

# The Effect of Stenosis Nature on Success of Silicone Intubation for Nasolacrimal Duct Stenosis in Adults

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## Abstract

**Purpose:** To evaluate the effect of stenosis nature on success of silicone intubation for nasolacrimal duct stenosis (NLDS) in adults (patent nasolacrimal duct with resistance to positive-pressure irrigation)

**Methods:** An interventional case series of consecutive monocanalicular and bicanalicular silicone intubation for nasolacrimal duct stenosis in adults were reviewed. The severity of the stenosis was classified by the surgeon as simple (defined as an easy passage during the probing procedure) or tight (defined as a resistance along the nasolacrimal duct with difficulty in probe passage). Treatment success was defined as the complete resolution of epiphora or intermittent epiphora with normal dye disappearance test at one year after tube removal.

**Results:** The study were included a total of 49 eyes of 37 patients (21 females and 16 males). The mean age at the time of surgery was 49.45±19.22 years (range, 14-79 years). Simple stenosis was found in 31 eyes (63.3%) and tight stenosis was found in 18 eyes (36.7%). Treatment success was achieved in 35 of 49 eyes (71.4 %). There was a statistically insignificant increase in treatment success of intubation in tight stenosis (88.8%) compared with simple stenosis (61.2%) (p=0.05).

**Conclusion:** Silicone intubation was more successful in eyes with tight nasolacrimal duct stenosis. However, the severity of the stenosis was not a predictive factor for intubation failure.

**Keywords:** Nasolacrimal Duct Stenosis, Silicone Intubation

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## Introduction

The term nasolacrimal duct stenosis (NLDS) describes patients with epiphora where nasolacrimal duct is partially patent to syringing (partial irrigation into the nose accompanied by some amount of reflux).<sup>1</sup>

Management of NLDS includes dacryocystorhinostomy,<sup>2,3</sup> balloon catheter dilatation, with and without silicone intubation,<sup>4,5</sup> silicone intubation (monocanalicular versus bicanalicular, double

bicanalicular)<sup>6-8</sup> and probing.<sup>9</sup> Bicanalicular or monocanalicular silicone intubation have been used with success rates of 53 to 60%.<sup>6,7</sup>

The purpose of this retrospective study is evaluation of stenosis nature as a predictive factor for outcome of silicone intubation for NLDS in adults. This study may assist in surgical decision-making based on intraoperative findings.

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## Methods

We performed a retrospective chart review of consecutive patients with NLDS, who underwent monocanalicular or bicanalicular silicon intubation of nasolacrimal duct from 2010 to 2012. The study was approved by the Tabriz University of Medical Sciences ethics committee.

The diagnosis of NLDS was based on a history of acquired epiphora in the presence of dye disappearance test longer than five minutes and positive irrigation with reflux on syringing. Diagnostic probing was performed from the lower punctum. After a feeling of "hard stop," irrigation of the nasolacrimal duct with normal saline was performed. Patients with some amount of reflux through the canaliculi (resistance to positive-pressure irrigation) and simultaneous passage of fluid in the throat were included. Also, all patients had confirmation of nasolacrimal duct abnormality made through nuclear lacrimal scintigraphy.

The patients with ocular surface diseases, abnormal lid position at rest or in blinking, punctal or canalicular abnormality, prior trauma or surgery of the lacrimal system, history of nasal diseases, early tube removal or early tube loss (less than three months) and less than one year of follow-up after the tube removal were excluded from the study.

All nasolacrimal intubation were performed under general anesthesia by a single oculoplastic surgeon (D.A.). The severity of the stenosis was classified by the surgeon as simple (defined as an easy passage during the probing procedure) or tight (defined as a resistance along the nasolacrimal duct with difficulty in probe passage). In the monocanalicular technique, a medium collaret Monoka Fayet tube (Guide of Crawford, Paris, France, FCI) was placed through the lower punctum. In the bicanalicular technique, a Crawford stent with an olive tip (Paris, France, FCI) was placed through the lower and upper punctum.

Treatment success was defined as the complete resolution of epiphora or intermittent epiphora with normal dye disappearance test at one year after tube removal.

Statistical analysis was performed by SPSS-17 software (SPSS, Inc., Chicago, IL). Descriptive statistics, including the mean and standard deviation were calculated for all

variables. Statistical analysis was performed using the  $\chi^2$ , the Fisher exact and the Independent Samples *t*-tests. A *p* value less than 0.05 was considered statistically significant.

