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ORIGINAL RESEARCH

A Comparative Study of Endoscopic Endonasal Dacryocystorhinostomy with and without Prolene Stenting

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ABSTRACT

Background: Endoscopic DCR is a surgical procedure to drain the lacrimal sac in instances of instrasaccular and postsaccular obstruction. The most common causes of failure of dacryocystorhinostomy are obstruction of the rhinostomy site and of the common canaliculus. Therefore some authorities postulated that intubation of the nasolacrimal system during dacryocystorhinostomy may prevent closure and scarring of rhinostoma whereas some authors do not support stenting. A bicanalicular silicone tube is the stent most often used in DCR procedures to prevent obliteration of the rhinostomy opening. As an alternative method to silicon intubation, several other materials have been used.

Objectives: Our study was done to compare the results of endoscopic DCR with and without prolene stenting and to assess the usage of prolene as stenting material in En DCR.

Methods: The surgical outcomes of Endoscopic Endonasal Dacryocystorhinostomy (En DCR) with and without prolene stenting were compared in fifty patients of chronic dacryocystitis who had nasolacrimal duct obstruction. Prolene stent in EnDCR was used in 50% of randomly selected cases. Surgical success was evaluated subjectively and objectively after 10 weeks and results compared. The patients were followed at 3 months.

Results: Most of the patients were in the fourth decade (30%) of age, with female predominance (82%) and majority presented with disease on the left side (52%).

The success rate was 92% with prolene stenting as compared to 88% without stent. There was no statistical difference in the results of two groups.

Conclusion: Endoscopic DCR has a good success rate with and without nasolacrimal stenting. Prolene as a stenting material is effective in primary cases with nasolacrimal duct obstruction. It can be used as an alternative to silicone, especially in settings with limited resources.

Key words: chronic dacryocystitis; endoscopic DCR; prolene stent;

INTRODUCTION

Epiphora is a common annoying symptom, embarrassing the patient both socially and functionally and may even endanger the eye. It is in contradistinction to lacrimation, caused by the imperfect drainage of tears through lacrimal passages. Lacrimation occurs due to excessive tear production. Dacryocystitis represents an acute or chronic inflammation of the lacrimal sac. Chronicdacryocystitis is the most common cause of epiphora (about 87%)[1]. Dacryocystorhinostomy (DCR) is a surgical procedure done to drain the lacrimal sac in instances of intrasaccular and postsaccularobstruction[2].

Caldwell first described ENDONASALDCR in 1893. However this did not gain popularity because of difficult visualization. Mcdonough & Meiring first described endoscopic transnasal dacryocystorhinostomy in 1989. Once performed only from an external approach, the advent of rigid

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endoscopes with endoscopic instrumentation has made the Endonasal approach a reality. During a routine FESS operation, the nasolacrimal duct was inadvertently exposed. This started a train of thought to apply it to the advantage of patients with nasolacrimal duct obstruction. The operation is a conservative and direct one, which is easily learned by an ENT surgeon. It is far less traumatic than the external approach as there is no facial scar, no disruption of medial palpebral ligaments or of the angular facial vessels and no significant complications[-3] 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[4].

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[5]. Silicone stent intubation is used in DCR procedure to prevent re stenosis of surgical ostium. However use is not generally accepted at concerns on cost effectiveness[6].

Prolene is universally used in almost all surgical disciplines for suturing and meshing purposes[7]. It is a cheap material and is readily available when compared with bicanalicular silicone tube.

AIMS AND OBJECTIVES

1. To compare the results of endoscopic endonasaldacryocystorhinostomy with and without prolene stent.
2. To evaluate the clinical efficacy and complications associated with prolene suture material as a stent.

MATERIALS AND METHODS

The hospital statistics shows prevalence of chronic dacryocystitis to be 4%. Considering 95% confidence interval and 10% permissible error the sample size of 46 is obtained. The study is done on 50 patients undergoing endoscopic endonasaldacryocystorhinostomy at Rural Teaching Hospital, for a period of 2 years.

Inclusion criteria

All patients with recurrent epiphora or dacryocystitis and have been diagnosed to have nasolacrimal duct obstruction not fulfilling the exclusion criteria.

Exclusion criteria

1) Watering due to causes other than nasolacrimal duct obstruction.
2) Patients with lacrimal trauma or lacrimal sac tumours.
3) Patients with uncontrolled hypertension or diabetes mellitus.
4) Unwillingness for endoscopic surgery and those not fit for anaesthesia.
5) Revision endonasaldacryocystorhinostomy and failed external dacryocystorhinostomy.

