Original Article

Does stenting improve the surgical outcome of Endoscopic Dacryocystorhinostomy? A prospective randomized study

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Abstract

Introduction: The objective of this study was to compare the surgical outcome of endoscopic dacyrocystorhinostomy with or without stenting. It was a prospective, randomized study conductedfrom October 2011 to September 2013. Ganesh Man Singh Memorial Academy for ENT-Head and Neck Studies,Tribhuvan University Teaching Hospital, Maharajgunj Medical Campus, Institute of Medicine, Kathmandu, Nepal.

Methods: Patients aged 15 years and above of all genders with primary acquired nasolacrimal duct obstruction (PANDO) were included in the study. Forty patients were randomly allocated into two groups, 20 each in Endoscopic Dacyrocystorhinostomy with stenting (EwS) and Endoscopic Dacyrocystorhinostomy without stenting (EoS). Post-operative assessment was done at 8 weeks. In the subjective assessment using with 5-point Likert Scale of degree of epiphora, a score of 1,2 or 3 was considered a success. Objective assessment with syringing and endoscopic evaluation of patency of rhinostome considered patent and partly patent lacrimal system on syringing and patent rhinostome as success.

Results: Both the subjective and objectivesuccess rate was 95% in EwS and 90% in EoS.However, there was no significant statistical difference between the two groups (*p* value =1.00).

Conclusion: The success rate of EwS was comparable to that of EoS with no added benefit in our study. In addition, EoS avoided the complications associated with stenting. So, we recommend EoS for PANDO.

Keywords: Endoscopic Dacryocystorhinostomy, Primary acquired nasolacrimal duct obstruction, silicon stent

Introduction

Endoscopic endonasal DCR(Endo DCR) has gained huge popularity for the treatment of primary nasolacrimal duct obstruction following its introduction by McDonogh and Meiring in 1989.[1,2]Several of its benefits include minimal blood loss, preservation of medial canthal ligament, maintenance of lacrimal pump mechanism, avoidance of facial scar and simultaneous correction of intranasal pathology.[3-5]

The success of Endo DCR in primary acquired nasolacrimal duct obstruction (PANDO) ranges from83% to95.3%. [2,4-7]Several adjunct procedures have been used with the aim to further improve the surgical outcome of Endo DCR namely absorbable packing

with or without topical steroids, mitomycin C, laser DCR and silicon stenting being one of them.[2,5,6,8] The stent apparently splays the edges of the lacrimal sac hence avoiding fibrous closure during healing with a subsequent patent rhinostome.[4] The success rate of Endo DCR without stenting is high so this study was done to find if stenting further increased the success rate of Endo DCR.

Methods

It was a randomized, interventional, comparative study conducted at Ganesh Man Singh Memorial Academy of ENT-Head and Neck Studies (GMSMA of ENT-Head and Neck Studies),Tribhuvan University Teaching Hospital, Maharajgunj Medical Campus, Institute of Medicine, Kathmandu, Nepal from October 2011 to September 2013 after obtaining approval from Institutional Review Committee. Patients aged 15 years or more, all gender with primary acquired nasolacrimal duct obstructionwere included in the study. All patients had nasoendoscopy by ENT, syringing and confirmation of hard stop on probing by Ophthalmology team. Revision DCRs were excluded. Those enrolled were randomized by lottery in two groups i.e. Endoscopic Dacyrocystorhinostomy with Stenting (EwS) and Endoscopic Dacyrocystorhinostomy without Stenting (EoS).

