

Management of Nasolacrimal duct Obstruction through Endoscopic Dacryocystorhinostomy in Patients with Compromised Nasal Airway

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ABSTRACT: **OBJECTIVE:** To study the effects of endoscopic dacryocystorhinostomy in obstructed nasolacrimal duct in patients with compromised nasal airway. **DESIGN:** Quasi Experimental Study. **PLACE & DURATION OF STUDY:** The study was conducted at the department of ENT-Head & Neck Surgery, Dow University of Health Sciences, Karachi from September 2002 to September 2012. Patients were selected from different hospitals including Faiz-e-Aam Hospital, National Medical Centre, Mid City Hospital and Civil Hospital, Karachi. **PATIENTS & METHODS:** Clinical records of 82 patients, who were diagnosed to have nasolacrimal duct obstruction and managed by endoscopic approach, were reviewed. Patients were divided in two groups. Group 'A' comprised patients with normal nasal patency and Group 'B' with compromised nasal airway. Data was collected including age, gender, associated nasal pathologies, or concomitant nasal surgery performed, post-operative relief of epiphora and complications if any, were recorded. Patients were followed up for 3 to 9 months. Surgical success was defined by complete relief from epiphora and free drainage of nasolacrimal duct, after 6 and 9 months of follow up. **RESULTS:** A total of 82 surgeries were performed in this series. Mean age was 41 years, and 52.4% (n=43) were female. Associated nasal pathology was found in 30.5% (n=25/82) patients. The commonest nasal pathology encountered in this study, was deviated nasal septum which was found in 18.3% (n=15/82) cases. Post-operative nasal synechiae and subsequent failure from relief of epiphora was observed in 32% (n=8/25) patients with reduced nasal patency (Group B). In contrast, occurrence of post-operative nasal synechiae was rare 5.2% (n=3/57) cases in other patients where the nasal patency was adequate and not compromised (Group A). **CONCLUSION:** Nasal anatomical or pathological variations are very common which result in reduced nasal patency. Among different nasal conditions, septal deviation is the most common, followed by concha bullosa. These anomalies increase the chances of post-operative synechiae formation. It can be minimized if these nasal conditions are concomitantly corrected.

Key Words: Nasolacrimal duct, Dacryocystorhinitis, Dacryocystorhinostomy, Epiphora, Nasal endoscopy.

INTRODUCTION: Epiphora and dacryocystitis are common clinical problems worldwide, which are mostly caused by obstruction of nasolacrimal duct. About 3% to 5% of the population suffers from this problem¹. This condition more commonly affects females in their fifth or sixth decade of life². This obstruction can occur anywhere, but at the junction between the lacrimal sac and nasolacrimal duct is commonly involved³. Local massage of the sac or probing of nasolacrimal duct may help in relieving its symptoms⁴. The history of lacrimal disease dates back from Hamurabi (2,200 B.C.)⁵, since then many treatment strategies have been suggested. The established surgical treatment to treat this condition is dacryocystorhinostomy (DCR). It is a surgical procedure by which lacrimal flow is diverted into the nasal cavity through an artificial opening made at the level of the lacrimal sac. The operation can be carried out by using either an external or endonasal surgical approach. The external approach was popularized first and became the surgery of choice for ophthalmologists.

This procedure was first described by Toti in 1904⁶, McDonogh⁷ was the first to perform nasal endoscopic DCR in 1989^{7,8}. In 1990's, use of minimal invasive, nasal endoscope revolutionized the surgical treatment by producing scar-less surgery in relatively short period of time, without damaging medial canthal structures⁸. Success rate varied from 60% to 90%, depending on the site of obstruction of nasolacrimal duct (NLD), use of lasers and endoscopic approach^{6,8,9}. The main cause of failure of DCR remained obstruction of the common canaliculus and closure of the osteotomy site by synechiae or nasal adhesions^{1,2}. Over a period of time, different measures were taken to minimize nasal synechiae. Silicon stents are used to maintain the patency of the ostium after DCR procedure. But prolong use of silicone tubes resulted in granulation tissue formation at the neo-ostium, resulting in the failure of the procedure⁴. Mitomycin C, which is an antimitotic and antiproliferative agent, was used to prevent nasal adhesion formation, with varying degrees of results. Narrow nasal passage may also adversely

affect post-operative success rate by increased chance of nasal synechiae formation due to narrow working space and close approximation of different anatomical structures. A variety of anatomical and pathological conditions of nose result in reduced nasal passage, so the purpose of this study was to determine the role of different nasal anatomical condition which reduce nasal patency on the outcome of endoscopic nasal dacryocystorhinostomy.

