Retrograde nasolacrimal duct implantation for the treatment of nasolacrimal duct obstruction★

A follow-up of 18 months

He Yue, Zhang Xi-bo, Lü Hong-bin, Ouyang Ke

Abstract

BACKGROUND: Polyurethane nasolacrimal duct stents cannot alter the anatomical structure of lacrimal outflow pathway and is a quick and useful option in treatment of lacrimal duct obstruction.

OBJECTIVE: To evaluate the clinical efficacy and safety of polyurethane nasolacrimal duct stents in patients with nasolacrimal duct obstruction.

METHODS: Between 2008 and 2009, we treated 94 consecutive nasolacrimal obstructions in 87 patients (mean age 56 years; range 26–71 years) with implantation of polyurethane stents. Indications were nasolacrimal duct obstruction in 31 patients and chronic dacryocystitis in 56 patients. Follow-up was 18 months.

RESULTS AND CONCLUSION: On day 2 after implantation, resolution of epiphora was complete in 92 eyes, accounting for 98% success rate (92/94). On follow-up, 85 of 94 stents (90%) remained patent. There were eight cases developing stent obstruction. Stents malfunctioned in one case, and was easily withdrawn. Complications included pain in seven cases, eyelid inflammation in two cases and nasal hyporrhea in all cases. Experimental findings indicate that polyurethane nasolacrimal duct stent is a quick and useful option in treatment of lacrimal duct obstruction.

Department of Ophthalmology, Affiliated Hospital of Luzhou Medical College, Luzhou 646000, Sichuan Province, China

He Yue★, Master, Attending physician, Department of Ophthalmology, Affiliated Hospital of Luzhou Medical College, Luzhou 646000, Sichuan Province, China
hylyfy@163.com

Corresponding author: Zhang Xi-bo, Associate professor, Department of Ophthalmology, Affiliated Hospital of Luzhou Medical College, Luzhou 646000, Sichuan Province, China

doi:10.3969/j.issn.2095-4344.2012.34.035

Received: 2011-11-08
Accepted: 2012-01-30
(20111108008/M)

He Y, Zhang XB, Lü HB, Ouyang K. Retrograde nasolacrimal duct implantation for the treatment of nasolacrimal duct obstruction: A follow-up of 18 months. Zhongguo Zuzhi Gongcheng Yanjiu. 2012;16(34):6449-6452.

[http://www.crter.org/crter-2012-qikanquanwen.html]

INTRODUCTION

Nasolacrimal duct obstruction (NLDO) and chronic dacryocystitis are the most common diseases of lacrimal duct. Although the visual acuity is not affected, epiphora and pyorrhea seriously agonize the patients, even lacrimal sac inflammation invades the orbit, leading to eyelid edema and orbital cellulitis[1]. Many studies focus on bacteriology and antimicrobial spectrum analysis of chronic dacryocystitis[2-3]. For many people, however, the best option is surgical intervention, such as nasolacrimal duct dredging and new lacrimal duct reconstruction, which are the most commonly used. The former requires simple operation and less damage, but the long-term effect is poor and the recurrence rate is high; the latter is mainly dacryocystorhinostomy (DCR)[4-5], with a success rate of 79%–90%, but complicated operations with many complications limits its application. What's more, inner canthus ligament injury may disrupt anatomical structure of normal lacrimal duct[6-7]. Once restenosis forms, no matter caused by postoperative anastomotic scar formation or ossification-caused anastomotic obstruction, it would pose a difficult treatment.

To overcome the above defects, other choices for the therapy of NLDO and chronic dacryocystitis are needed, endoscopic intranasal dacryocystorhinostomy and endoscopic laser dacryocystorhinostomy, for instance, which also defect with long operation time and long learning curve[8]. Similar to DCR, they would change the original anatomy of lacrimal duct, and cannot recover physiological tear fluid channel.

Since 1989, minimally invasive interventions have been reported to deal with such diseases. Balloon dilatation catheter is simple and safe, but the initial success rate and long-term patency rate are low, as metal stent is lack in longitudinal elasticity, once the stent gets blockage, it had to be removed.

Nasolacrimal duct stent is a kind of polymeric biomaterial, polyurethane, which has been widely used and no rejection is caused. Our hospital has adopted retrograde nasolacrimal duct stent implantation in the treatment of chronic dacryocystitis since 2008.

SUBJECTS AND METHODS

Design

A case analysis.

Time and setting

All cases were recruited from Department of Ophthalmology in the Affiliated Hospital of Luzhou Medical College, China from June 2008 to December 2009.

Subjects

A total of 87 patients (94 eyes) were treated with the implantation of retrograde nasolacrimal duct stent between June 2008 and December 2009. There were 23 males (25 eyes) and 64 females (69 eyes), aged 26–71 years (mean 56 years), and their disease duration was from 2 months to 18 years.

