will undergo external DCR). Results of both were compared.

RESULTS

The mean age of study population was 34.34 ± 6.65 yrs. Among the study population, 36 patients (72 %) were female and 14 were male (28 %). Mean age of Group A (i.e. patients subjected to endo DCR) was 34.60 ± 5.72, while that of Group B (patients undergone external DCR) was 34.08 ± 7.58 yrs. Patients had a right sided predilection for DCR operation (66 %). Most common presenting symptom was epiphora (66 %) followed by epiphora with discharge. Mean time taken for the operation was significantly ($p < 0.0001$) more in group B (117 ± 14.43 mins) compared to that in group A (46.60 ± 8.63 mins). Massive intra-operative bleeding was more common in group B (32 %) compared to that in group A ($p = 0.0023$). Group B had a significantly higher rate of post-operative complications (56 %) compared to that in group A ($p = 0.00085$). Group B also had a higher success rate compared to group A; but this difference was not significant. ($p = 0.22144$).

CONCLUSIONS

Both the approaches have their own merits and demerits; but both are accepted alternatives, so either approach could be performed depending on the situation.

KEYWORDS

Endoscopic DCR, External DCR, Epiphora

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BACKGROUND

Obstruction of nasolacrimal duct is manifested by the presence of epiphora and / or recurrent or persistent infection. Dacryocystorhinostomy (DCR) is performed to re-establish normal lacrimal drainage into the nose in patients with obstructed lacrimal drainage system due to various causes. Anatomically the lacrimal passage starts from the domain of ophthalmologists & ends in the realm of otorhinolaryngologists. So DCR operation has generated interest in both EYE & ENT surgeons over the past several years and with the widespread use of nasal endoscopy, endoscopic DCR has gained popularity.

Dacryocystorhinostomy was first described via external approach by Toti and modified by Dupuy Dutemps and Bourguet.[1,2] The first intranasal DCR was described by Caldwell.[3] However the endonasal technique was not successful due to difficulty in visualising the endonasal anatomy. But in last two decades, the development and use of rigid nasal endoscope for various nasal and paranasal surgery has provided the otorhinolaryngologist with unprecedented direct view of nasal anatomy, even allowing the visualisation at angles from direct visual axis. The current study is based on a broad objective to compare experience of endoscopic and external DCR in cases of chronic dacryocystitis secondary to primary post-saccal stenosis.

METHODS

The study was designed prospectively as a non-randomised comparative interventional study. It was conducted over a period of 12 months from January 2017 to December 2017. Patients attending the Ophthalmology and ENT OPD with complaint of watering of eyes along with discharge and with or without a medial canthus mass during this period were examined by an ophthalmologist. Patients with primary chronic dacryocystitis with post-saccal stenosis not bearing any complication were included in the study. All revision cases, with pre-saccal stenosis (common canalicular block, punctal atresia) and with comorbid conditions (malignancy, post traumatic, atrophic rhinitis) were excluded from this study.

A total of 50 patients were included in our study depending on the inclusion and exclusion criteria mentioned. Sample size was predetermined considering availability of resources. After taking detailed history from each and every case, clinical examination was done including anterior rhinoscopy and complete ophthalmological examinations. Level of nasolacrimal duct obstruction was ascertained. Pre-operative diagnosis of level of nasolacrimal duct obstruction was done by probing, syringing test and by Jones test (infusion of fluorescein in the lacrimal canaliculus and observing the stained nasal drainage). In syringing if regurgitation occurs from opposite punctum, it indicates obstruction is present distally but regurgitation from same punctum indicates a canalicular or common canalicular block which is to be confirmed by probing. For probing topical anaesthesia was given to the involved eye and both upper and lower canaliculus was dilated by a punctum dilator. This was followed by introduction of Bowman probe angled medially, if a soft stop was felt then there was a common canalicular block while a hard stop means it was touching the medial wall of the sac so obstruction was present distally. Patients who were suspected of canalicular block by lacrimal syringing were further investigated by dacryocystography and were excluded from the study.