The proceduresfor all patients were done by a single surgeon (Pradhan B) under General anesthesia. The mucosa overlying lacrimal sac was infiltrated with approximately 3ml of 2% xylocaine with 1:200,000. Mucoperiosteal flap was raised over the the frontal process of maxilla and the lacrimal bone after vertical incision was given 1 cm anterior to middle turbinate which was joined by horizontal incisions at the level of the axilla and 2/3 of the middle meatus. 2 mm Kerrison punch was used to remove the frontal process of maxilla after peeling out the lacrimal bone. The medial sac wall was then incised vertically using sickle knife after tenting it with lacrimal probe, creating anterior and posterior flaps.Syringing was done with dexamethasone and chloramphenicol eye drops and free flow of fluid observed endoscopically. Patients were randomized to EwS had lacrimal stenting with the ends tied in the middle meatus. Concomitant conventional septoplasty or FESS if needed was done. None of the cases had nasal packing. Post-op oral antibiotics and dexamethasone and chloramphenicol eye drops were prescribed for 2 weeks. Gentle nasal saline douching was advised for 3 weeks. Patients were followed up in OPD weekly for 2 weeks and then in every 2 weeks. Subjective and objective assessments were done at 8 weeks' post-operative period. The stent was removed at 6 weeks in EwS group.

The subjective assessment was based on the degree of epiphora which was graded on a 5-point Likert scale. A score of **1** = symptom free, **2** = significantly improved, **3** = slightly improved, **4** = no improvement and **5** = worse. A score of 1,2 or 3 was considered a success.

The objective assessment included nasal endoscopic examination to assess the presence or absence of rhinostome or any granulation around it and syringing to assess the patency of the rhinostome. The syringing findings were noted as

Patent: - No resistance to the flow of the fluid through sac to nasopharynx.

Partially patent: -Regurgitation of some fluid through the opposite punctum and passage of rest of the fluid into the nasopharynx.

Blocked: - Regurgitation of all fluid through the opposite punctum with none passing into the nasopharynx.

Patent and partially patent on syringing was taken as success. Data analysis was done using SPSS version 18.0. Student's t test was used to compare means of the two groups. The subjective and objective outcomes were compared using Chi-square test.

Results

A total of 40 patients were enrolled in the study with 20 each in EwS (16 females, 4 males) and EoS (14females and 6 males) group. The age ranged from 20 years to 78 years with the mean age being 43 and 42 years respectively in EwS and EoS. There was no statistical difference in the age and sex distribution in both groups(Table 1).

Table 1: Demographics of the patients (N=40).

Characteristic	Endo DCR with stenting (n=20)	Endo DCR without stenting (n=20)	All cases	p– value
Age (years) • Mean ±SD • Range	 43±19.021 23-78	 42.65±15.322 20-75	 42.82	 0.247
Sex • Female • Male • Ratio	 16 4 4:1	 14 6 2.33:1	 30 10 40	0.716

Most common presentation was epiphora(24/40, 60%) followed by epiphora with intermittent purulent discharge (10/40, 25%), epiphora with swelling at medial canthus (3/40, 7.5%), epiphora with intermittent discharge and swelling at medial canthus (2/40, 5%) and only swelling at medial canthus(1/40, 2.5%) (Table 2).

Table 2: Symptomatology of patients (N=40).

Clinical Feature	Epiphora	Epiphora with intermittent purulent discharge	Epiphora with intermittent purulent discharge with swelling	Epiphora with swelling	Swelling
Endo DCR with Stent(n=20)	12	6	2	0	0
Endo DCR without Stent(n=20)	12	4	0	3	1
Total	**24**	**10**	**2**	**3**	**1**

Septoplasty was required in seven (17.5%) cases; threein EwS and four in EoS while one patient in EwShad Functional Endoscopic Sinus Surgery (FESS)as an additional procedure.

Subjective evaluation

Subjective assessment on the 8th weeks post-operative follow up showed 15(65%) patients with no epiphora, four (20%) patients with significant improvement and in one (5%) the condition remained the same in EwS group. In EoS group, 11(55%) patients became symptom free, seven (35%) reported significant improvement, one (5%) had no improvement and one (5%) had worsening of symptom. The overall subjective success in EwS was 95% and 90% in EoS group, however the difference was not statistically significant (Table 3).

Table 3: Subjective assessmentat 8th week post operative period (N=40).