Method of study

50 patients of either sex having symptoms and signs suggestive of chronic dacryocystitis and fulfilling the inclusion criteria are taken for the study.Prolene stent in EnDCR was used in 50% of randomly selected cases. Surgical success was evaluated subjectively and objectively after 10 weeks and results compared. The patients were followed at 3 months.

RESULTS

Age distribution

	GROUP A		GROUP B		TOTAL	
Age in years	**No of pts.**	**%**	**No of pts.**	**%**	**No of pts.**	**%**
24-30 yrs	3	12%	2	8%	5	10%
31-40 yrs	4	16%	6	24%	10	20%
41-50 yrs	9	36%	6	24%	15	30%
51-60 yrs	6	24%	6	24%	12	24%
> 60 yrs	3	12%	5	20%	8	16%
Fishers exact test p= 0.790(NS)						

Table 1: Age Distribution

In our study of 50 cases age of the patients ranged from 24-81 yrs with most of the patients in age group of 41-50 yrs (30% N=15, 9 in group A and 6 in group B). The mean age of presentation is 49.18 yrs. (table 1)

Sex Incidence

Sex	Group A	Group B	Total
No of males	5 (20%)	4(16%)	9(18%)
No of females	20(80%)	21(84%)	41(82%)
χ^2= 0.001, p=0.999 NS			

Table 2: Sex incidence

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In our study 82% of the patients are females. (N=41, 20 in group A and 21 in group B) and 18% are males(N=9, 5 in group A and 4 in group B) (Table 2).

Laterality

SIDE	GROUP A		GROUP B		TOTAL	
	No of pts.	%	No of pts.	%	No of pts.	%
RIGHT	11	44%	10	40%	21	42%
LEFT	12	48%	14	56%	26	52%
BILATERAL	2	8%	1	4%	3	6%
χ^2= 0.541, p=0.763 NS						

Table 3: Laterality

In our study 52% of the cases presented with disease on left side.(N= 26, 12 in group A and 14 in group B), 42% (N=21 11 in group A and 12 in group B) had disease on the right side and 6% (N= 3, 2 and1 in group A and group B respectively) had the disease bilaterally (Table 3).

	GROUP A		GROUP B		TOTAL	
Diagnosis	No of pts.	%	No of pts.	%	No of pts.	%
CDC	21	84%	22	88%	43	86%
CDC+ Mucocele	2	8%	1	4%	3	6%
CDC+ Pyocele	2	8%	2	8%	4	8%
Fishers exact test p=0.999 NS						

Table 4: Mode of presentation

In our study majority of the patients(86%) presented with chronic dacryocystitis and 6% (N=3, 2 in group A ,1 in group B) presented with mucocele and 8 % (N=4, 2 in each group) presented with pyocele. (table 4). Fishers exact test p=0.999 NS, the presence of pyocele or mucocele did not affect the results.

Post operative period follow up

Syringing results

	1st week		6th week		10th week	
Syringing	**Group**	**Group**	**Group**	**Group**	**Group**	**Group**
	A	B	A	B	A	B
Patent	0	25(100%)	24(96%)	22(88%)	23(92%)	22(88%)
Non patent	0	0	1(4%)	3(12%)	2(8%)	3(12%)

Table 5: Syringing results at 1st, 6th and 10th week

Objective analysis was done by syringing (Table 5). During the first week syringing was not done in group A patients due to the presence of the stent and in group B patients it was found to be patent in all cases N=25 (100%) At 6th week (Table 5, Figure 21) in group A patients, syringing was patent in 96% (N=24) and non patent in 4% (N=1). In group B syringing was patent in 88%(N=22) and non patent in 12%(N=3) of cases. At 6th week 2=0.272, p=0.602, p>0.05 and is statistically insignificant.

At 10 weeks syringing in group A was patent in 23(92%) and non patent in 2(8%) of cases. In group B syringing patency was seen in 22 (88%) and was non patent in 3(12%) of the cases.

At 10th week, $\chi 2$ =0.001, p = 0.999 , p>0.05. This test for objective analysis between the two groups statistically stands insignificant. At 10th week, $\chi 2$ =0.001, p = 0.999 , p>0.05. This test for objective analysis between the two groups statistically stands insignificant.

Subjective assessment

	1st week		6th week		10th week	
	Group A	**Group B**	**Group A**	**Group B**	**Group A**	**Group B**
Complete relief	0	25(100%)	24(96%)	22(88%)	23(92%)	22(88%)
No relief	0	0	1(4%)	3(12%)	2(8%)	3(12%)

Table 6: Symptomatic relief

Symptomatic assessment at 1st week in group B (table 6), all the cases reported a complete symptomatic relief N=25(100%).