The study population was than allocated in two groups (Group A and Group B) by lottery method. Patients who were allocated in Group A by this method were sent to ENT OT and an ENT surgeon performed endo DCR in these patients while those who were allocated in Group B were taken to the Ophthalmology OT where an Ophthalmologist performed external DCR for relieving their symptoms. Per-operatively a suction container was used to measure amount of bleeding that occurred during each procedure. Both the procedures were done under local anaesthesia except for some uncooperative patients for whom general anaesthesia was given. During post-operative and follow-up period, results of both the procedures were compared to find out if there is any advantage of one over the other.

Endoscopic DCR – A nasal pack soaked in 4 % lignocaine was inserted and kept as such for 15 to 20 mins followed by injecting nasal mucosa with 2 % lignocaine with adrenalin. Nasal mucosal flap was created and elevated. Lower portion of frontal process of maxilla and lacrimal bone removed. After the sac got exposed it was marsupialised by a vertical incision with an upper and a lower releasing incision. Gel-foam was introduced within the tract to maintain its patency.

External DCR – After giving local anaesthesia in the involved side medial to the medial canthus a J shaped incision is given 3 - 4 mm medial to medial canthus, blunt dissection done to reach the MPL, it was disinserted, and periosteum elevated till lamina papyracea which is a thin bone. Osteotomy was done with bone punch and nasal mucosa exposed. Lacrimal sac was inflated with viscoelastic fluid and a flap was made. Nasal mucosa was also incised to form a flap. Nasal mucosal flaps were sutured with sac flap. Wound was closed in step by step manner.

Statistical Analysis

In our study we have depicted all data as actual numbers and percentages. Chi-square test and unpaired t-test were done to find out association between different variables. 95 % confidence level was considered acceptable. P-value less than 0.05 was considered significant. Mean, median and mode were calculated from Microsoft excel. MedCalc software was used for comparison of means. Chi-square calculator of 'Social Science Statistics' website was used.

RESULTS

The mean age of study population was 34.34 ± 6.65 yrs. with a range of 23 yrs. to 50 yrs., median age being 35 yrs. Among them 36 patients (72 %) were female and 14 were male (28 %). Mean age of Group A (i.e., patients subjected

to endo DCR) was 34.60 ± 5.72, ranged from 24 yrs. to 43 yrs., median 35 yrs. While mean age of Group B (patients who underwent external DCR) was 34.08 ± 7.58 yrs. with a range between 23 yrs. to 50 yrs., median 35 yrs. In both the groups 8 patients (32 %) were in age group 20 - 30 yrs. of which 2 were males and 6 females, 12 patients (48 %) in 31 - 40 yrs. age group with 3 males and 9 females and 5 patients (20 %) in 41 - 50 yrs. group comprising of 2 males and 3 females.

In Group A, 16 Patients (64 %) had their DCR done on right side while 9 (36 %) had it on left side while in Group B, 17 patient (68 %) had a right sided DCR while 8 had it on left side (32 %) as a whole our study population had a right sided predilection for DCR operation (66 %). Most common presenting symptom of study population was epiphora (66 %) followed by epiphora with discharge (24 %), mucocele (8 %) and pyocele (2 %). Mean duration of symptoms in Group A was 15.32 ± 2.51 months, ranging from 11 months to 20 months while that in Group B was 15.68 ± 2.30 months with a range from 12 to 20 months. In both group median being 15 months.

	Mean ± SD (mins)	Range (mins)	Median (mins)
Group A (n = 25)	46.60 ± 8.63	30 - 60	50
Group B (n = 25)	117 ± 14.43	90 - 145	120

Table 1. Distribution of Study Population Based on the Mean Time Taken for Surgery in Different Groups

Difference – 70.40, Standard Error – 3.363, 95 % CI – 63.6387 to 77.1613, t-Statistics – 20.935, DF – 48, Significance Level - $p < 0.0001$(Highly Significant)

Table 1 shows that the mean time taken for the operation was more in group B (117 ± 14.43 mins) compared to that in group A (46.60 ± 8.63 mins), which was found to be statistically significant.

	Group A (n = 25)	Group B (n = 25)
Minimum Bleeding	17 (68 %)	5 (20 %)
Moderate Bleeding	6 (24 %)	12 (48 %)
Massive Bleeding	2 (8 %)	8 (32 %)

Table 2. Distribution of Study Population Based on Intra-Operative Bleeding during Surgery in Different Groups

$x^2 = 12.1455$, df = 2, p = .0023, significant

Table 2 shows massive bleeding is more in Group B (32 %) compared to that in group A (8 %) and this difference between the two groups were found to be statistically significant.

