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ORIGINAL RESEARCH

A Study to Compare Surgical Outcome of Endoscopic-Endonasal DCR with or without Silicone Tube in Patients with Nasolacrimal Duct Obstruction

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ABSTRACT

Introduction: Tearing and recurrent chronic conjunctival discharge are the most frequent symptoms and signs of lacrimal pathway obstruction.Because conservative care is usually ineffective in chronic conditions, the definitive treatment for the condition is surgery in which the patency of the nasolacrimal pathway is restored. A dacryocystorhinostomy (DCR) is the creation of a fistula from the lacrimal sac into the nose. Present study is planned to evaluate the results of Endoscopic Endonasal DCR with or without silicon stent in patients with nasolacrimal duct obstruction at tertiary level health care center.

Materials and Method: The present study was conducted among 60 cases that were diagnosed as nasolacrimal duct obstruction or chronic dacryocystitis. The study population was divided in three groups i.e., group I for endonasal endoscopic dacryocystorhinostomy with silicon stent, group II for endonasal endoscopic dacryocystorhinostomy without silicon stent and group III for conventional (external) DCR.Differences between the two groups were assessed with the Pearson ChiSquare and Fisher's exact test and differences were regarded as statistically significant if a two-sided *P*-value was less than 0.05. Data are expressed as the number of cases or mean with standard deviation (SD).

Results: The maximum number of patients 27 cases (45%) was in the age group of 41-50, followed by 12 cases (20%) in the age group of 51-60. Group I had a mean age of 43.4 years, range 15–77 years, and Group II had a mean age of 45.7 years, range 24–72 years. The two groups were comparable in age wise distribution.We found intra operative bleeding was more in conventional DCR in Group III 10 cases (50%) has more bleeding while in Group I, 2 case (10%) and Group II 2 case (10%) has more bleeding. Though the success rate of Group I was (95%) better than Group II (90%), and in Group III success rate is also (90%) it was not statistically significant.(p= 0.5).

Conclusion: The present study concluded that a statistically significant difference was found between the preoperative and one-week postoperative. Though the success rate of Group I was (95%) better than Group II (90%), and Group III (90%) it was not statistically significant. Furthermore, a longer follow-up time may give more reliable objective outcome information.
Keywords: Conjunctival discharge; Dacryocystorhinostomy; Endoscopic Endonasal DCR

INTRODUCTION

Tearing and recurrent chronic conjunctival discharge are the most frequentsymptomsand signs of lacrimal pathway obstruction.Different symptoms attributable to lacrimal pathway obstruction are common among middle aged and older patients.[1]Epiphoracan be extremely troublesome and a source of social embarrassment. Epiphora can be because of an obstruction, stenosis, punctual malposition or functional disorder of the lacrimal passages.[2] The symptoms of nasolacrimal duct obstruction (NLDO) were described in papyrus documents by the ancient Egyptians.[3]Woog[1] published a study concerning the epidemiology of acquired symptomatic lacrimal obstruction and showed that the most common form of acquired symptomatic lacrimal obstruction is NLDO, occurring with an annual incidence rate of 0.02%. The same study also confirms that acquired lacrimal pathway obstruction was most common in the middle-aged, with a median age of 67 years. Moreover, 69% of patients with all forms of obstructions and 73% with NLDO were female.[1]

Because conservative care is usually ineffective in chronic conditions, the definitive treatment for the condition is surgery in which the patency of the nasolacrimal pathway is restored. A dacryocystorhinostomy (DCR) is the creation of a fistula from the lacrimal sac into the nose. This procedure is mainly used to treat distal outflow obstruction to the nasolacrimal system.[4]

The most common causes of DCR failure are obstruction of the osteotomy site and obstruction of the common canaliculus (it has been thought that an adequately size osteotomy at the end of surgery would eventually narrow down to a final size of 2 mm due to scarring). Therefore, some authorities postulated that intubation of the nasolacrimal system during DCR, may prevent closure and scarring of the osteotomy or stenosis of the common canaliculus and so improve the success rate.[5]

Thus, insertion of silicone stents is almost universally employed to prevent rhinostomy stenosis and to help to stabilize epithelialization between two mucosal surfaces having surgical continuity.[6]

Present study is planned to evaluate the results of Endoscopic Endonasal DCR with or without silicon stent in patients with nasolacrimal duct obstruction at tertiary level health care center at SPMC, Bikaner.

