

ORIGINAL ARTICLE

# Facial Asymmetry and Nasal Septal Deviation in Acquired Nasolacrimal Duct Obstruction

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## ABSTRACT

**Introduction:** Acquired nasolacrimal duct obstruction is a common disorder affecting adults. Its pathogenesis is not known. We hypothesize that facial and bony asymmetry can contribute to the unilaterality of the nasolacrimal duct obstruction.

**Materials and Methods:** Retrospective study was done on all patients with acquired nasolacrimal duct obstruction who presented to our practice from January through June 2010. External photographs were obtained. Lacrimal probing and irrigation was used to confirm blockage of the nasolacrimal duct. Nasal endoscopy was performed to visualize the intranasal anatomy and location of the nasal septum.

**Results:** There were 23 patients who underwent endoscopic dacryocystorhinostomy (11 males, 12 females) for acquired nasolacrimal duct obstruction. Average age was 58 years old (range, 27 to 84 years). Facial photos analysis showed facial asymmetry in 17 patients, with one side being smaller than the other side. This corresponded to the side of the nasolacrimal duct obstruction in 12 out of these 17 patients (p-value 0.03). Nasal endoscopy revealed septal deviation to the side of the nasolacrimal duct obstruction in 21 of the 23 patients, with one having twisted septal deviation. Septoplasty was performed in 10 cases in addition to endoscopic dacryocystorhinostomy.

**Conclusions:** Unilateral nasolacrimal duct obstruction appears to occur on the side in which the nasal septum is deviated. There is a trend of nasal septal deviation toward the smaller side of the face. Further prospective studies are needed to clarify the above relationships.

**Keywords:** Facial asymmetry, Acquired nasolacrimal duct obstruction, Nasal septal deviation

Secondary acquired nasolacrimal drainage obstruction (NLDO) can be caused by infectious, inflammatory, neoplastic, traumatic, or mechanical processes. The pathogenesis of primary acquired nasolacrimal duct obstruction is unknown. It is essentially an idiopathic inflammation and fibrosis without any precipitating cause that leads to partial stenosis or complete occlusion of the nasolacrimal duct (Tucker et al., 1997). It affects women, typically after age 40, more frequently than men (Woog, 2007). Studies have shown the higher incidence of NLDO in women is not related to sexual hormones, viral infection, or eye make-up (Kashkouli et al., 2010). The increased incidence is believed to be related to the anatomical difference between the bony nasolacrimal excretory system in men versus women (Groessl et al., 1997).

Asymmetry of the face is not rare; studies on laterality of the normal human skeletal face which

employed relatively small sample sizes reported a dominance of the right side hemiface (Farkas and Cheung, 1981; Shah and Joshi, 1978). In regard to patients having skeletal deformities, previous reports using larger sample sizes have also documented proportions of facial asymmetry as 25–80% in the United States (Haraguchi et al., 2002; Proffit et al., 1990). The shorter or smaller side of the face has accompanying deviated nose with higher ala and deeper nasolabial fold, orbital dystopia, and higher cheekbone. Of significance, the nasal septum is deviated toward the shorter side of the face (Hafezi et al., 2010). Moreover, there is a higher incidence of facial asymmetry in patients with nasal deviation. Interestingly, studies have shown that septal deviation is associated with an increased prevalence of rhinosinusitis (Orlandi, 2010).

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We hypothesize that facial and bony asymmetry can contribute to the unilaterality of the nasolacrimal duct obstruction. Herein, we analyze our patients with NLDO undergoing dacryocystorhinostomy (DCR).

## MATERIALS AND METHODS

This was a retrospective interventional case series. All patients with primary acquired nasolacrimal duct

obstruction who presented to our practice from January through June 2010 were analyzed. External photographs were obtained using a standardized technique in the frontal position. Figure 1 depicts facial asymmetry analysis. Nasal endoscopy was performed to visualize the intranasal anatomy and location of the nasal septum. Observers were blinded to either analyzing the external photos or performing endoscopic nasal septal deviation evaluation. Lacrimal probing and irrigation was used to confirm blockage of the nasolacrimal duct. All patients underwent endoscopic DCR.