At 6th week, (Table 6) in group A 96%(N=24) cases reported complete relief and 4%(N=1) reported no symptom relief. In group B complete relief was reported by 88%(N=22) cases and 12%(N=3) there was no relief. $\chi 2$ = 0.272, p=0.602 this test for the comparison of symptomatic assessment between the two groups statistically stands insignificant. At 10 weeks complete relief from epiphora was reported by 23(92%) of

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group A and 22(88%) of group B patients. $\chi 2$= 0.001; p=0.999. This test for subjective analysis for symptomatic relief stands statistically insignificant.

Results after 3 months

Group	Objective analysis		Subjective assessment	
	Patent	Non patent	Relieved	Non Relieved
Group A	23(92%)	2(8%)	23(92%)	2(8%)
Group B	22(88%)	3(12%)	22(88%)	3(12%)

Table 7: Results after 3 months

The overall success results at three months (table 7, figure 22) in group A with prolene stenting is 92% and that in group B without stenting is 88%, p=0.999 is statistically not significant. One patient with failure in group A had granulation tissue around the stent and in one patient there was closure of the rhinostomal opening. . In group B closure of the rhinostomal opening was seen in two cases which led to failure and in another patient there was fibrosis at the rhinostomal opening which led to failure.

Complications

COMPLICATION	GROUP A	GROUP B
None	18	22
Rhinostomal closure	1	2
Granulation	1	0
Irritation	3	0
Minor post op bleed	2	1

Table 8: Complications

Author	Procedure	Result %
WeidenBecker[2] (1994)	En DCR with stent	95
Zhou[12](1996)	En DCR with stent	93.70
Yung & Hardman[13](1998)	Inferior En DCR with stent	90
Sprekelson[14] (1996)	En DCR	96
Maier &Schmidt[15](2000)	En DCR with stent	90
Bambule&Chamero[16](2001)	En DCR with stent	91.7
Bruno Fayet (2002)	En DCR with stent	86
Peter J. Wormald[17] (2002)	Powered En DCR with stent	95.7
S. Mortimore[18] (1999)	En DCR without stent	87
Sundusaslan 2009[19]	En DCR with prolene stent	92.9%
Present study	En DCR with prolene stenting	92%
	Without stenting	88%

Results of our study in comparison with other

There were no major surgical complications (table 8 figure 23) such as orbital injury or diplopia. Minor bleeding was observed in 2 cases of group A and in 1 case of group B. Closure of the rhinostoma was seen in 1 case of group A and 2 cases of group B and there was granulation tissue at the stoma observed in 1 case of group A and none in group B. Ocular Irritation was reported by 3 cases of group A. No patient in group B reported any irritation. Spontaneous extrusion of the prolene stent was not seen in any of the cases. In none of the patients was the stent needed to be removed before 6 weeks. The prolene stenting material did not cause either punctual stenosis or canalicular laceration in any of the cases.

DISCUSSION

In our present study of 50 cases of chronic dacryocystitis, EnDCR with prolene stenting was performed in 50% of randomly selected patients (GROUP A), and without stenting in the remaining 50% of cases (GROUP B). The purpose of our study is to compare the results of EnDCR with and without prolene stenting and to assess the usage of prolene material as an alternative to silicon stents.

Age incidence: Most of the patients in our study are in the age group of 41-50 yrs. H.Basil Jacobs (1959) in his study found the maximum incidence of this condition between 40-55 years of age[1]. Sarda et al (1961)[8] noted maximum incidence of chronic dacryocystitis in the third and fourth decade of life.
Our results were similar to those quoted by most authors. Duke Elder[9] states that the disease preferentially affects adults over middle age, being relatively rare in children and adolescents. The highest incidence quoted by him was in the 4th decade of life.

Sex incidence: In our study the disease is seen predominantly in the females (82%)

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Duke Elder states that while the disease in the newborn affects both the sexes equally, its occurence among adults is in the ratio of 75-80% females to 25-30 males[9]. H.Basil Jacobs (1959) found a female to male ratio of 3:1 in his series of patients. He claimed that females were more affected by chronic dacryocystitis as they had a higher vascular congestive factor and a narrower bony canal[1]. R.Dalgleish (1967)[10] reported a percentage of 54% amongst females. Chronic dacryostitis is observed to be common in women of low socio-economic group due to their bad personal habits, long duration of exposure to smoke in kitchen and dust in external environment. Other possible cause could be congenital anatomical narrowing of naso lacrimal drainage system in females as compared to males.

Laterality: In our study of 50 cases 52% had left sided disease, 42% had right sided disease & 6% had bilateral disease.