MATERIALS AND METHODS

The present randomized study was conducted among the patients of Chronic Dacryocystitis admitted in the Department of Otorhinolaryngology, Sardar Patel Medical College & Hospital, Bikaner over a period of 1 year. The study included 60 cases that were diagnosed as nasolacrimal duct obstruction or chronic dacryocystitis and who were fulfilling inclusion criteria during the study period. Inclusion criteria comprised of patients with history of persistent watering or mucoid/mucopurulent discharge from eye, patients in whom sac

syringing reveals obstruction in the lowerpassage with regurgitation from the other punctum, patients with mucocoele, patients with external lacrimal fistula and those who were willing to undergo surgery.Exclusion criteria comprised of patient with epiphora with no signs of lacrimal drainage obstruction on sac syringing, patient with ectropion/ entropion/ lower lid laxity, patient with canalicular and punctal obstruction, patient with post traumatic bone deformity, patient with history of radiation therapy and patients with sinonasal malignancy and granulomatous conditions.

The study population was divided in three groups i.e., group I for endonasal endoscopic dacryocystorhinostomy with silicon stent, group II for endonasal endoscopic dacryocystorhinostomy without silicon stent and group III forconventional (external) DCR.

A written fully explained consent stating the voluntary participation of subjects in the study was taken before the enrollment of the subjects.All cases selected for the study were evaluated using preformed proforma. Adetailed history was taken as to age, sex, socioeconomic status, occupation, nature and duration of symptoms etc. Nasolacrimal Duct Obstruction Symptom Score (NLDO-SS) questionnaire was given, and symptom score will be calculated.[7]

Detailed preoperative clinical examination was done by Otorhinolaryngologist and Ophthalmologist including regurgitation testing, lacrimal syringing and probing. Examination of nasal cavity will be done with anterior rhinoscopy, posterior rhinoscopy and endoscopic evaluation in order to check for accessibility of lacrimal sac, deviated nasal septum, turbinate hypertrophy or any other associated pathology.

Radiological studies done like X-ray study of PNS water's view and NCCT paranasal sinuses wherever required. Routine blood investigations, urine examination, X-ray chest (PA) view, ECG will be done in all patients.

Findings in the nasal cavity were assessed and scored by using the Lund-MacKay (Lund and Mackay 1993) staging system (Appendix). During the preoperative visit (Studies II-IV), all the patients filled out a Nasolacrimal Duct Obstruction Symptom Score (NLDO-SS) questionnaire and preoperative data study forms.[7]

Pre-anaesthetic check-up and xylocaine sensitivity testing of all the patients were done.The procedure was done under local or general anaesthesia. In case of local anaesthesia the nose was prepared using cotton strips soaked in 4 percent xylocaine and adrenaline (1:10000, in a ratio of 4:1), 10-15 minutes prior to surgery. This ensures adequate decongestion, mucosal anaesthesia, easy access and a bloodless field. Two percent xylocaine with adrenaline was injected submucosally into the lateral nasal wall, superior and anterior to the attachment of the middle turbinate, and along the maxillary line.

External infiltration was performed just below the medial canthus of the eye, in order to anaesthetize and ensure vasoconstriction at the anterior lacrimal crest and lacrimal fossa. The ocular surface was anaesthetized with two drops of 4 percent xylocaine. In children, apprehensive patients and in non cooperative patients general anaesthesia was used.

For post-operative assessment, Merocel nasal pack removed on 3rd post operative day. All the patients were treated with Antibiotic eye drops (topical dexamethasone and ciprofloxacin eye-drops) given four times a day for three to four weeks in order to ensure continuous flow through the lacrimal system, and intranasal saline spray or saline nasal drops advised four to five times a day to avoid crust formation for one month.Advice to avoid nose blowing for

four to seven days was given to avoid nasal hemorrhage and orbital emphysema. During the postoperative visit the rhinostoma site and middle meatus were cleaned with suction by using 0^{o} nasal endoscope in localanesthesia. Lacrimal syringing was performed in all the cases.

Endoscopic visualization of the nasal cavity performed in order to remove crusts and granulations and to check the patency of the newly created ostium using lacrimal irrigation. Subsequent follow up done post-operatively at one week, one month, three-month, six months. This includes symptom evaluation and scoring (i.e. checking for subjective improvement in eye watering) and endoscopic evaluation of the newly created ostium, in order to check for adhesion formation and restenosis. Silicon stent was removed after three months of surgery.

