

## Limited Approach in Endoscopic Dacryocystorhinostomy of Pediatrics

### Abstract

**Background:** Limited spatial nasal cavity in children, make pediatric dacryocystorhinostomy (DCR) a difficult surgical procedure. We apply a limited approach to pediatric DCR and follow them for their consequences. **Materials and Methods:** An experimental study was done in pediatric DCR with limited approach (age < 14-year-old). After written consent, with general anesthesia, with nasal endoscopic surgery, lacrimal bone is exposed and extruded. In contrast with routine procedure, ascending process of maxillary sinus reserve; and marsupialization and wide exposure to lacrimal sac was done only by lacrimal bone defect; and cannulation preserve with temporary silicone tube. **Results:** Between 2006 and 2012, 16 pediatric DCR was done by a unique surgeon in 2 otorhinolaryngologic centers. Before surgery 14 (87.5%) had epiphora, 3 (18.8%) had eye discharge, and 3 (18.8%) had eye sticky eye. Two (12.5%) had history of facial trauma, and 10 (62.5%) had congenital nasolacrimal duct insufficiency. Five (31.3%) had history of dacryocystitis. Patients were followed for  $17 \pm 9$  months. Silicone tube stayed for  $4 \pm 2.5$  months. We could follow 7 patients and minimal improvement or need to revision surgery considered as technical failure. After surgery, 3 patients had no epiphora with complete improvement; 2 had very good improvement with confidence of the patients and parents; 2 cases had unsuccessful surgery in our patients, who needs to another surgery. One of them had several probing and surgery before our endoscopic DCR. **Conclusions:** Limited approach in endoscopic DCR of pediatrics can be done in noncomplicated patients, with minimal manipulation, more confidence, and acceptable results.

**Keywords:** *Dacryocystorhinostomy, endoscopy, methods*

### Introduction

Nasolacrimal duct obstruction (NLDO) may cause by traumatic injury, congenital obstruction, infections, or idiopathic. Patients complain of epiphora, eye discharge, and dacryocystitis as a result of nasolacrimal obstructive symptoms. Obstructions of the lacrimal apparatus can occur in distal (sac or duct) or proximal (punctal stenosis or absence, single canalicular or common canalicular [lateral or medial]) parts or may be functional. Dacryocystorhinostomy (DCR) cannot reliably managing obstructions proximal to and including the common canaliculus.<sup>[1]</sup>

Lacrimal pathway stenoses in childhood are uncommon after the 1-year-old. Different conservative treatments such as hot compresses, massages, topical antibiotics, probing, and intubation of the lacrimal pathways uses to improve stenosis of lacrimal apparatus.<sup>[2]</sup> Persistent NLDO is treated by probing, intubation,

or balloon dacryoplasty; and then surgical implementation is the next step, which may be external or endoscopic.<sup>[3]</sup>

Refractory cases have been managed by DCR.<sup>[4]</sup> DCR can be done by external or endoscopic approach, and endocanalicular laser-assisted surgery. Limited spatial nasal cavity in children, poorly defined and rapidly changing anatomy, along with a tendency toward vigorous growth of scar tissue, make pediatric DCR a difficult surgical procedure, and may alter surgical results.

We apply a limited approach to pediatric DCR and follow them for their consequences.

### Materials and Methods

An experimental study was done in pediatric (<14 years old) DCR with limited approach. Between 2006 and 2012, 16 pediatric DCR was done by one surgeon in 2 Otolaryngologic Center (Kashani and Pars Medical Center, Isfahan, Iran).

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After written consent, with general anesthesia, surgery was done with limited approach in compared to extended endoscopic DCR the introduced by Professor Wormald,<sup>[5]</sup> that “by the guide of rigid light with the 4-mm or 2.7-mm 30° endoscope superior nasal mucosal flap is elevated from the lateral nasal wall and reflected over the axilla of the middle turbinate and then expose the lacrimal extended by removing lacrimal bone and the part of us ending process of maxillary bone that covered the lacrimal sac.”<sup>[5]</sup>

We explore the lacrimal sac anterosuperior to M-point. M-point was defined as the midpoint of a maxillary line. The maxillary line corresponded intranasally to the junction of the uncinate and maxilla and extranasally to the suture line between the lacrimal bone and maxilla within the lacrimal fossa. This suture was around half way between the anterior and posterior crests. In the axial plane, M-point adjusted with the superior margin of the maxillary sinus ostium posteriorly (average 10 mm) and is just inferior to the lacrimal sac-duct junction anteriorly. The M-point was about 3.9 cm from the nasal sill in women and 4.8 cm in men (for alive patients).<sup>[6]</sup>

The periosteum is reflected from the anterior lacrimal crest to reveal the lacrimal sac fossae. The sac is then reflected laterally. Lacrimal bone is exposed and extruded.

In contrast with routine procedure, ascending process of maxillary sinus was reserved; and marsupialization and wide exposure to lacrimal sac were done only by lacrimal bone defect; Canulation preserves with temporary silicone tube.

Patients followed at least 2 months after surgery by visiting in the otolaryngology office, and we wanted them to follow after the silicone tube removal.