H.Basil Jacobs (1959)[1] in his study found that right side was affected 53 times and the left side 37 times in 90 unilateral cases and only 14 cases were bilateral. Dalgleish (1967)[10]stated that there was no significant difference in right sided and left sided affection, and that the incidence of bilaterality increases with age. Mallik, Chatterjee et al (1970)[11] reported an increase in left sided blocks (55.8%).

In our study the success rate of En DCR with prolene stenting is 92%. Complete symptomatic relief was seen in 23(92%) cases, & 2(8%) reported no symptomatic relief.

Sundusaslan 2009[19] in their study of 42 eyes with prolene stent reported a success rate of 92.9%. They reported that the results were very good in 81%, as good in 11.9% and no change in 7.1%. which is similar to our results with prolene stenting.

Many variations of endoscopic dacryocystorhinostomy with little modifications like the use of stents, laser and mitomycin-C have been described in the last decade, with equally good results. A bicanalicular silicone tube is the stent most often used in DCR procedures to prevent obliteration of the rhinostomy opening after DCR.

In the literature, as an alternative method to silicon intubation, several other materials have been used to retain the lacrimal aperture following endoscopic DCR.

Tamura et al used T- sheet made from a penrose drain tube in seven patients[20]. They reported that the results were very good in four patients(57%), good in two patients (29%), and showed no change in one patient(14%). In another two reports, kishore et al[21]. and Erkan et al[22] used standard otologic T- tubes in endoscopic DCR. Erkan reported that the results were very good in 11 patients(50%), good in five patients(23%), and showed no change in six patients(27%).

Thus the success rate with stent in our study is 92% which is found to correlate well with studies of weidenbacker 1994, Zhou 1996, Yung & Hardman 1998, Bambule&Chamero 2001, PJWormland 2002,[2,12,13,16,17]. The procedure was a failure in 8% (N=2) in group A. In one patient with failure in group A, granulation tissue was observed around the stent and in one patient there was closure of the rhinostomal opening.

The success rate in group B without stent is 88%. 22 patients reported a complete symptom relief and 3 cases reported no relief in the symptoms. The procedure was a failure in 12%(N=3) cases. Closure of the rhinostomal opening was seen in two cases which led to failure and in another patient there was fibrosis at the rhinostomal opening which led to failure. In our study there was no statistically significant difference found between the surgical out comes in the two groups (p=0.999).

In the present study, patients are assessed subjectively and objectively at ten weeks. Evaluation of postoperative results involves subjective improvement of epiphora (Sperkelsen 1996)[14]. However,Durvasula et al used objective methods to monitor patients. DurvasulaVSP (2004) has found no need to assess the patients objectively on a long term basis once the patency of the stoma was observed at three months[23].

During our study no major complications were observed. Minor post operative bleed was seen in two cases of group A and a case of group B. Ocular irritation was complained by 3(12%) of the patients of group A which was managed with steroid eye drops and antibiotics and none of the cases in group B. We observed granulation tissue around prolene in one case. Rhinostomal closure was observed in a case of group A and in two cases of group B. Fibrosis of the stomal opening was seen in a case of group B. Spontaneous extrusion of the prolene stent was not seen in any of the cases. In none of the patients was the stent needed to be removed before 6 weeks. The prolene stenting material did not cause either punctual stenosis or canalicular laceration in any of the cases. Hence prolene can be efficiently used as a stenting material in En DCR.

CONCLUSION

In the present study, we compared the results of En DCR with and without prolene stenting in 50 cases of chronic dacryocystitis where prolene material was used as stent in 50% of the randomly divided cases. Based on the available data and from literature, we conclude that:

- Endoscopic DCR is simple and safe.
- It is minimally invasive procedure as it is a direct approach to the sac.
- Can be performed safely in cases of pyocele and mucocele.
- Cosmetically it is acceptable as there is no external scar.
- Prolene is non absorbale, its retention of strength after application, minimum tissue

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reactivity, slipperiness (allowing easy removal from tissues) and resistance to bacterial contamination are its main advantages and can be used as a stenting material in En DCR.

- Prolene is dyed blue, allowing for easy visibility and hence can be easily procured intranasally.
- Lateral displacement of the stent leading to ocular discomfort, conjunctivitis and corneal erosion can be prevented by tying multiple knots in the nasal cavity.
- Prolene is a cheap material, readily available in all operating theatres , can be used as an alternative to the routinely used silicone stents in settings with limited resources and is effective in primary cases with postsaccal or nasolacrimal duct obstruction.
- EnDCR has a good success rate with and without stenting.

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