During each postoperative visit the patients were asked common ocular symptoms of NLDO.[8] The surgical outcome was considered successful if the saline solution freely reached the nose during the lacrimal sac irrigation and if the patients had no tearing or recurrent infection of the lacrimal sac.[9]

The data from the patients proforma compiled into Microsoft Excel 2007 spreadsheet. The open-Epi software from CDC[10]was used for statistical calculations.Differences between the two groups were assessed with the Pearson ChiSquare and Fisher's exact test. The correlations between categorical variables were assessed with Pearson's correlation coefficient. The level of statistical significance was set to 5%.

Differences were regarded as statistically significant if a two-sided *P*-value was less than 0.05. Data are expressed as the number of cases or mean with standard deviation (SD).

RESULTS

In the present study, 60 cases were enrolled for endoscopic DCR. These cases were further randomized into three groups: group I and group II and Group III. There were 20 cases in Group I for endonasal endoscopic dacryocystorhinostomy with silicone stent and 20 cases in Group II for endonasal endoscopic dacryocystorhinostomy without silicone stent and 20 cases in Group III for conventional DCR.

In our study of total 60 patients, the maximum number of patients 27 cases (45%) was in the age group of 41-50, followed by 11 cases (18.33%) in the age group of 31-40 (table 1). In the present study, the mean age of patients at the time of the surgery was 41.22 years, range 10-60 years.

In this study of 60 cases, deviation of the nasal septum was seen in 10 cases (16.6%). Out of that septoplasty was performed in 5 cases (8.3%) with severe deviation of nasal septum. Concha bullosa with deviated nasal septum was seen in 2 cases in all of them conchoplasty was done. Nasal polyp was seen in 2 cases FESS was performed (table 2).

The P Value for all above baseline characteristics is not significant (>0.05). Therefore, all groups are comparable (table 3).

In group I, the maximum numbers of cases 11 (55%) were done between the duration periods of 31-45 minutes, in 4 cases (20%) the surgical duration was between 45-60 minutes and 3 cases (15%) were done within 30 minutes, however 2 cases (10%) required more than 60 minutes. The mean surgical duration ± SD was 41.1 ± 8.2 minutes in group I.

In group II, 12 cases (60%) were done between 31-45 minutes followed by 3 cases (15%) which were done within 30 minutes and 4 cases (20%) were done between the duration

period of 45-60 minutes. 1 case (5%) were done in >60 minutes. The mean surgical duration ± SD was 40.1 ± 7.92 minutes in group II.

In group III, 11 cases (55%) were done between 31-45 minutes followed by 3 cases (15%) which were done within 30 minutes and 4 cases (20%) were done between the duration period of 45-60 minutes. 2 cases (10%) were done in >60 minutes. The mean surgical duration ± SD was 41.1 ± 7.92 minutes in group II (table 4).

In our series, the Postoperative early complication was punctual trauma seen in Group 1 case (5%), Group III 1 case (5%). Peri-orbital oedema was seen in Group III 1 cases (5%), and minor post op bleed seen in Group I 2 cases (10%) in Group II 2 case (10%) in Group III bleeding seen in 10 cases (50%) (table 5). Excessive crusting in Group I, 2 cases (10%); in Group II, 3 cases (15%). Granulation formation at the anterior lip of the rhinostomy 5 cases (12.5%). These were removed endoscopically. Synechiae formed between the middle turbinate andlateral wall in 2 cases (5%) which were released during follow up visits. Rhinostomal closure was found in nasal endoscopic examination in 1 cases (5%) in Group I, 2 case in Group II (10%), 1 case (5%) in Group III during follow up visits.

Table 1: Distribution of the cases according to Age group

Age in years	**Group I (n=20) (With silicon stent) No of cases (%)**	**Group II (n=20) (Without silicon stent) No of cases (%)**	**Group III (n=20) External dacrosystorhinostomy No of cases (%)**	**Total**
10-20	3	2	1	6 (10%)
21-30	1	1	2	4 (6.6%)
31-40	2	6	3	11 (18.33%)
41-50	9	8	10	27 (45%)
51-60	5	3	4	12 (20%)
Total	20	20		60

Table 2: Diagnostic Nasal Endoscopic examination and additional procedures performed with Endoscopic Dacryocystorhinostomy

