

Comparative Study of Endonasal Endoscopic Dacryocystorhinostomy and External Dacryocystorhinostomy

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ABSTRACT

A prospective study on 50 cases of chronic dacryocystitis was done to see outcome of management by endoscopic dacryocystorhinostomy (DCR) in Indian population and to look for its advantages or disadvantages over external-DCR. Effect of mitomycin-C was also evaluated in endoscopic DCR cases. Dacryocystitis was diagnosed on the basis of clinical examination by doing regurgitation test and lacrimal syringing. These patients were divided into two groups: group I consisted of those 25 subjects who were planned for endonasal endoscopic DCR and group II of those 25 subjects who underwent external-DCR in ophthalmology department. Of all the cases, maximum number of cases was in the age group of 21 to 35 years, 27 (54%) cases, 88% were females and 12% were males. External-DCR required a relatively longer surgical duration of an average 65 minutes as compared to 35 minutes for endonasal DCR. Average hospital stay for patient in group I was 3 days and it was 7 days in group II. There were minimal intraoperative complications in endoscopic procedure as compared to external-DCR group. Average follow-up was 6 months. Primary success rate was 96% in both the groups. Thus, it was concluded that both the procedures represent good alternatives for the treatment of primary nasolacrimal sac or duct obstruction or chronic dacryocystitis, endoscopic DCR having advantage of less complications and less traumatic. Mitomycin-C was found to be helpful in reducing fibrosis.

Keywords: Dacryocystitis, Dacryocystorhinostomy, Lacrimal sac, Nasolacrimal duct obstruction.

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INTRODUCTION

Dacryocystitis is a condition in which there is inflammation of the lacrimal sac due to stagnation of the sac contents, as a result of stricture of the nasolacrimal duct arising from chronic inflammation, usually of nasal origin (which is much more common) or due to congenital blockage in the nasolacrimal duct.

Various factors responsible for stasis of tears in lacrimal sac are as follows:

- Anatomical factors, which retard drainage of tear include: comparatively narrow bony canal, partial canalization of membranous nasolacrimal duct or excessive membranous folds in it.
- Obstruction of lower end of the NLD by nasal disease, such as inferior turbinate hypertrophy, marked deviated nasal septum, polyps, tumors, and atrophic rhinitis causing stenosis may also cause stagnation of tears in the lacrimal sac.
- Mild grade inflammation of lacrimal sac due to associated recurrent conjunctivitis may block the NLD.

The code of Hamurabi around 2250 BC made the first documented reference to the surgical treatment of a lacrimal fistula or a lacrimal abscess. Toti¹ who published an article in 1904 describing a surgical treatment of dacryocystitis, made the major contribution to external dacryocystorhinostomy (DCR). Transnasal DCR was first described in 1889 by Killian. Caldwell² (1893) too described intranasal DCR technique involving partial inferior turbinate resection to expose nasolacrimal duct. It was modified later by West,³ in 1911 and Halle,⁴ in 1914 using microscope for visualization.

However, microscopic approach did not gain popularity mainly due to difficulties in visualizing the intranasal anatomy. With the development of rigid nasal endoscopes, the otorhinolaryngologist now has a well-illuminated and magnified view of the nasal cavity. This has facilitated the intranasal surgical approach and has allowed more controlled access and manipulation of the lacrimal sac.

MATERIALS AND METHODS

In the present study, 50 patients attending department of otorhinolaryngology and ophthalmology, IG Medical

College, Shimla, with epiphora were examined and investigated thoroughly to establish their etiology and cases of hyperlacrimation were excluded from this study. Dacryocystitis was diagnosed on the basis of clinical examination by doing regurgitation test and lacrimal syringing. The cases of presacal block were excluded from study group. Other cases excluded were those who had dry eye syndrome, any neoplastic tumors of lacrimal system or who were not willing to be part of the study. Radiological evaluation by X-ray of the paranasal sinuses was done to find out the cause of obstruction of the nasolacrimal apparatus or any other precipitating factor.

Any predisposing or coexisting nasal condition, like deviated nasal septum, middle turbinate hypertrophy (Concha bullosa) was corrected simultaneously to achieve an easier approach and to remove the possible mechanical cause of chronic inflammation and secondary stenosis/insufficiency of the nasolacrimal duct. Endoscopic DCR was done as per standard procedure using hammer-chisel/drill. External-DCR was done by modified DCR technique. Routine postoperative management was done in all cases.

