

Lacrimal Canalicular Bypass Surgery with Autologous Superficial Temporal Artery Graft

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Abstract

Purpose: To describe superficial temporal artery graft as a new autologous tissue to reconstruct the upper lacrimal drainage system.

Methods: We explain the history of a 30-year-old female with upper lacrimal drainage system obstruction, in whom conjunctivodacryocystorhinostomy (CDCR) failed to resolve epiphora. A superficial temporal artery graft was harvested, intubated with Masterka tube, and implanted between the conjunctiva and nasal cavity. Masterka was replaced with a thicker dummy tube 12 weeks postoperatively. The adequacy of the graft was checked with irrigation tests in follow-up visits from 1 to 26 months after the procedure.

Results: Superficial temporal artery autograft successfully eliminated epiphora of the patient in whom (CDCR) with Jones tube failed to make her symptom free.

Conclusion: Superficial temporal artery autograft as an autogenous tissue with adequate characteristics can be considered in selective patients of upper lacrimal obstruction to reconstruct the lacrimal drainage system.

Keywords: Dacryocystorhinostomy, Jones tube, Lacrimal duct obstruction, Temporal artery, Transplant

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INTRODUCTION

Conjunctivodacryocystorhinostomy (CDCR) is the standard treatment of proximal canalicular obstruction, which creates a fistula between the caruncle, lacrimal sac, and nasal cavity. Due to obstruction and shrinkage of the fistula, this procedure had a high failure rate in the absence of implants that helped keeping the fistula in shape.¹ A variety of materials and tissues have been tested to resolve this problem. A Pyrex glass tube (Jones tube) is well known for this purpose, providing acceptable results with a low rate of complications.² However, almost all patients will have leastwise one minor complication

after a lacrimal bypass procedure in an extended follow-up. Erickson *et al.* executed the superficial temporal artery bypass graft concept for nasolacrimal drainage in a cadaveric model.³ This report describes superficial temporal artery graft as a new autologous tissue to reconstruct the upper lacrimal drainage system in a patient with a failed CDCR with a Jones tube.

CASE REPORT

An otherwise healthy 30-year-old woman complained of bilateral epiphora. She had a history of CDCR with Jones tube implantation in 2017 on the left side due to proximal

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canalicular obstruction. An endonasal endoscopic survey determined a tube that touched the nasal septum, resulting from a longer tube than the proper size. Furthermore, granulation and fibrotic tissue were composed around the distal part of the tube. However, due to the frequent failures to relieve symptoms with the Jones tube and the patient's preference for trying other treatments than the Jones tube, after ethics committee approval, we planned a superficial temporal artery autograft for the upper lacrimal drainage system reconstruction.

Under the ultrasound imaging guide, the direction of the superficial temporal artery on the left forehead was marked over the temporalis muscle. Lidocaine 2% was injected around the artery with a 27-gauge needle for local anesthesia. After draping with povidone-iodine, a 4 cm long incision was formed with a number 15 scalpel blade. The course of the temporal artery appeared using blunt dissection with scissors. The 2.8 cm length of the artery was separated, and after tying both the ends of the artery with 4-0 silk ties, amputated between the silk ties, the cut ends were cauterized [Figure 1]. The harvested artery was embedded around a Masterka monocanalicular silicone tube (FCI, Marshfield Hills, MA, USA) using 7-0 absorbable sutures. A Masterka tube and surrounding temporal artery were implanted between the caruncle and the nasal cavity. The plug collarette of the Masterka was sutured to the neighboring soft tissue to prevent undesirable graft movements. Intraoperative fluorescent-fluid irrigation through the graft and simultaneous endonasal endoscopy showed free fluid passage and a patent pathway.

Three months later, a pyogenic granuloma was formed in the caruncle, and the epiphora restarted again. The pyogenic granuloma was removed, and Masterka was replaced with a thicker tube to prevent graft shrinkage. For this purpose, a dummy tube (15 mm × 4 mm) of Jones tube set (StopLoss™ Introducer Set, FCI, Marshfield Hills, MA, USA) was employed. The plug collarette of Masterka was grasped with a toothed forceps and finely explanted with turning movements



Figure 1: The superficial temporal artery was split along its 2.8 cm length, and after tying both the ends with 4-0 silk ties, it was excised between the silk ties

from the inside of the grafted artery. Then, the dummy tube was implanted in the graft with delicate turning motions. The viscoelastic gel was installed as a lubricant in the area to decrease the chance of trauma to the graft. Two weeks later, the dummy tube was explanted, and the adequacy of the graft without any tube was checked with an irrigation test and concomitant endonasal endoscopy. The epiphora was resolved postoperatively. At the most recent follow-up, 26 months following the grafting procedure, the patient was symptom free. The dye irrigation test revealed a patent pathway reconstructed with superficial temporal artery autograft [Supplementary Video 1].

This report followed the tenets of the Declaration of Helsinki, and informed consent was obtained from the patient.

DISCUSSION

This report introduced a superficial temporal artery graft as a proper autologous tissue to reconstruct the upper lacrimal drainage pathway in a patient who had a failed CDCR with Jones tube implantation. Reconstruction of the upper lacrimal drainage pathway with autogenous tissue may have satisfactory results in a complicated patient with several operations and Jones tube failure. Yung and Hardman-Lea treated a patient with multiple failed CDCR with Jones tube using a pedicle nasal septal tube.⁴ In 1983, Campbell *et al.* introduced CDCR with buccal mucus membrane graft, which increased the success rate of surgery.⁵ A study with a larger sample size also showed the benefits of this procedure, but lumen obstruction after removing the temporarily inserted tubes inside of grafts has limited this procedure.⁶ It has also been reported that using a mucous membrane autograft to reconstruct the upper lacrimal drainage system in complicated medial canthal region injuries can be beneficial.^{7,8}

Using other autologous tissues as a lumen in CDCR has also been documented in the literature. Saphenous vein autograft is another example, and a 19-month follow-up had satisfactory results.⁹ In this report, we used the superficial temporal artery as an autologous tissue to reconstruct the lacrimal drainage system. This concept was reported in cadaver,³ but has not been reported in a clinical setting. Unlike mucus membrane and veins, the superficial temporal artery has a muscular medium that helps it withstand collapses and restenosis, improving long-term efficiency.

Proper approximation and suturing of both nasal and conjunctival ends of the autologous artery to prevent graft shrinkage are critical points for a successful result. Due to technical limitations of getting access without additional incisions, we did not suture the graft to the nasal mucosa. Instead, proximal fixation to the conjunctiva and utilizing temporary tubes to embed graft were performed, hoping enough tension to make adhesion to the surrounding tissue in the healing stage. We observed pyogenic granuloma formation with Masterka, so it was explanted, and due to the presence of inflammation, to prevent occlusion of the

graft, replaced with a thicker dummy tube. After 2 weeks, when a significant reduction in inflammation occurred, the dummy tube was also removed. We also employed intranasal and eye drop corticosteroids to reduce inflammation and graft failure. Early elimination of synthetic materials and subsequent decrease in foreign body effect may explain the acceptable result of graft as a Jones tube. Therefore, the use of autologous temporal artery graft can be considered in special cases.

In conclusion, the upper lacrimal drainage pathway obstructions are treated with CDCR and Jones tube. This report propounded superficial temporal artery to bypass lacrimal drainage system that can be assessed in a larger comparative studies to treat complicated cases of proximal lacrimal obstruction.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published, and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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