	With Complication		Without Complication
Group A (n = 25)	2 (Lid oedema) (8 %)		23 (92 %)
Group B (n = 25)	14 (56 %)	Lid oedema - 6 Lid ecchymosis - 5 Incision site infection - 2 Hypertrophied scar – 1	11 (44 %)

Table 3. Distribution of Study Population Based on Post-Operative Complications in Different Groups

$x^2 = 13.2353$, df = 1, p = .00085, significant

Table 3 shows that Group B is associated with a higher rate of post-operative complications (56 %) compared to that in group A (8 %) and this difference between the groups were found to be statistically significant.

Subjectively a 4-point scale was used to grade the degree of epiphora relief. Grade 1 included those patients who were completely symptom free, Grade 2 and Grade 3 included those patients who had significant and just improvement respectively while Grade 4 were those patients who had no improvement even after operation. Grade 1 to 3 was considered as success while Grade 4 was considered as recurrence or failure.

	Group A (%)	Group B (%)
Grade 1 (Symptom Free)	19 (76)	17 (68)
Grade 2 (Significant Improvement)	2 (8)	4 (16)
Grade 3 (Just Improvement)	1 (4)	2 (8)
Grade 4 (No improvement)	3 (12)	2 (8)

Table 4. Distribution of Study Population Based on Results of Subjective Evaluation at 1 Month in Different Groups

$x^2 = 1.311$, df = 3, p = 0.7264, not significant

Table 4 shows that 76 % patients in Group A i.e. those who are subjected to endo DCR became completely symptom free after one month compared to 68 % of patients in Group B who had an external DCR operation. But this difference was not statistically significant.

	Success (%)	Failure (%)
Group A (n = 25)	22 (88)	3 (12)
Group B (n = 25)	23 (92)	2 (8)

Table 5. Distribution of Study Population on the Basis of Surgical Outcome in Different Groups

$x^2 = 0.6373$, df = 1, p = 0.2222, not significant

Table 5 shows though Group B is associated with a higher success rate (92 %) compared to that in Group A (88 %) this difference was not significant.

DISCUSSION

External DCR was regarded as the gold standard in the treatment of chronic dacryocystitis, but it carries some disadvantages e.g. cutaneous scar, medial canthal structure injury and functional interference with the action of lacrimal pump. Endoscopic DCR has become more popular in recent past due to lack of these disadvantages of external DCR and with equal or even more promising result. Direct inspection of lacrimal sac for underlying pathology can be done in Endoscopic DCR and can be easily converted into external DCR in difficult cases.

This study revealed 66 % of the study population presented with a right sided disease which was in agreement with the finding of Nichlani SS et al.[4] Our study also revealed epiphora as the most common presenting symptom (66 %) which was very close to the finding of Karim et al., (68.2 %) and Sharma et al who similarly found epiphora as the main presenting complaint.[5,6]

In our study we found that the mean duration of external DCR (117 ± 14.43 mins.) was significantly more than that of Endo DCR (46.60 ± 8.63 mins). Authors such as Hartikainen et al., (external DCR – 78 mins and endo DCR – 38 mins.) and Moras et al., (external DCR – 76 mins., endo DCR – 46 mins.) showed similar finding.[7,8]

Per operative bleeding of more than 15 ml was considered massive bleeding in our study which was significantly more common in external DCR (32 %) compared to endoscopic DCR (8 %) in our study. Various studies revealed similar findings e.g. Ozer S et al., reported

intra operative bleeding in 48 % cases of external DCR compared to 4 % of endoscopic DCR.[9] Moras et al. noticed 45 % patients had intra operative bleeding in external DCR whereas 30 % of the patients experienced intra operative bleeding during endoscopic DCR.

The present study revealed post-operative complications (e.g lid ecchymosis, lid oedema, infection or hypertrophy at the incision) were more common with external DCR (56 %) compared to endoscopic DCR (8 %) which was found to be statistically significant. In a study by Saha R et al. it was observed that post-operative complications were more in external DCR (33.3 %) compared to endo DCR.[10] Study done by Moras et al revealed similar finding and showed wound gaping was present in 10 % of the patients who underwent external DCR due to infection at the incisional site.