Diagnostic criteria

Lacrimal duct irrigation indicated the appearance of NLDO and chronic dacryocystitis. According to the epiphora symptoms in Munk classification[9], patients were divided (0: no epiphora; Ⅰ: occasional epiphora, twice tear-wiping every day; Ⅱ: three or four times of tear-wiping every day; Ⅲ: five to ten times of tear-wiping every day; Ⅳ: more than 10 times of tear-wiping every day, but no persistent epiphora; Ⅴ: continuous epiphora).

Inclusion criteria

The epiphora level at III grade or higher and patients with chronic dacryocystitis were involved in this study.

Exclusion criteria

(1) Patients with abnormal structure in lacrimal puncta, lacrimal duct and lacrimal sac. (2) Patients with nasal disease confirmed by the rhinolaryngologist consultation, such as nasal polyp and turbinate hypertrophy.

Methods

Main materials

Nasolacrimal duct stent was purchased from Hunan Huafu Medical Equipment Science and Technology Limited Company, China, including BL-A and BL-B types. Nasolacrimal duct stent was consisted of a mushroom head and a drainage tube, equipped with hollow lacrimal duct probe, nasolacrimal duct dilator coating and core rod, nasolacrimal duct pusher, and guiding wire. Materials were medical polyurethane, which is non-toxic and non-mutagenic, and induces no local stimulation reaction and allergic reaction, but has good histocompatibility.

Preoperative preparation

Lacrimal duct was conventionally irrigated. The inferior nasal tract at the operated side was intussuscepted with Benoxil-Ephedrine cotton piece and three times of Oxybuprocaine Hydrochloride Eye Drops, one drop one time at the interval of 10 minutes.

Operations

(1) Local anesthesia: patients in a supine position were anesthetized with 2 mL of 2% lidocaine for infraorbital nerve blockage and 2 mL for anterior ethmoidal nerve blockage. (2) Expansion of lacrimal puncta: upper lacrimal punctum was diluated with punctum dilator. (3) Lacrimal duct probing: 22G hollow lacrimal duct probe was inserted into the inferior nasal meatus through the punctum, lacrimal canaliculus and nasolacrimal duct. (4) Insertion of guide wire: the guiding wire was inserted into hollow lacrimal duct probe until the inferior nasal meatus, and the wire end was pulled out with the wire guide hook. (5) Retrograde dilatation of nasolacrimal duct: the nasolacrimal duct was retrogradely dilated along the guide wire, using a lacrimal dilator, until the lacrimal sac through the NLDO site, and the nasal lacrimal dilator core rod was removed after dilation. (6) Implantation of nasolacrimal duct stent: nasolacrimal duct stent placed into the nasolacrimal duct loader, and transferred to the nasolacrimal duct dilator coating along the guide wire, and nasolacrimal duct was retrograded into the lacrimal sac *via* the nasal lacrimal dilator, then nasal lacrimal dilator coat, nasal lacrimal duct pusher and guiding wire were removed. (7) Position of nasolacrimal duct: the position of nasolacrimal duct was determined with lacrimal duct radiography or by rhinoscopy, and the stent can be reinstalled until the implantation was satisfied. (8) Lacrimal duct irrigation: lacrimal duct was irrigated with 0.4% gentamicin and 0.1% dexamethasone *via* the hollow lacrimal duct probe, until it was smooth.

Postoperative management

Eyes were given antibiotic eye drops, and the lateral nasal cavity was given ephedrine nasal drops. According to individual conditions, systemic antibiotics, hormones and hemostatic drug can be applied. Within postoperative 1 week, the lacrimal duct was irrigated with the mixture of saline, gentamicin and dexamethasone, per day within the first week, once or twice per week within the first month, and once or twice per month within the former 6 months.

Efficacy assessment

According to Munk grading, 0–Ⅰ level: healed; less than Ⅰ level: improved; invalid: no significant change compared with preoperative level; deterioration: increasing level compared with preoperative level.

Main outcome measures

The epiphora and lacrimal patency in patients with lacrimal duct obstruction were observed after nasolacrimal duct implantation.

RESULTS

Efficacy assessment

During the hospitalization, there were 8 eyes at Ⅲ level,

accounting for 100% healing rate, 19 eyes at Ⅳ level, accounting for 100% healing rate, and 67 eyes at Ⅴ level, accounting for 97% healing rate and 3% improvement. There were no invalid or deteriorated cases and the overall efficiency reached 98% (92/94). Postoperative X-ray radiography showed that nasolacrimal duct stent was located in the nasolacrimal duct (Figure 1). Nasal endoscopy displayed the end of nasolacrimal duct stent (Figure 2).