PATIENTS AND METHODS: The study was conducted at the department of ENT-Head & Neck Surgery, Dow University of Health Sciences, Karachi from September 2002 to September 2012. Patients were selected from different hospitals including Faize-Aam Hospital, National Medical Centre, Mid City Hospital and Civil Hospital, Karachi. Patients who were diagnosed to have post saccal nasolacrimal duct obstruction were included in the study. All patients were operated under general anaesthesia, using 0° and 30° rigid endoscopes, by the same surgeon. Patients were sorted in two groups. Group 'A' comprised patients with normal nasal patency. Patients with reduced nasal patency were included in group 'B'. History, clinical examination and computerized tomographic scans of nose and paranasal sinuses were obtained to document the evidence of anatomical or pathological cause of reduced nasal airway, e.g. nasal septal deviation, concha bullosa or polypi etc. All patients had distal canalicular obstruction. Endoscopic dacryocystorhinostomy was performed under general anaesthesia. A 2% lignocaine in 1:100,000 solution of adrenaline was injected anteriorly and superiorly to anterior attachment of middle turbinate. A vertical mucosal incision was given in the lateral wall of nose, just anterior to the anterior attachment of middle turbinate. Mucoperiosteal flap was raised up to anterior attachment of middle turbinate. Lacrimal bone was identified and removed to expose lacrimal sac that was confirmed by passing a probe from the canaliculus. The lacrimal sac was opened by giving a crisscross incision in the medial wall of lacrimal sac, which was partially resected. Silicone stents was passed through upper and lower canaliculus into the nose. A stay suture was applied to retain for a period of 6-8 weeks, till the patient is symptom free or there is free flow of tears into nose. All patients were given prophylactic topical and systemic antibiotics with saline nasal douches, post-operatively for about three weeks. Main outcome measures were complete relief from epiphora, with free drainage of fluid through nasolacrimal duct, and presence or absence of nasal synechiae formation after 6 and 9 months of follow up. The results were statistically analyzed by Chi Square test and Fisher Exact test and significance level of $p < 0.05$ was taken as reference value.

RESULTS: From September 2002 to September 2012, altogether 82 surgeries were performed in this series. Age of the patients ranged from 8-60 years with mean age was 41 years. Females were slightly more in number 52.4 % (n=43). Male to female ratio was found to be 1: 1.2 (Table-1). Associated nasal pathology was

Gender	Frequency No. of Patients	Percent	Valid Percent	Cumulative Percent
Male	39	47.6%	47.6%	47.6%
Female	43	52.4%	52.4%	100.0%

Table 1 : Gender distribution (n=82).

Nasal Pathology	Frequency No. of Patient	Percent %	Relief of Symptoms	Adhesions
CB	8	9.8%	5	3
DNS	15	18.3%	10	5
Polyp	2	2.4%	2	0
Absent	57	69.5%	54	3

Table 2 : Results showing different Nasal Pathologies (n=82) .

	Group A (Patients with Normal nasal patency) n=57	Group B (Patients with Reduced nasal patency) n=25	Grand Total n=82
	Relief of epiphora	54 (65.8%)	17 (20.7%)
Adhesions	3 (3.6%)	8 (9.7%)	11 (13.4%)

Table 3: Results showing relief of epiphora and adhesions in groups A and B.

found in 30.5% (n=25) patients. The commonest nasal pathology encountered in this study was deviated nasal septum which was found in 18.3% (n=15/82). Other nasal pathologies found were concha bullosa in 9.7% (n=8/82), and nasal polypi in 2.4% (n=2/82), (Table 2). Failure from relief of symptoms i.e. epiphora was associated when patients were found to have associated nasal pathologies. Failure due to nasal adhesions and subsequent epiphora were more commonly noticed in 32% (n=8/25) in group 'B', who had compromised nasal passage. Post-operative nasal adhesions were rare occurring in 5.2% (n=3/57) in group 'A' which comprised 69.5% (n=57/82) patients, who were free from associated nasal pathologies. Corrective surgery in the form of septoplasty, turbinectomy or endoscopic sinus surgery was performed where required in other cases. After corrective surgery these cases were included as normal cases where concomitant pathology was absent. Post-operative synechiae formation was dropped from 9.7% to 3.6%, with overall improvement of results (Table 3).