## Results

In our study a total of 49 eyes of 37 patients (21 females and 16 males) with NLDS were included. The mean age at the time of surgery was  $49.45 \pm 19.22$  years (range, 14-79 years). The monocanalicular stent was used in 28 eyes, whereas bicanalicular stent was used in 21 eyes. Simple stenosis was found in 31 eyes (63.3%) and tight stenosis was found in 18 eyes (36.7%). Baseline characteristics by stenosis nature are given in table 1.

There was no correlation between the increasing age and the accumulation of tight stenosis ( $p=0.9$ ). Also, there was no correlation between the sex and the accumulation of tight stenosis ( $p=0.76$ ). Treatment success was achieved in 35 of 49 eyes (71.4%). Treatment success was achieved in 16 of 18 eyes with tight stenosis. Treatment success was achieved in 19 of 31 eyes with simple stenosis. Intubation was more successful in tight stenosis (88.8%) compared with simple stenosis (61.2%). However, the severity of the stenosis was not a predictive factor for intubation outcome ( $p=0.05$ ).

**Table 1.** Baseline characteristics by stenosis nature

Type of intubation	Simple stenosis	Tight stenosis	<i>p</i> value
Monocanalicular	19/31 (61.2%)	9/18 (50%)	0.55 *
Bicanalicular	12/31 (38.7%)	9/18 (50%)	

\*: Fisher exact test

## Discussion

Silicone intubation is less invasive procedure than endoscopic versus external dacryocystorhinostomy.<sup>10</sup> Also, silicone intubation holds another advantage: instead of creating a nonphysiologic bypass of the nasolacrimal duct, the normal anatomic pathway is reestablished.<sup>5</sup>

Overall, our surgical success was higher than other reports, achieving 71.4% success at one year. Kashkouli et al compared monocanalicular silicone intubation with

bicanalicular silicone intubation in 48 consecutive cases of NLDS. The authors achieved a lower success rate with monocalicular silicone intubation (61.3%) and bicanalicular silicone intubation (59%).<sup>7</sup> Also, Connell et al reported a 55% success rate for silicone intubation in partial nasolacrimal duct obstruction.<sup>6</sup>

Tight stenosis was found in 18 eyes (36.7%) in our study. Also, the difficulty of intubation was recorded in 38.7% of eyes in study by Connell et al.<sup>6</sup>

There is female preponderance as compared to males in diseases of lacrimal drainage system.<sup>9,11</sup> The predilection for females can be explained by the narrower lumen of the bony nasolacrimal canal or possibly endocrine factors.<sup>11</sup> However, gender had no significant association with the accumulation of tight stenosis in our study ( $p=0.76$ ). Also, Kashkouli et al reported that there was no evidence in favor of the role of sex hormones in pathogenesis of nasolacrimal duct obstruction in adults.<sup>12</sup>

There was no correlation between the increasing age and the accumulation of tight stenosis ( $p=0.9$ ) in our study. We could not find any association between age and the accumulation of tight stenosis in the literature.

Placement of a silicone stent allows reduction of flow resistance and increasing flow volume through dilation of the soft tissue portion in the nasolacrimal duct. The increasing flow may help maintain an enlarged passage (riverbed phenomenon) for tear drainage.<sup>10</sup> Thus, silicone intubation improved the anatomical abnormality of nasolacrimal duct. We found that the severity of the stenosis was not a predictive factor for intubation outcome ( $p=0.05$ ). However, intubation was more successful in tight stenosis (88.8%) compared with simple stenosis (61.2%). Therefore, it seems that the anatomical abnormality is not the only etiological factor for inadequate tear drainage in simple stenosis and the degree of physiological dysfunction specially at the level of lacrimal pump can play a role in pathogenesis of this disorder. This study is thought to be the first investigation about the effect of stenosis nature on success of silicone intubation for nasolacrimal duct stenosis in adults.

Some authors advocated that partial nasolacrimal duct obstruction can be primarily managed with an endoscopic versus external dacryocystorhinostomy.<sup>3,13</sup> However, patients with anatomical nasolacrimal obstruction had significantly better outcomes in dacryocystorhinostomy compared with functional obstruction.<sup>14</sup> Therefore, it seems that further studies are necessary to evaluate the best type of surgery in patients with simple stenosis. Another weakness of the current study was the lack of follow up examination beyond one year, precluding the stability of treatment success in patients.

## Conclusion

Patients with tight nasolacrimal duct stenosis had better outcomes in silicone intubation compared with simple nasolacrimal duct stenosis. However, the severity of the stenosis was not a predictive factor for intubation failure.

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