		Endo DCR with Stent (n=20)	Endo DCR without Stent (n=20)	*p* value
Subjective assessment	No epiphora	15 (65%)	11 (55%)	
	Significant improvement	4 (20%)	7 (35%)	
	Slight improvement	0	0	
	No improvement	1 (5%)	1 (15%)	
	Worse	0	1 (15%)	
Outcome	Success	19 (95%)	18 (90%)	1.00
	Failure	1	2	

Objective evaluation

At 8th week post-operative period, syringing in EwS group revealed patency in 18 (90%), partially patent in one (5%) and blocked in one (5%) whilst the rhinostome was patent in 19 (95%) and closed in one(5%). Similarly, EoS group, the rhinostome was patent in 16 patients (80%), partially patent in two (10%) and blocked in two (10%). The overall objective success in EwS was 95% and 90% in EoS group, however the difference was not statistically significant (Table 4).

Table 4: Objective assessment at 8th week post operative period (N=40).

		Endo DCR with Stent (n=20)	Endo DCR without Stent (n=20)	P value
Syringing	Patent	18 (90%)	16 (80%)	
	Partially patent	1(5%)	2(10%)	
	Blocked	1(5%)	2 (10%)	
Rhinostome	Patent	19(95%)	18(90%)	1.00
	Closed	1(5%)	2(10%)	
Outcome	Success	19 (95%)	18 (90%)	1.00
	Failure	1 (5%)	2 (10%)	

Table 5: Comparison of complications following Endo DCR (N=40)

		Endo DCR with Stent (n=20)	Endo DCR without Stent (n=20)
Complications	Synechiae	0	4
	Granulations	1	1
	Tube prolapse	1	0
	Accidental tube extrusion	1	0
	Periorbital swelling	1	0

Granulation was seen in one patient each in both groups. Four patients in EoS had synechiae.The patient in EwS group who had closed rhinostome had granulation. Similarly, the two patients with closed rhinostome in EoS had granulations and synechiae each. There was one case each of accidental tube prolapse and tube extrusion in the 3rd post-operative week. However, the rhinostome remained patent in both cases. One patient developed periorbital swelling on the 1st post-operative day (POD) which resolved on 5thPOD with conservative management (Table 5).

Discussion

Dacryocystorhinostomy (DCR) is the surgical procedure to create a fistulous tract between the lacrimal sac and nasal cavity in PANDO.[2]Although external approach was routinely done previously, nowadays with the advent of endoscopes, Endo DCR has taken preference over External DCR.[3]

Silicon stenting has been anticipated in maintaining the patency of fistula as it splays the edges of the lacrimal sac thus impeding fibrous closureduring postoperative healing period.[2]It is threaded in the inferior and superior canaliculi with the ends passing through the lacrimal sac and tied together in the middle meatus. It is retained for weeks to months to maintain the patency of the ostium between the lacrimal sac and middle meatus which also corrects the canalicular stenosis.[4]

We had in our study 20 patients each in both EwS and EoS group. Interestingly female patients (30) outnumbered the male patients (10).This probably could be because females especially middle aged to elderly age group have smaller dimension of the lower nasolacrimal fossa and middle nasolacrimal duct hence are prone to PANDO. [9]

Out of the 40 patients, four had septoplasty and one had FESS as an additional procedure. Unlu et alperformed Endo DCR in 30 patients of which14 had septoplasty, two had septoplasty with concha bullosa reduction and five had concha bullosa reduction in the same sitting.[2]Similarly, Raghuwanshi et al had 5/90 patients needing additional procedures namely septoplasty (2), uncinectomy (2) and concha bullosa reduction (1).[6]So Endo DCR in our study like in literature allowed concomitant additional nasal procedures in the same sitting.