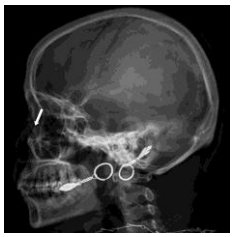

Figure 1 The implanted nasolacrimal duct stent (lateral view)

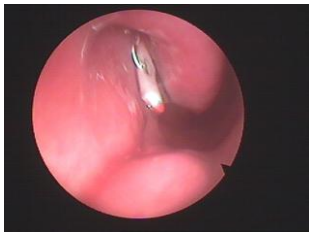

Figure 2 Nasolacrimal duct stent under nasal endoscope

Complications

The operation was successfully completed in all 94 eyes. Operation time was 10–20 minutes at the average of 13 minutes. During the operation, seven patients (8%) were complained about of pain, which was relieved by postoperative oral administration of analgesics; two patients (2%) appeared eyelid edema, and were healed within 48 hours after cold compress. A small amount of nasal bleeding was visible in all patients during the operation and was terminated after treatment. There was no acute dacryocystitis, acute conjunctivitis, eyelid hematoma and headaches occurred.

Follow-ups

All patients were followed up for over 1.5 years, and 85 of 94 stents (90%) remained patent. There were nine cases (10%) developing epiphora. Stents malfunctioned in one case, and was easily withdrawn. Three eyes (3%) appeared with duct obstruction, and were improved by irrigation. The above ocular symptoms were visible in four eyes within postoperative 3 months, while the remaining five eyes appeared with epiphora at 1 year, and were treated with DCR after repeated irrigation of lacrimal duct failed. During follow-up, the symptoms of epiphora were also observed in additional five eyes (5%), but lacrimal duct irrigation found unobstructed, we speculated that the symptoms resulted from the functional epiphora induced by poor functions of orbicularis oculi in aged patients. During the 18-month follow-up, the success rate of nasolacrimal duct stent implantation reached 90% (85/94). No patients showed stent exposure or rejections.

DISCUSSION

Nasolacrimal duct stent consists of drainage tube and mushroom head, which functions to expand and fix. In this study, we performed an 18-month follow-up visit among patients following retrograde nasolacrimal duct stent implantation, and found that the symptoms were improved significantly in vast majority of patients (90.4%). Among them, four eyes appeared epiphora again, one eye underwent secondary implantation due to deviations of primary stent position, and another three eyes with duct obstruction were significantly improved by repeated irrigation. The above ocular symptoms in four eyes were disappeared within 3 months after operation. During follow-up, epiphora were also observed in additional five eyes (5.3%), but lacrimal duct irrigation found unobstructed, we speculated that the functional epiphora were induced by poor functions of orbicularis oculi in aged patients. No one showed stent exposure or rejection. Among 94 eyes, only 5 eyes had epiphora at 1 year and underwent DCR when repeated irrigation failed.

The therapeutic effect of nasolacrimal duct stent in treatment of lacrimal duct obstructions remains controversial, and the success rate after implantation can reach 100%[10]. The follow-up visit lasts 1 year and the success rates ranged from 39.6%–84%, it is reported that the two-year success rate was 85%[11-12]. Results of this study showed that nasolacrimal duct stent implantation is a minimally invasive means of treatment, with the following advantages: (1) widely operation indications, especially for aged patients who cannot undergo DCR; (2) small damage to the physiological structure of lacrimal duct, with less trauma and pain, rapid recovery and repeatable operation; (3) no need for skin incision and no postoperative facial scar; (4) short operation time and less bleeding; (5) the stent is non-toxic and good biocompatible, can be long-term indwelling after implantation.

At the same time, many problems should be taken into the consideration, such as (1) to raise the success rate of operation, preoperative lacrimal duct contrast examination is essential to understand the lacrimal sac size, postoperative X-ray film and doctor consultation is suggested to define nasal anatomy abnormality, such as nasal septal deviation and turbinate hypertrophy; (2)

intraoperative nasolacrimal duct probing is suggested to act along the direction of nasolacrimal duct; (3) the guide wire is difficult to remove and is easy to invade the pharynx, especially followed with nasal anatomy abnormality, meanwhile nasal mucosa should be fully contracted for great space preoperative; (4) patients should comply with the medical order to avoid inflammatory exudate, scab and granulate on tissue induced stent restenosis.

Retrograde nasolacrimal duct stent implantation is a novel, minimally invasive, easy to be accepted means for the treatment of chronic dacryocystitis and NLDO, especially for patients who have refused many operations. With the advance of the stent materials, design and technology, the stent also may be used in the treatment of lacrimal duct obstruction.

REFERENCES

[1] Henney SE, Brookes NJ, Clifford K, et al. Dacryocystitis presenting as post-septal cellulitis: a case report. J Med Case Reports. 2007;1:77.

[2] Shah CP, Santani D. A comparative bacteriological profile and antibiogram of dacryocystitis. Nepal J Ophthalmol. 2011;3(6):134-139.