	Group I (n=20) (With silicon stent) No of cases (%)	**Group II (n=20) (Without silicon stent) No of cases (%)**	**Group III (n=20) External dacrosystorhinostomy No of cases (%)**	**Total**
Nasal Pathology				
Deviated Nasal Septum	4	3	3	10
Concha bullosa with Deviated nasal septum	1	0	1	2
Hypertrophic	2	1	2	5

turbinate				
Nasal polyps	1	1	0	2
Additional procedure performed				
Septoplasty	3	2	0	5
Conchoplasty	1	0	0	1
FESS	1	1	0	2

Table 3: Comparison between two groups for baseline characteristics

Varibles	**Group A**	**Group B**	**Group C**	**Statistics**
Age Group				
<40	6	8	6	$\chi^2 = 0.600$
>40	14	12	14	p value = 0.741
Sex				
Male	2	4	3	$\chi^2 = 0.784$
Female	18	16	17	P value = 0.0676
Laterality				
Unilateral	18	17	17	$\chi^2 = 0.288$
Bilateral	2	3	3	P value =0.866
Associated Nasal pathology				
Present	8	5	6	$\chi 2 = 1.078$
Absent	12	15	14	P value = 0.583
Additional Procedure				
Done	5	4	0	$\chi 2 = 5.490$
Not done	15	16	20	P value = 0.0640

Table 4: Comparison of Surgical duration

Duration of surgery in Minutes	**Group I (n=20) (With silicon stent) No of cases (%)**	**Group II (n=20) (Without silicon stent) No of cases (%)**	**Group III (n=20) External DCR No of cases (%)**	**Total**
Up to 30 min	3 (15%)	3 (15%)	3 (15%)	9 (15%)
31-45 min	11 (55%)	12 (60%)	11 (55%)	34 (56.66%)
45-60 min	4 (20%)	4 (20%)	4 (20%)	12 (20)
> 60 min	2 (10%)	1 (5%)	2 (10%)	5 (8.3%)
Mean duration of surgery	41.1	40.1	41.1	
S.D.	10.82	9.65	10.82	
$\chi 2 = 0.459$,P value=0.998				

Table 5: Postoperative complications

	Group I (n=20) (With silicon stent) No of cases (%)	Group II (n=20) (Without silicon stent) No of cases (%)	Group III (n=20) External dacryocystorhinostomy No of cases (%)	Total
Postoperative early complications				
Punctal trauma	1	0	1	2
Peri orbital oedema	0	0	1	2
Minor post op bleed	2	2	10	14
Postoperative late complications				
Excessive crusting	2	3	0	5
Granulation	2	3	0	5
Synechiae	1	1	0	2
Rhinostomal closure	1	2	1	4
Persistent watering	1	2	2	5

DISCUSSION

In present study of total 60 patients, the maximum number of patients 27 cases (45%) was in the age group of 41-50 followed by 12 cases (20%) in the age group of 51-60. Group I had a mean age of 43.4 years, range 15–77 years, and Group II had a mean age of 45.7 years, range 15–72 years.The two groups were comparable in age wise distribution.

In this study of 60 cases, deviation of the nasal septum was seen in 10 cases (16.6%). Out of that septoplasty was performed in 5 cases with severe deviation of nasal septum. Concha bullosa with deviated nasal septum was seen in 2 cases (3.3%) conchoplasty was done in 1 case. Nasal polyp was seen in 2 cases (3.3%) FESS was done in all 2 cases.Zenk et al[11]reported that anterior rhinoscopy and endoscopy of the nose had revealed septal deviation in 71 (43.0%) cases, nasal polyposis in 9 (5.5%), and scars or synechiae in the agger nasi area of the affected side in 12 (7.2%) cases.[11]Sonkhya et al[12] in their study reported that septoplasty was performed in 36 per cent of cases. A high deviated nasal septum (DNS) adjacent to the anterior end of the middle turbinate was removed endoscopically through a Killian's incision. The anterior cartilage was kept intact. In 18 per cent of cases, endoscopic sinus surgery was performed for chronic sinusitis and nasal polyposis. In 10 per cent of cases, conchoplasty and turbinoplasty were performed to improve access and to avoid post-operative synechiae formation.[12]Zenket al[11] intraoperatively found lacrimal sac empyema in 82 (49.7%) cases and macroscopic sac mucosal alterations, such as synechiae or prominent mucosal hypertrophy, in 45 (27.3%) subjects. We found empyema in 39 (65%) cases and mucosal alteration in 10 cases (16.67%).