In the current study, the stent was removed at 6 weeks. There is no consensus on the duration of the stenting as it seems to vary from 2 weeks to 6 months in different studies.[2,4,6]

We had an overall success of 95% and 90% both subjectively and objectively in EwS and EoS group respectively with the difference not being statistically significant. A systematic review of 12 randomized control trial of 1,239 endoscopic DCR in 1,216 patients with silicone stents in 533 procedures showed an overall success rate of 91.9%(1,139/1,239) for endoscopic DCR. With stenting it amounted to 92.9% (495/533) and without stenting it was 91.2% (644/706). However, there was no statistically significant difference.[7]

Unlu et al[2] did a prospective study on 30 Endo DCR, with the first 16 consecutive without stenting and the latter 14 with stenting. The medial sac wall was removed whilst the mucosal flaps were not preserved. Their result showed subjective improvement of 85.7% with rhinostome seen in 64.3% in stenting group in an average follow up of 15 months and 81.3% subjective improvement with rhinostome seen in 68.8% in group without stenting in an average follow up of 30 months. The difference in success rate between the two groups was not statistically significant.The subjective improvement was found in more patients even with less number of visualization of the rhinostome in this study. The success of surgery was concluded not being directly related to size of the healed ostium but rather its patency. Meta analysis by Kim et al[3] analyzed 9 studies involving 587 patients where functional success rates tended to be higher in stent group although there was no statistical significant difference.

Interestingly, another study later by Unlu et al[10]had a better result on objective assessment as compared to the subjective assessment. The study assessed the long term result of stenting versus no stenting after a median follow up of 8 years. The stent was placed for 8 weeks. In the stent group, the symptomatic improvement was seen in 84.2% with patent rhinostome in 89.5%. Similarly, in the group without stenting, both the symptomatic relief and patent rhinostome was 94.7%. Similar trend was seen in the study by Raghuwanshi et al[4]where the patency was seen in 93.3% with symptomatic relief in 88.8% at 18 months post operative period of EWS. Here,the discrepancy between anatomic patency and functional improvement has been attributed to either over production of tear or derangement in outflow tract.[4,9]

As per Raghuwanshi et al[4] the rhinostomy wound epithelisation is complete by 2 months however the rhinostome is considered to be stable at 8-12 months. So,with time, the success of the procedure may change. In a retrospective study by Mohamad SH et al[9], the symptomatic success at 33 months follow up dropped to 57% from 70% at 6 months in the stent group. Similarly, it dropped to 88% from 97% in the non- stent group in the same duration. The patency of the rhinostome was 67% and 93% respectively in the stent and non-stent group at 33 months. This dropped from 80% in stent and 100% in non stent group at 6 months.

Complications of Endo DCR in general include nasal bleeding treated conservatively, nasal synechiae, granulations at the ostium, orbital fat prolapse.[4,5] Stenting adds on the risk of punctual/corneal abrasion, slitting of canaliculi, false passage, tube prolapse, stent extrusion ecchymosis around medial canthi, discomfort in addition to increasing the risk of granulations. [2,4,5,10] In our case, granulations developed in one case each from both groups with additional tube prolapse, extrusion and periorbital swelling in the EwS group.

The causes of failure in Endo DCR has been enlisted as progressive ostial fibrosis,inadequately sized ostia, unrecognized or post-operative canalicular obstruction, synechiae.[5] Assessment of the factors by Gupta for failed DCR needing revision Endo DCR in 60 cases out of 600 done over 10 years showed inadequate sac opening in 38.3%, low rhinostomy in 28.3%, contracture

at rhinostomy site in 10%, improper selection of cases and atonic sac in 3.3% and pre existing canaliculitis in 1.6%. patients. Most of these factors were found to be secondary to false localization of sac, inadequate removal of sac wall, too much of mucosal removal leading to synechiae at surgical site.[11] This study showed there are other contributory factors leading to failure in Endo DCR of irrespective of stenting or not stenting.

Advantage of not stenting includes shortened operative time, avoidance of stent related complications, cutting down on cost, avoiding additional follow up needing stent removal.[4,9]Since, there is similar surgical success rate between EwS and EoS in the literature, stenting has been advocated to be avoided even in revision case unless associated with canalicular stenosis.[4,9,10.11]

The limitation of the study was the short follow up as rhinostome is considered stable at 8-12 months and with time, there is chance of the rhinostome closure.[4] A longer follow up with larger samples size would have been better to assess the long term result of both EwS and EoS.

Conclusion

The success rate of EwS was comparable to that of EoS with no added benefit in our study. In addition, EoS avoided the disadvantages associated with stenting. So, we recommend EoS for PANDO.

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