OBSERVATIONS AND DISCUSSION

There was no significant difference in gender or age distribution between the two groups. In both groups, there were three (12%) males and 22 (88%) females. Hartikainen et al⁸ reported 81.2% females and Cokkeser et al¹⁰ 87% females in their study. Singh et al¹⁴ have reported 72% females and 28% males in their study of management of chronic dacryocystitis by endoscopic DCR in Indian population, while Vishwakarma et al¹⁵ reported chronic dacryocystitis in 73.2% females. They have observed that it is more common in women of low-socioeconomic group due to their bad personal habits, long duration of exposure to smoke in kitchen and dust in external environment. In addition to that use of kajal and other cosmetics perhaps increase the chance of transmission of infection. Other possible causes could be congenital anatomical narrowing of nasolacrimal drainage system in females as compared to males.

Average age of patients was 35 years (12–63 years) in group I and 36 years (18–70 years) in group II. Of all the cases, maximum number of cases were in the age group of 21 to 35 years, 27 (54%) cases. Next common age group was 36 to 50 years, 13 (26%) cases. Youngest patient was a girl of 12 years and was only the case in both groups where general anaesthesia was used. She underwent endoscopic DCR. In all other cases of both groups, local anesthesia was used. Oldest patient was 70 years female and had her right external-DCR done. While Hartikainen et al⁸ reported oldest patient of 65 years, Yung et al⁹

of 70 years. The probable explanation of this lower age presentation in our setup can be lower socioeconomic status of the patients, poor hygiene and overcrowding.

Overall, there were 54% patients with left side involvement, 32% with right and 14% with bilateral involvement, indicating that left side is more prone for such pathologies probably due to certain anatomical factors and may be due to some personal habits. Our data match well with that of Hartikainen et al⁸ (62.5%: left), and Singh et al¹⁴ (56%: left). It had been observed that NLD and lacrimal sac form a greater angle on right side than left side. It increases the chance of stasis and obstruction of NLD and lacrimal sac on left side. It was attributed as the probable cause for preponderance of chronic dacryocystitis on left side.

There were 16 (64%) cases of deviated nasal septum in group I. Of 16 patients with deviated nasal septum in group I, six patients underwent septal correction as well, along with endoscopic DCR to facilitate adequate access to the surgical area. Middle turbinate hypertrophy was found in three (12%) patients in group I. Partial middle turbinate resection to exenterate concha bullosa was required in two patients for better visualisation of surgical area. Whittet et al⁵ has also recommended partial resection of middle turbinate and held that it helps in reducing chances of synechiae formation. Yung et al⁹ too recommended trimming of anterior part of bulky middle turbinate. However, Woog et al¹¹ recommended either gentle medial mobilization or complete resection of middle turbinate. They held that partial resection of middle turbinate might promote the development of adhesion between the turbinate and intranasal ostium. But, we did not find any such complication. So, another advantage of endoscopic DCR is that this approach can be combined with surgical eradication of possible etiopathogenic factors of lacrimal stenosis, e.g. septal deviation or chronic rhinosinusitis, as a one stage procedure.

In group I, 15 (60%) surgeries were done on left side, 9(36%) on right side and 1(4%) bilaterally. The ability to operate bilaterally is one of the advantages endoscopic DCR has got over external-DCR. In group II, 15 (60%) surgeries were done on left side and 10 (40%) on right side, reconfirming left side involvement in majority of cases.

There were 3 (12%) cases in group I who had complications during and after the surgery. In one patient, periorbital fat came into nasal cavity while excising mucosa due to accidental breach of lamina papyracea. The complication was recognized immediately and procedure was completed carefully. The outcome in this case was also patent nasolacrimal system. Dolman¹² has also reported this complication in 2.5% of his endoscopic DCR

cases. Two (8%) patients had postoperative periorbital edema which subsided with routine treatment. We did not encounter any major bleeding or any other special complication, like synechia formation, medial rectus injury, conjunctival fistula formation, or canalicular obstruction. Cokkeser et al¹³ also reported no intra- or postoperative complications with their hammer chisel technique except mild mucosal hemorrhage which did not preclude the performance of DCR. Singh et al¹⁴ did not see any major complications except mild to moderate bleeding in few cases where some additional nasal and PNS surgeries were done.

However, in external-DCR group 9 (36%) patient had complications related with surgery. The difference between the complication rate in both the groups was found to be statistically significant ($p < 0.05$). Cokkeser et al¹³ also reported 21.5% complications in endonasal endoscopic dacryocystorhinostomy (EE-DCR) and 39.2% complications in external-DCR.

The average duration of endoscopic DCR was 35 minutes and that of external-DCR was 60 minutes. The difference between the two groups was found to be statistically significant ($p = 0.000$). Cokkeser et al¹⁰ had shown similar results as shown below in Table 1. However, Hartikainen et al⁸ had shown mean duration to be less in endoscopic DCR than that of our value. But they had not performed any additional procedure along with EE-DCR like us.