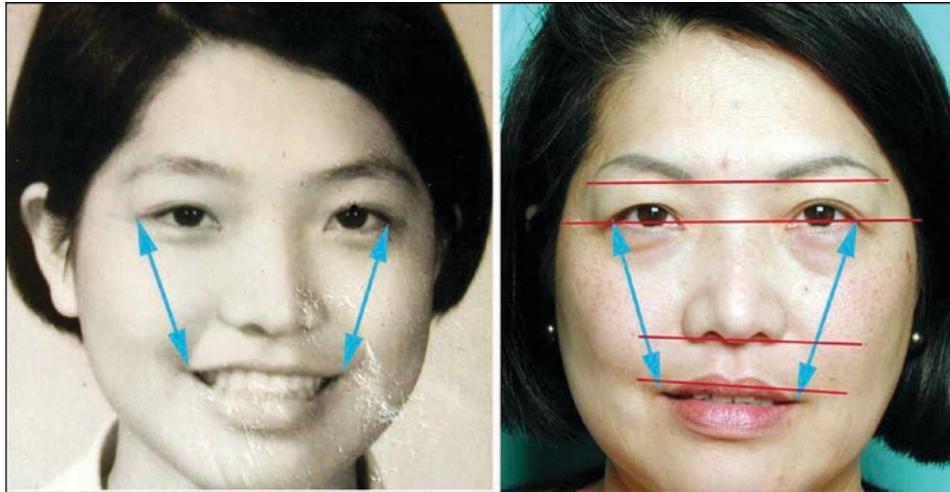


FIGURE 1 This figure depicts facial asymmetry analysis, using straight lines drawn from the lateral canthus to the corner of the mouth. Both photos are of the same person; the left at age 20 years old and the right at age 55 years old.

TABLE 1 List of all patients with NLDO who underwent DCR.

Case	Age/Sex	Septal Deviation	Facial asymmetry (small side)	Nasolacrimal duct obstruction	Septoplasty
1	27/F	R	M	L	No
2	77/M	M	L	L	No
3	80/M	L	L	L	Yes
4	75/M	L	L	L	Yes
5	60/M	R	R	R	No
6	40/M	R	L	R	Yes
7	70/M	R	L	R	Yes
8	59/F	R	M	R	No
9	60/F	R	M	R	No
10	38/F	L	R	L	Yes
11	50/F	R	M	R	Yes
12	65/F	L	L	L	No
13	84/M	L	L	L	No
14	39/F	R	L	R	No
15	48/F	R	R	R	Yes
16	62/M	L	L	L	Yes
17	65/F	M	M	R	No
18	45/F	R	L	R	No
19	56/M	L	L	L	No
20	53/F	L	L	L	Yes
21	69/M	M	M	R	No
22	55/F	L	L	L	Yes
23	58/M	L	L	L	No

R=right, L=left, M=midline.

## RESULTS

A total of 23 patients underwent endoscopic DCR (11 males, 12 females) for primary acquired nasolacrimal duct obstruction. Average age was 58 years old (range, 27 to 84 years).

Facial photos analysis showed facial asymmetry in 17 patients, with one side being smaller than the other side (left 14, right 3) (Table 1). This corresponded to the side of the nasolacrimal duct obstruction in 12 out of these 17 patients ( $p$ -value 0.03). Nasal endoscopy revealed septal deviation to the side of the nasolacrimal duct obstruction in 21 of the 23 patients, with one having twisted septal deviation. Septoplasty was performed in 10 cases in addition to endoscopic DCR. Mean follow-up time was 6 months (range, 3–12 months). Representative cases are shown in Figures 2 and 3.

## DISCUSSION

Facial asymmetry can be subtle and go unnoticed. The smaller or shorter side of the face can have the following features: dystopic orbits, elevated lip corners,

asymmetric zygomatic arches, asymmetric misplaced nasal alae, and lack of parallel growth on both sides of the nose (Hafezi *et al.*, 2010).

Unilateral nasolacrimal duct obstruction appears to occur on the side in which the nasal septum is deviated. There is also a trend of nasal septal deviation toward the smaller side of the face. This can possibly explain the pathogenesis of primary acquired NLDO.

The formation of the lacrimal drainage system begins at the 4th fetal week and the process is completed until the end of the 7<sup>th</sup> month (Dantas, 2010; Mann, 1957). The fusion of the medial nasal prominence and maxillary prominence causes the formation of the nose and midface (Mathes, 2006). Some authors believe that there is a cause and effect relationship between maxillary and nasal growth centers. Grymer *et al.* (1991) examined 42 identical twins and found some influence of the nasal septum and total nasal resistance on the development of the nasomaxillary complex. Freng *et al.* (1988) compared the facial growth in deviated and non-deviated septum patients and revealed significant growth problems in surrounding skeletal areas, such as smaller posterior facial height, which causes cartilage buckling, leading to resistance to normal nasal airflow.

