

# Spherical Headed Silicone Intubation in the Treatment of 26 Cases (31 eyes) of Chronic Dacryocystitis under Nasal Endoscopy

Wanhong Liang, Yongqiang Liang, Xingyun Deng, Hongzhi Yuan

Department of Ophthalmology, Taiping People's Hospital of Dongguan, Dongguan 523900, Guangdong Province, China

## Abstract

**Purpose:** To observe the clinical efficacy of spherical headed silicone implantation in the treatment of chronic dacryocystitis under nasal endoscopy.

**Methods:** Twenty-six patients (31 eyes) with chronic dacryocystitis were subjected to spherical headed silicone implantation under topical anesthesia (lacrimal passage and nasal mucosal surface). Lacrimal passage irrigation was performed daily throughout the first postoperative week, and once each month thereafter.

**Results:** All spherical headed silicone tube placements were successfully performed. The operative time ranged from 6 to 11 minutes. Symptoms of epiphora were immediately ameliorated post-operatively, and irrigation demonstrated patency of the lacrimal system in all patients. All patients were followed from 7 to 24 months, during which symptoms of tearing were improved. The lacrimal ducts of 27 eyes (87.7%) were normal. The lacrimal ducts of 4 others (12.3%) were still blocked. Lacrimal passage irrigation was open and secretion disappeared in 28 eyes (90.3%). Tearing was observed in 3 eyes (9.68%).

**Conclusion:** Spherical headed silicone tube implantation under nasal endoscopy is successful in relieving symptoms of tearing. (*Eye Science* 2011; 26; 217–220)

**Keywords:** chronic dacryocystitis; spherical headed silicone tube implantation; nasal endoscopy

Chronic dacryocystitis is commonly observed in a clinical setting. The recent emergence of the spherical-headed silicone tube, together with the widespread application of nasal endoscopy, serve as

a novel treatment of chronic dacryocystitis, owing to its simple operation, lucid visual field and low incidence of injuries to surrounding tissues, etc, which is in accord with patients' increasingly high expectations of medical treatment. A total of 26 cases (31 eyes) of chronic dacryocystitis received spherical-headed silicone-tube implantations under nasal endoscopy between June 2009 and June 2011, of which primary cure was achieved in 28 eyes, ineffective treatment in 3 eyes, and the recovery rate achieved was 90.3%, yielding a satisfying treatment outcome.

## Materials and methods

### General information

From June 2009 to June 2011, 26 patients (31 eyes) with chronic dacryocystitis were admitted to our hospital. Prior to formal operation, lacrimal-passage irrigation and lipiodol-contrast angiography made possible a definite diagnosis that nasal lacrimal-duct obstruction had led to chronic dacryocystitis. Nasal examinations precluded the possibilities of lacrimal passage and acute nasal inflammatory reaction, and other occupied lesions. Among 26 patients, there were 9 males (9 eyes); 17 females (22 eyes); 17 right eyes; 14 left eyes; an age range of 34 to 65 years (mean age  $46.5 \pm 10.5$  years), and the course of disease was 7 to 12 months.

### Surgical instruments

The following instruments were employed during surgery: a No.7 hollow lacrimal probe with an 8 cm diameter; a 3 mm expansion rope made of nylon wires; a spherical-headed silicone tube (consisting of a hollow circular tube 3.5 cm in length, a spherical head with a 4.2 mm external diameter, a tube with a

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**Corresponding author:** Wanhong Liang, Department of Ophthalmology, Taiping People's Hospital of Dongguan, Dongguan 523900, Guangdong Province, China. E-mail: wanhongleang@163.com

2.5 mm external diameter, an 8 cm circular pull wire attached to the spherical head and a 1.5 cm circular pull wire at the bottom); 0 to 3 silk thread; a dacryon dilator; a lacrimal-passage douche syringe; a nasal endoscopy (0 degree); and a television monitor.

### **Surgical procedure**

Lacrimal-passage irrigation was conducted using 1% gentamicin solution until any lacrimal-sac secretion was fully removed. Nasal cavity mucous anesthesia was conducted by inserting a cotton sheet containing 1% adrenaline tetracaine into the surface of the inferior nasal meatus. Surface anesthesia of the lacrimal passage mucosa was performed by using an 0.5% tetracaine solution. The upper dacryon was dilated, and 0 to 3 silk thread was inserted in a No.7 hollow lacrimal probe, which was inserted through the upper dacryon. Probing of the nasolacrimal duct was performed and then the probe was inserted into the nasolacrimal duct. PBS was injected into the probe, the lower segment of thread was placed into the nasal cavity, and the lower end of thread was then used to pull out the probe. Nasolacrimal expansion ropes (2.5 mm in thickness) were connected, and pulled the thread into the nasolacrimal duct, making a movement in a seesaw pattern, assisted by the thread. The rugged surfaces of the expansion ropes could remove the inflammation hyperplasia tissues in the obstructed nasolacrimal duct to achieve full expansion of the duct.