In present study the result of surgery was evaluated at one month after the procedure, by a subjective 4-point scale based on the degree of relief of epiphora viz. Symptom free, significant improvement, just improvement and no improvement. We found 76 % of patients subjected to endo DCR were completely symptom free (Grade 1) which was more than that of external DCR group, but this association was not statistically significant. We have considered Grade 4 (no improvement) as failure while Grade 1, 2 and 3 (symptom free, significant improvement and just improvement) were considered as success. Thus, we found patients subjected to external DCR had a higher success rate (92 %) compared to endo DCR group (88 %) but this association was also statistically non-significant. This type of evaluation of result of surgery on the basis of subjective response has also been done by Zaidi FH et al in their study where they also found a higher success rate in external DCR.[11] In our study failures in external DCR group (2 cases) were due to rhinostomy closure by extensive granulation in one case and narrow ostium in the other one. Failures observed in endo DCR group (3 cases) were due to granulation tissue formation and synechiae formation.

Various studies showed failure in external DCR was due to excessive granulation at the rhinostomy site and ostium related problems whereas synechiae and fibrosis along with granulation was attributed for failure in endoscopic DCR, which corroborated the findings of present study.[12,13]

CONCLUSIONS

Though DCR done by endoscopic approach has some advantages over external approach i.e. decreased operative time, less post-operative complications, but surgical outcome was marginally better in the latter. Thus, it can be said that both are acceptable alternatives, and choice of surgery should depend on patient's preference, available resources, and surgeon's expertise.

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REFERENCES

[1] Toti A. Nuovo metodo conservatore di cura radicale delle suppurazioni croniche del Sacco lacrimale (dacriocistorinostomia). Clin Mod Pisa 1904;10:385-387.
[2] Dupuy-Dutemps L, Bourguet J. Procede plastique de dacryocystorhinostomie et ses resultats. Ann Ocul J 1921;158:241-246.
[3] Caldwell GW. Two new operations for obstruction of the nasal duct, with preservation of the canaliculi and with an incidental description of a new lacrimal probe. Am J Ophthalmol 1893;10:189-193.
[4] Nichlani SS, Jagade MV, Ganeshan A. A comparative study between endoscopic and external approach dacryocystorhinostomy. Bombay Hosp J 2010;52:189-196.
[5] Karim R, Ghabrial R, Lynch TF, et al. A comparison of external and endoscopic endonasal dacryocystorhinostomy for acquired nasolacrimal duct obstruction. Clin Ophthalmol 2011;5:979-989.
[6] Sharma HR, Sharma AK, Sharma R. Modified external dacryocystorhinostomy in primary acquired nasolacrimal duct obstruction. J Clin Diagn Res 2015;9(10):NC01-NC05.
[7] Hartikainen J, Antila J, Varpula M, et al. Prospective randomized comparison of endonasal endoscopic dacryocystorhinostomy and external dacryocystorhinostomy. Laryngoscope 1998;108(12):1861-1866.
[8] Moras K, Bhat M, Shreyas CS, et al. External dacryocystorhinostomy versus endoscopic dacryocystorhinostomy: a comparison. J Clin Diagn Res 2011;5(2):182-186.
[9] Ozer S, Ozer PA. Endoscopic vs. external dacryocystorhinostomy-comparison from the patients' aspect. Int J Ophthalmol 2014;7(4):689-696.
[10] Saha R, Sinha A, Phukan JP. Endoscopic versus external approach dacryocystorhinostomy: a comparative analysis. Niger Med J 2013;54(3):165-169.
[11] Zaidi F, Symanski S, Olver J. A clinical trial of endoscopic vs. external dacryocystorhinostomy for partial nasolacrimal duct obstruction. Eye 2011;25(9):1219-1224.
[12] Kumar CA, Kulkarni N, Lathi A, et al. Study of causes of failure in external DCR and endonasal DCR. IJBAMR 2017;6(2):26-30.
[13] Tsirbas A, Davis G, Wormald PJ. Revision dacryocystorhinostomy: a comparison of endoscopic and external techniques. Am J Rhinol 2005;19(3):322-335.