DISCUSSION: The most common cause of a surgical failure in endoscopic DCR is obstruction of the neo-ostium by granulation tissue or synechiae that forms post-operatively¹⁰. To avoid or prevent obstruction of the neo-ostium, many modified techniques have been attempted. These include complete separation of the sac from the nasolacrimal duct to divert lacrimal flow to the neo-ostium¹², use of steroids or mitomycin-C^{13,14}, and use of mucosal flaps after wide resection of bone surrounding the sac¹⁵⁻¹⁷. We used silicone stents in all our cases to maintain the opening of the neo-ostium and to prevent synechiae of the canaliculus. There are debates over the use of silicone tubing in endoscopic DCR. Some researchers have reported 81-87% success rates without using silicone tubes after

endoscopic DCR, and so, either do not recommend using silicone tubing or advise removing it early because of granulation formation stimulated by the tubing itself¹⁹. Anatomical variants of the sinonasal cavities are very common and about 15 major variants have been described²⁰. These anatomical variations cause narrowing or obstruction of the osteo-meatal channels. Any surgical intervention in narrow nasal cavities may result in mucosal damages of adjacent structures leading to synechiae formation²¹. Nasal septum deviation is the most common disorder that presents in up to 62% of the population^{20,21}. The incidence of concha bullosa, which is a pneumatized cavity within middle turbinate of the nose, has varied from 14 to 53% in different studies^{20,21,22}. Nasal septum deviation has been observed in neonates. In a randomized group of newborns, it was found that 21.8% had nasal septal deviation²³. The commonest cause of nasal septal deviation in neonates was birth trauma^{23,24}. In one study, it has been observed that incidence of nasal septum deviation increases with age. Nasal fracture is the most common facial fracture, and the prevalence of nasal septal deformity and its relationship with the different types of sinonasal pathologies and increased rate of complications have been assessed in different studies^{22,23}. In a study by Nussbaumer et al., 55 out of 256 patients (21.5%) required additional endonasal procedures to improve access to the lacrimal area²⁴. In a recent study by Cheng et al., out of 28 dacryocystorhinostomies (DCR), septoplasties were also performed in 25 patients, with overall improvement of results to 96.4%²⁵. They concluded that septoplasty was an effective and safe procedure during endonasal DCR, allowing better exposure of the surgical field in patients with significant DNS.

In present study, associated nasal anomalies have resulted 26.6% increased incidence of nasal synechiae formation i.e. 32% (8/25), in group 'B', who had also reduced nasal patency. The other group of patients, whose nasal cavities were normal, demonstrated lower 5.2% (3/57) incidence of nasal synechiae formation. This is in accordance with other studies published so far¹¹. This study also demonstrated that septal deviation was the most common anomaly followed by concha bullosa, which is also concordant to other published data in literature. In our study, the main complication was post-operative synechiae formation, which occurred in 11/82 (13.4%) cases. Other rare complications of endoscopic DCR include, bleeding from the nasal cavity, orbital injury, CSF leakage through a fractured ethmoid, and corneal abrasion or canaliculi erosion due to the overly-tight silicone tube placement^{6,19,26}. Recurrent infections can occur if the lower portion of the bone surrounding the sac is removed inadequately¹⁷. In recent years, Lasers were also used to improve surgical success rate and minimize nasal adhesion or synechiae formation²⁷. But there is no convincing evidence to prove that use of lasers is of any added advantage in improving the success rate.

CONCLUSION: Nasal anatomical or pathological

variations are very common which result in reduced nasal patency. Among different nasal conditions, septal deviation is the most common followed by concha bullosa. These anomalies increase the chances of post-operative synechiae formation. It can be minimized if these nasal conditions are corrected. Endoscopic DCR has equally good results in the management of nasolacrimal duct obstruction. It does not produce external surgical scar. It preserves medial fibers of orbicularis oculi muscle and lacrimal pump action. The surgery is performed more quickly as a day care procedure. Concomitant nasal problems like septal deviation, enlarged turbinates or nasal polyposis can also be corrected at the same time, thereby improving success rate. Besides, endoscopic approach can deal with nasal conditions e.g. nasal septal deviation, concha bullosa and nasal polypi etc. Thereby increasing the success rate and also reducing rate of post operative complications.

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