The sphere-headed silicone tube was connected and implanted into the nasolacrimal duct and the lacrimal-sac under nasal endoscopy, enabling the sphere head to enter the lacrimal-sac, which was blocked at the upper opening of the nasolacrimal duct and the end retained in the nasal cavity. PBS was injected via the lower dacryon, and a smooth wash indicated a good placement of the tube. If there is no smooth wash, certain adjustments should be made. After a good tube placement was confirmed, the upper end of the pull lines was cut off.

### **Post-operative treatment**

The patients were subjected to systemic antibiotics for three to five days, tobramycin and dexamethasone eye drops four times a day for one week, and then tobramycin eye drops four times a day for one month. The lacrimal passage flush was done by using

1% gentamicin once daily for one week, and once per month thereafter. The sphere-headed silicone tube was pulled out six month later. The lacrimal-duct flush was administered once a month. Post-operative follow-up lasted from seven to 24 months.

### **Evaluation criteria for efficacy**

Criteria for healing cases; neither epiphora nor pyorrhea was observed; smooth lacrimal-passage flush; no liquid backflow. Criteria for effective cases; both epiphora and pyorrhea were evidently ameliorated; smooth lacrimal-passage flush or pressing flush. Criteria for ineffective cases; epiphora and pyorrhea still exist; lacrimal-passage flush was not smooth. The conditions 24 hours after surgery were taken into consideration.

### **Results**

Successful sphere-headed silicone intubations were achieved in all 26 patients (31 eyes). Lacrimal-passage flush was smooth and open, and most patients sensed that epiphora symptoms were significantly alleviated. Six months after tube intubation, lachrymation symptom disappeared and smooth lacrimal-passage flush was performed in all patients. During the three-month follow up after extubation, lachrymation symptoms disappeared in all cases, two among which showed relatively obstructed lacrimal-passage flush. In one case, six-month following extubation, and in two cases 12 months following extubation, displayed the symptom of lachrymation and obstructed lacrimal-passage flush, accounting for 9.68% of all cases.

Surgical complications; lacrimal puncta avulsion affected one eye; a modicum of hemorrhage occurred in nasal mucosa when dilating the nasolacrimal duct, requiring no treatment. No intolerant pain was reported intra-operatively. Mild swollen sense was observed while dilating the nasolacrimal duct. The operating time was around six to 11 minutes. The surgeons in our hospital had previously performed spherical-headed silicone intubation in the treatment of chronic dacryocystitis. Herein, we compared the clinical efficacy of nasoendoscopic spherical-headed silicone intubation and traditional spherical-headed silicone intubation, as shown below in Table 1.

**Table 1** Comparison of clinical efficacy of nasoendoscopic and conventional spherical-headed silicone intubation of the eye (%)

| Groups                  | Number of eyes | Lacrimal passage obstruction during intubation | Lacrimal passage obstruction after extubation | Cure rate | Surgical complications |
|-------------------------|----------------|--|---|-----------|------------------------|
| Endoscopic intubation   | 31             | 0(0)   | 3(9.68)                                       | (90.3)    | 1(3.23)                |
| Conventional intubation | 30             | 2(6.67)  | 5(16.7)                                       | (83.3)    | 4(13.3)                |

## Discussion

Chronic dacryocystitis is mainly induced by obstruction or stenosis of the nasolacrimal duct, disturbing normal tear discharge and retaining tears in the lacrimal-sac for a long time. The bacteria in tears, such as, pneumococcus, staphylococcus, etc, propagate and stimulate the lacrimal sac wall, leading to chronic inflammation of the lacrimal sac mucosa, which yields mucosal or purulent secretion. The affected subjects constantly present with watery tears, severely interfering with their quality of life. There is also a potential risk of subsequent ocular infection. Currently, there are techniques available for lacrimal-passage recanalization<sup>1</sup>; the first category of technique is dacryorhinocystostomy, including traditional external dacryorhinocystostomy and nasoendoscopic dacryorhinocystostomy. These two techniques serve to open the obstructed nasolacrimal duct and restore smooth lacrimal drainage.