In endoscopic DCR group, our operative time was more, wherever additional procedure, like septal correction or partial excision of middle turbinate was done. In the initial cases, time taken for surgery was comparatively more than that of later cases. With increasing experience we were able to locate the sac quickly and accurately while assistant was able to precisely manipulate the probe for identification and tenting of medial wall of lacrimal sac.

In our study, the success rate was defined by patency of the lacrimal drainage system on testing with irrigation at 6 months, accompanied by the subjective relief of symptoms by the patient's description. The overall primary success rate for endoscopic DCR was 96% which was equivalent to that of external-DCR (96%). However, group I

was further subdivided into two groups: in one group mitomycin-C was not used and in other it was applied. There was one failure in subgroup where mitomycin-C was not used, making result of this subgroup as 92% successful. There was no statistically significant difference in the success rate between groups I and II, whether success rate of group I was taken as a whole or subgroup wise.

We used mitomycin-C in 12 cases of endoscopic DCR and all the cases had successful outcome, i.e. 100% success rate. Patel et al⁶ used mitomycin-C in two cases of revision DCR and found that it helps in inhibiting scarring. Selig et al⁷ recommended use of adjunctive treatment with mitomycin-C along with endoscopic DCR to improve success rate. They observed that mitomycin-C seem to act by modulating the proliferation of fibroblasts, rather than by causing cell death. Woog et al¹¹ too reported 99.2% success rate in mitomycin-C treated group while performing endoscopic DCR. Keeping in view all these references and our observation, it can be held that mitomycin-C definitely helps in improving success rate. However, there was no statistically significant difference in the success rate of the two subgroups ($p = 0.327$). Reason for this may be the small size of the data.

Our postoperative follow-up was 6 months in both the groups. Singh et al¹⁴ reported average follow-up from 3 months to 1 year, but their success rate is equivalent to that of ours (Table 1). Dolmann MW et al¹² compared results at 6 months and 1 year and held that there was no significant difference in results at these two intervals.

The advantages of endoscopic DCR are minimal morbidity; less intraoperative bleeding; shorter operative time; preservation of pump function of the orbicularis oculi muscle, presacral fibers and medial canthal tendon; and a better cosmesis. Simultaneous treatment of other nasal pathologies, like deviated nasal septum, polyps, concha bullosa, etc. in same sitting is another advantage of endoscopic DCR. Acute dacryocystitis is not a contradiction to endoscopic approach as is with external approach. Endoscopic DCR gives direct access to the sac, thus limiting tissue damage, and angular vein damage, hence preserving the canthal anatomy. Revision surgery is very easy in cases of endoscopic DCR.

Table 1: Mean duration of surgery (minutes)

Present study		Hartikainen J et al ⁸		Cokkeser Y et al ¹⁰		
EE-DCR	External-DCR	EE-DCR	External-DCR	EE-DCR	External-DCR	
35 (25–50)	60 (40–70)	23 (14–38)	78 (60–115)	33 (15–105)	65 (50–120)	
Success rate						
Present study		Cokkeser Y et al ¹⁰		Singh M et al ¹⁴	Yung MW et al ⁹	
EE-DCR	External-DCR	EE-DCR	External-DCR	EE-DCR	External-DCR	
Success rate	96%	96%	89.2%	88.2%	92.6%	93%
Stent Y/N	N	N	Y	Y	N	Y

The advantages of external-DCR are intraoperative visibility inside the lacrimal sac, allowing inspection of the internal punctum and lacrimal sac mucosa. In cases of suspected malignancy of lacrimal sac, external-DCR can be performed with biopsy of the suspected tissue. Malignancy and fibrosis of lacrimal sac are contraindications for endoscopic DCR and external-DCR is the only solution in such cases. Dacryoliths can also be detected and removed with this procedure.

Endoscopic DCR has been known to have some disadvantages, such as small opening size, high equipment cost, difficulty in detecting possible nasolacrimal sac and duct pathology and more frequent follow-up, which is required in the postoperative period for removal of debris and granulations.

The difficulties of external-DCR include intraoperative diffuse bleeding obscuring visibility, usually at the beginning of the surgery and a narrow space in which to suture anterior flaps in spite of large bony ostium created.

CONCLUSION

This study demonstrates that the success rate of surgical, non-laser assisted endonasal endoscopic DCR is similar overall to that of external-DCR. The question who should perform the lacrimal system surgery, the ophthalmologist or the surgeon experienced in endoscopic surgery is debatable. In experienced hands both these surgical techniques have minimal complications and success rates are almost equal. However, choice of surgery may depend on any associated pathology. Mitomycin-C application holds promise of decreasing fibrosis.

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