The mean surgical duration of surgery in group I, the maximum numbers of cases (55%) were done between the duration periods of 31-45 minutes, in 4 cases (20%) the surgical duration was between 45-60 minutes and 3 cases (15%) were done within 30 minutes, however 2 cases

(10%) required more than 60 minutes. The mean surgical duration ± SD was 41.1 ± 8.2 minutes in group I.In group II, 12 cases (60%) were done between 31-45 minutes followed by 3 cases (15%) which were done within 30 minutes and 4 cases (20%) were done between the duration period of 45-60 minutes. 1 case (5%) were done in >60 minutes. The mean surgical duration ± SD was 40.1 ± 7.92 minutes in group II.In group III, 11 cases (55%) were done between 31-45 minutes followed by 3 cases (15%) which were done within 30 minutes and 4 cases (20%) were done between the duration period of 45-60 minutes. 2 cases (10%) were done in >60 minutes. The mean surgical duration ± SD was 41.1 ± 7.92 minutes in group III.The *P*- value is 0.992. Therefore, there is no significant difference between both the groups regarding surgical duration.

We found intra operative bleeding in Endo DCR 4 cases (10%).Out of those two patients were known hypertensive they had been taken to surgery after controlling their blood pressure, but peri-operative haemostasis was difficult because of the guarded use of adrenaline. In two cases nasal mucosal inflammation led to haemorrhage during incision of the lacrimal sac wall. The intra-operative bleeding encountered in any of the case was not significant enough to abundant the procedure, it was managed with frequent nasal packing and suction. Three cases had excessively thick bone in the frontal process of the maxilla, which required more extensive drilling. Intra operative bleeding was more in External DCR it was seen in 10 case (50%) which was controlled.In our series, the postoperative early complication was punctual trauma seen in 2 case (3.3%), Peri orbital oedema was seen in 1 case (1.6%).Post-operatively, delayed complications like excessive crusting in 5 cases (8.33%) and granuloma formation at the anterior lip of the rhinostomy 5 cases (8.3%). Rhinostomal closure was found in nasal endoscopic examination in 1 case (1.6%) in Group I, in Group II two cases (3.3%),1 case in Group III (1.6%) during follow up visits.1 Case in Group III showsphysiological pump failure.

Sonkhya et al[12] reported minor delayed complications included granuloma formation at the anterior lip ofthe rhinostomy in seven cases, synechiae between the middle turbinate andlateral wall in three cases,excessive crusting in eight cases and a periorbitalsaline collection along the inferior lid plus emphysema,noted during syringing in one case, due tocreation of a false track during canaliculi probing.[12] The most common complication of EDCR in most series is failure of theprocedure with persistence of tearing or infection. This may result from fibrousocclusion of the rhinostomy site or the presence of synechiae betweenthe lateral nasal wall and middle turbinate or nasal septum. In other cases,the ostium may be patent but too small to provide efficient tear drainage.Failure to open the inferior portion of the lacrimal sac satisfactorily may resultin continued accumulation of lacrimal debris (lacrimal sump syndrome).Similarly, persistent discharge or infection may develop in a lacrimal sac diverticulumthat may not have been drained completely by way of the intranasalroute. Other potential problems may include bleeding and sinusitis. A thoroughpreoperative evaluation and meticulous surgical technique to avoidunnecessary mucosal trauma also are important.[13]

Outcomes after EN-DCR and EXT-DCR were comparable, with good results maintained over time. A recent retrospective comparison of outcomes between EN-DCR and EXT-DCR showed that the success rate (94%) for EXT-DCR is slightly better than that (86%) for EN-DCR.[14] However, Leong and co-workers, in a systematic review of outcomes after DCR in adults, showed that the failure rate for laser-assisted DCR was higher.[14]

Endoscopic dacryocystorhinostomy, compared with external DCR has the advantages ofgreater cosmetic acceptability, reduced surgical time, minimal learning curve, minimal blood loss, less risk of interfering with the physiological lacrimal pump mechanism, simultaneous management of intranasal pathology, and the facility for biopsy if necessary, as the lacrimal sac is opened and visualised directly.[4,12]

The results in our studies are well in line with those of earlier studies assessing the effect of EN-DCR, where the success rate has varied between 90% and 93%.We have few limitations in the present study. The number of patients in the present study was not extensive, as has been the case in most other studies concerning EN-DCR.

CONCLUSION

The present study concluded that a statistically significantdifference was found between the preoperative and one-week postoperative. Though the success rate of Group I was (95%) better than Group II (90%), and Group III (90%) it was not statistically significant. Furthermore, a longer follow-up time may give more reliable objective outcome information

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