If they did not follow, we called them by telephone to inform about subjective improvement. Minimal improvement or need to revision surgery considered as technical failure.

## Results

16 patients were studied; mean age was  $5 \pm 3$ -year-old. Ten (62.5%) was female, and 6 was male. Two patients (12.5%) had a history of facial trauma, and 10 (62.5%) had congenital nasolacrimal duct insufficiency. Five (31.3%) children had history of dacryocystitis [Table 1].

Before surgery, 14 (87.5%) cases had epiphora, 3 (18.8%) had eye discharge, 3 (18.8%) had sticky eye. Eight DCR was done on the right eye, and 9 DCR on left eye.

Patients were followed for  $17 \pm 9$  months. Silicone tube stayed for  $4 \pm 2.5$  months (at least 2 months). All of the patients had improvement during the stay of silicone tube.

We could follow 7 patients after silicone tube removal. After surgery, 3 patients had no epiphora with complete

**Table 1: Demographic data of the patients**

Variable	Frequency (%)
Age (years)	
2	1 (6.2)
3	2 (12.5)
4	5 (31.2)
5	4 (25)
8	1 (6.2)
9	1 (6.2)
12	1 (6.2)
14	1 (6.2)
Male/female	6/10
History of dacryocystitis	5 (31.3)
History of facial trauma	2 (12.5)
Congenital nasolacrimal duct insufficiency	5 (31.3)
Epiphora	14 (88.5)
Discharge	3 (18.8)
Sticky eye	3 (18.8)

improvement; 2 had very good improvement with satisfaction of the patients and parents; 2 cases had unsuccessful surgery in our patients, who needed to another surgery; one of them had several probing and surgeries before our endoscopic DCR.

Five of seven patients with successful follow-up had improvement so limited endoscopic DCR approach had 71.4% success rate.

## Discussion

This study revealed acceptable success rate of modified DCR technique, without maxillary extrusion in pediatric population.

The study of Komínek and colleagues in pediatric DCR with “standardized Tsirbas, and Wormald. Technique” on 58 cases revealed the success rate of 51/58 (87.9%).<sup>[7]</sup> The standard surgical procedure was a manual osteotomy of the frontal process of the maxilla and removal of the lacrimal bone. Preserving the lacrimal and nasal mucosa through an endoscopic approach has a great importance in this method.<sup>[8]</sup>

In another study of standard technique with 8 pediatric cases (11 eyes), 90.9% completely became symptom-free.<sup>[9]</sup>

Jones *et al.* studied this technique on 34 patients (43 ducts); in patients with congenital NLDO (with normal craniofacial abnormalities), 22 of 29 eyes (76%) were cured, 3 (10%) showing improvement; and in patients with congenital craniofacial abnormality or syndrome one of 11 (9%) eyes experienced complete resolution and four of 11 (36%) eyes got better. Of the patients with acquired NLDO, two of three (67%) of the eyes were cured and one (33%) improved.<sup>[10]</sup>

Leibovitch *et al.* evaluated 21 cases; anatomical success rate (free flow of fluorescein sodium and patency of ostium

on nasal endoscopy) was 100%, and the clinical success rate (resolution of epiphora) was 92.3%.<sup>[3]</sup> Berlucchi showed 100% success rate on 6 patients.<sup>[2]</sup> Vanderveen evaluated 17 children (22 ducts), and they demonstrated all but 2 patients (88%) with NLDO showed complete resolution of tearing and discharge.<sup>[11]</sup>

Endoscopic KTP laser was also used in dacryocystorhinostomy; Doyle *et al.* studied 5 patients (6 eyes) and all patients experienced a recurrence of their symptoms postoperatively.<sup>[12]</sup>

In 2011 Uysal *et al.* reported endocanalicular diode laser procedure on 18 cases had 100% the anatomical success rate (patency of ostium on nasal endoscopy), and the clinical success rate (resolution of epiphora) was 85%.<sup>[13]</sup> NLDO treated with a multidiode transcanalicular laser, and bicanalicular silicone intubation stenting had a functional success rate of 95.2% in other reports.<sup>[14]</sup>

In a study of external dacryocystorhinostomies on 134 cases, symptoms were improved in all cases and complete cure achieved in 96%, with no immediate postoperative complications and only few (3%) short-term complications.<sup>[15]</sup>

We had 71.4% success rate in our limited approach that was less than other studies; it should be accomplished by other supplementary methods to improve our results.

Limitation of this study was at a first small number of the study population and lack of appropriate follow-up. Gathering the number of more referral centers data can improve the number, but this method of surgery should be taught and then follow their patients. Another limitation was an improvement of follow-up and its scoring; it could improve by more visits of patients and more precise indicators of lacrimal pathway patency in the follow-up period.

Limited Approach in endoscopic DCR of pediatrics can be done in noncomplicated patients, with minimal manipulation, more confidence, and acceptable results.

## Conclusions

The limited approach in endoscopic DCR of pediatrics can be done in noncomplicated patients, with minimal manipulation, more confidence, and acceptable results.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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