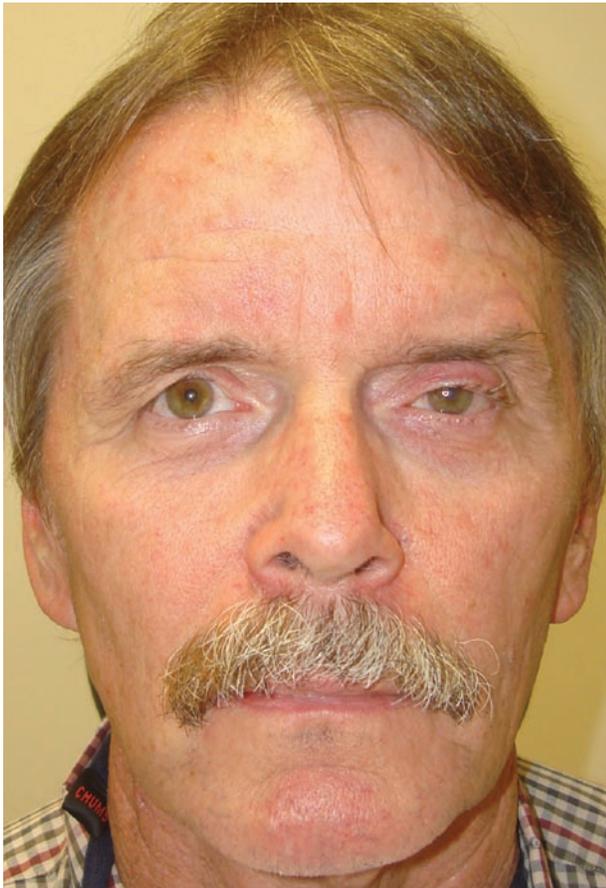


FIGURE 2 A 59-year-old male, with left nasolacrimal duct obstruction and left septal deviation. Note the facial asymmetry with left side smaller than right. He underwent endoscopic DCR with septoplasty.

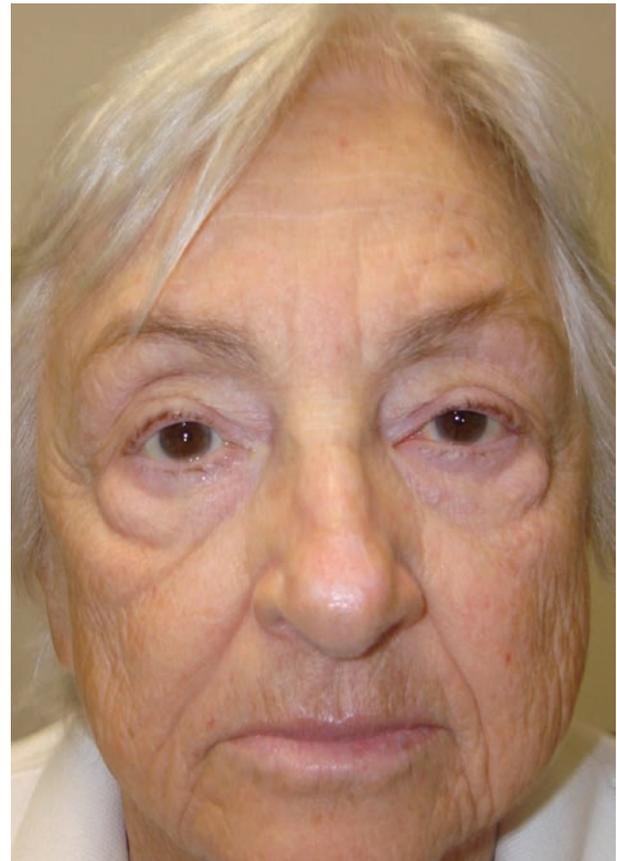


FIGURE 3 84 year-old female, with left nasolacrimal duct obstruction and minor septal deviation. Note the facial asymmetry with left side smaller than right. She underwent endoscopic DCR without septoplasty.

It seems that the cause of a congenital crooked nose may be part of a larger genetic problem. By inhibiting multiple facial growth centers, this genetic problem results in slower growth on one side of the nose, causing it to deviate toward the slow-growing side of the face. At the moment, we are not sure whether facial growth retardation deviates the nasal tip and curves the septum toward the pathology or whether there is genetic information that controls both face and nose growth simultaneously. Findings from a few cases of similar asymmetric faces in siblings or parents and children strengthen the theory of genetically determined deformities rather than traumatic or developmental ones. However, substantial further research is required to prove this hypothesis.

Interestingly, studies have shown the dominant growth of the right side or hypo-growth on the left side of the face (Frakas and Cheung, 1981; Shah and Joshi, 1978). The dominance of left side laterality is seen in subjects without any discernible postnatal factor, which supports a congenital basis. In our small case series, 14 of the 17 patients with facial asymmetry had the left side smaller. It is hypothesized that neural crest migrations are more likely to be delayed on the left side, and preceded on the right side (Geschwind and Galaburda, 1985; Haraguchi et al., 2002). An initial subtle difference in timing of migration may lead to an eventually obvious dominance of the right side of the face. Moreover, our patient population was equally divided among the sexes, even though primary acquired NLDO is more often observed in women. Perhaps our observation in facial anatomy and nasal septal deviation would be more fitting for the smaller subset of men who are affected rather than women. A larger series would be useful to answer this question.

In summary, our study shows that unilateral NLDO appears to occur on the side in which the nasal septum is deviated. There is also a trend of nasal septal deviation toward the smaller side of the face. This is consistent with other studies showing a significant growth retardation of the midface and orbit on the concave side of the nose. Unilateral NLDO may relate to bony facial asymmetry. Further prospective studies, with 3-dimensional CT scanning, are needed to clarify the above relationships and provide quantitative analysis of facial asymmetry, nasal septal deviation, and nasolacrimal duct canal size.

**Declaration of interest:** The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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**Proprietary interests:** none.

**PRECIS:** Unilateral nasolacrimal duct obstruction may relate to bony facial asymmetry and nasal septal deviation.

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