Traditional dacryorhinocystostomy has a success rate of over 90%, owing to the direct anastomosis of the nasolacrimal sac and nasal-cavity mucosa<sup>2</sup>. However, it has multiple disadvantages, including severe surgical trauma; a high incidence of hemorrhage; disrupted dacryocyst and nasal cavities; and facial scars. Older patients and those in poor health condition cannot tolerate the surgery physically, while younger patients are reluctant to undergo such surgery because of the possible effect on their appearance. A single application of nasolacrimal-duct recanalization or nasoendoscopic dacryorhinocystostomy may easily cause surgical failure owing to lacrimal-passage obstruction induced by granulation hyperplasia<sup>3</sup>.

In recent surgery, a supporting device has frequently been placed behind the unobstructed lacrimal passage to prevent repetitive obstruction induced by inflammatory adhesion. We previously adopted a novel spherical-headed silicone tube<sup>4</sup> as a support for

nasolacrimal duct. Long-term clinical studies have confirmed the safety and efficacy of a silicone-tube implantation, which averts lacrimal-passage cicatrization by exerting no stimulating effect on connective-tissue hyperplasia<sup>5</sup>. A spherical-headed silicone tube was inserted into the nasolacrimal duct, letting the sphere head enter at the dacryocyst and with the lower end placed within the inferior nasal meatus. The silicone head has a spherical-cavity structure with an outer diameter of 4.2 mm, which can be relatively stably fixed on the lacrimal sac and also remarkably reduce the incidence of lacrimal-sac obstruction and junction obstruction between the nasolacrimal duct and the lacrimal sac.

The tube, with an outer diameter of 2.5 mm, can provide effective support of the nasolacrimal duct. A relatively large drainage cavity was formed after extubation to avoid repetitive obstruction. The thread was mainly taken out from the nasal cavity and placed into the spherical-headed silicone tube intra-operatively. The visual field in the nasal cavity is dark, so the operation might be "blind", which can cause severe injuries to nasal mucosa intra-operatively and even nasal-mucous adhesion post-operatively. Besides, the surgeons were unable to identify whether the silicone tube head had been placed in the lacrimal sac, therefore reducing the operative success rate.

Owing to the widespread application of nasal endoscopy, the surgeons in our hospital can take out the inferior segment of thread and accurately ascertain the silicone tube head entering the lacrimal sac under nasal endoscopy. Nasal endoscopic spherical-headed silicone intubation has the following advantages: the lucid visual field averts damages to nasal mucosa, reduces the possibility of hemorrhage, and alleviates patients' sufferings intra-operatively. Post-operatively, the patients present mild nasal-mucous edema and less surgical complications, such as nasal-mucous adhesion, enhancing the operative success

rate. This technique induces mild injuries to surrounding tissues. There is no need to incise skin, muscle, ligament and interior vessels, etc, leaving no facial scars, which is likely to be welcomed by many patients.

In this investigation, 26 patients sensed that epiphora symptoms were markedly alleviated two days post-operation, presenting smooth lacrimal-passage irrigation and mild nasal-mucosa edema. However, neither nasal-mucosa hemorrhage nor adhesion was observed. The symptoms of lacrimation disappeared in all patients during the intubation procedure. The lacrimal passage was unobstructed during irrigation and the spherical-headed silicone tube was properly placed without detachment. Three months after extubation, pressing lacrimal irrigation should be performed to achieve unobstructed irrigation in two cases. No lacrimation symptom was noted.

Related examination revealed nasolacrimal-duct mucosa pachynsis and opening stenosis. Lacrimal passage irrigation was given regularly. One case presented lacrimation symptoms with an unobstructed lacrimal duct during irrigation six months post-operatively and two cases one year postoperatively. Nasal endoscopic examination showed nasolacrimal mucosa fibroplasia and opening obstruction. The re-obstruction of the nasolacrimal duct caused by fibroplasia following extubation contributed to surgical failure in three cases. The corresponding preventive measure is taking drugs, mainly 2.5% fluorouracil and 0.1% mitomycin, which are able to inhibit fibroplasia. Some scholars reported that using these agents can achieve a 97.5% effective rate in the treatment of nasolacrimal-duct obstruction<sup>6</sup>.

The following points should be especially stressed during operation. Full expansion of the nasolacrimal duct should be performed; otherwise, the implanted silicone tube may be flattened<sup>7</sup>, characterized by an

unobstructed lacrimal passage during irrigation, which is associated with insufficient clinical experience and nasolacrimal stenosis. Therefore, thick ropes should be used to expand the nasolacrimal passage fully. Fibroplasia potentially causes re-obstruction of the nasolacrimal passage, featuring lacrimal-passage obstruction during irrigation a certain period after extubation. A preventive measure is to perform lacrimal irrigation regularly and use drugs that can inhibit fibroplasia.

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