[3] Chaudhary M, Bhattarai A, Adhikari SK, et al. Bacteriology and antimicrobial susceptibility of adult chronic dacryocystitis. Nepal J Ophthalmol. 2010;2(4):105-113.

[4] Toti A. Nuovo metodo conservatore di cura radicale delle suppurazioni croniche del sacco lacrimale (dacriocistorinostomia). Clin Mod Firenze. 1904;10: 385-387.

[5] Rathore PK, Kumari Sodhi P, Pandey RM. Topical mitomycin C as a postoperative adjunct to endonasal dacryocystorhinostomy in patients with anatomical endonasal variants. Orbit. 2009;28(5):297-302.

[6] Dolman PJ. Comparison of external dacryocystorhinostomy with nonlaser endonasal dacryocystorhinostomy. Ophthalmology. 2003;110(1):78-84.

[7] Mandeville JT, Woog JJ. Obstruction of the lacrimal drainage system. Curr Opin Ophthalmol. 2002;13(5): 303-309.

[8] Hong JE, Hatton MP, Leib ML, et al. Endocanalicular laser dacryocystorhinostomy analysis of 118 consecutive surgeries. Ophthalmology. 2005;112(9):1629-1633.

[9] Munk PL, Lin DT, Morris DC. Epiphora: treatment by means of dacryocystoplasty with balloon dilation of the nasolacrimal drainage apparatus. Radiology. 1990;177(3): 687-690.

[10] de Souza C, Nissar J. Experience with endoscopic dacryocystorhinostomy using four methods. Otolaryngol Head Neck Surg. 2010;142(3):389-393.

[11] Lanciego C, De Miguel S, Padilla M, et al. Nasolacrimal stenting: toward improving outcomes with a simple modification of the song stent. Cardiovasc Intervent Radiol. 2006;29(4):586-594.

[12] Ciampi JJ, Lanciego C, Navarro S, et al. Treating epiphora in adults with the Wilhelm plastic nasolacrimal stent: mid-term results of a prospective study. Cardiovasc Intervent Radiol. 2011;34(1):124-131.

逆行性人工鼻泪管植入修复泪道阻塞性疾病：18 个月随访*

何　跃，张熙伯，吕红彬，欧阳科(泸州医学院附属医院眼科，四川省泸州市　646000)

何跃★，男，1978 年生，四川省南充市人，汉族，2010 年昆明医学院毕业，硕士，主治医师，主要从事眼底疾病、青光眼、泪道方面研究。

通讯作者：张熙伯，副教授，泸州医学院附属医院眼科，四川省泸州市　646000

文章亮点：

人工鼻泪管植入后 1.5 年的随访观察，绝大多数患眼(85/94)症状明显改善，且未发现材料外露及排斥反应。

摘要

背景：人工鼻泪管植入治疗泪道阻塞性疾病不会改变泪道的解剖结构，是一种简单有效的治疗方法。

目的：评价人工鼻泪管植入治疗泪道阻塞性疾病的有效性及安全性。

方法：选择 2008/2009 逆行性人工鼻泪管植入治疗泪道阻塞患者 87 例，共 94 眼，年龄 26~71 岁，平均 56 岁。其中鼻泪管阻塞患者 31 例，慢性泪囊炎患者 56 例。随访时间为 18 个月。

结果与结论：人工鼻泪管植入后第 2 天 92 眼溢泪症状完全缓解，成功率为 98%(92/94)。随访中，85 眼人工鼻泪管保持通畅，8 眼发生阻塞，1 眼发生人工鼻泪管移位，植入有效率为 90%(85/94)。植入后有 7 例患者出现疼痛，2 例出现眼睑水肿，所有患者均有少量鼻出血，经对症处理后均缓解。结果可见人工鼻泪管植入是治疗泪道阻塞性疾病简单有效安全的方法。

关键词：人工鼻泪管；溢泪；泪道阻塞；慢性泪囊炎；泪道系统治疗

中图分类号: R318　文献标识码: B

文章编号: 2095-4344(2012)34-06449-04

何跃，张熙伯，吕红彬，欧阳科. 逆行性人工鼻泪管植入修复泪道阻塞性疾病：18 个月随访[J]. 中国组织工程研究，2012，16(34):6449-6452.

[http://www.crter.org/crter-2012-qikanquanwen.html]

来自本文课题的更多信息--

作者贡献：实验设计为何跃，实验实施为何跃，张熙伯，实验评估为吕红彬，资料收集为何跃，张熙伯，欧阳科。何跃成文，张熙伯审校，何跃对文章负责。

利益冲突：课题未涉及任何厂家及相关雇主或其他经济组织直接或间接的经济或利益的赞助。

(Edited by Cai JP/Yang Y/Wang L)