

Alexander L. Grigalunas and Adam J. Cohen

---

## Griffiths Nasal Catheter

### Introduction

Since its initial description by Toti in 1904, numerous modifications in technique and technological advances have been made to dacryocystorhinostomy (DCR) surgery [1]. These include sutured and sutureless rhinostomy flaps, endoscopic approaches, various alloplastic stents [2], balloons, and implants such as the Griffiths Nasal Catheter (GNC) and Rains stent. These advances have focused on the prevention of cicatricial ostium closure leading to DCR failure.

The GNC is an implant that improves long-term patency of the fistula tract in primary and secondary procedures. Another device, a Modified Rains Stent, has increased DCR success rates in

high risk patients with Wegener's granulomatosis, pemphigoid, sarcoidosis, and choanal atresia.

The GNC is a self-retaining alloplastic device shaped like a collar button (Fig. 21.1). Made from a thermoplastic, highly biocompatible elastomer called C-Flex (Saint-Gobain Performance Plastics, Clearwater, FL, USA), the GNC has low platelet adhesion and protein binding [3]. C-Flex is non-pyrogenic, non-cytotoxic, less permeable, higher in tensile strength, and has a greater degree of elasticity than silicone [4].

The GNC has a standard lumen diameter and is available in two collar sizes. A 12 mm collar diameter is primarily used for an external DCR in adult patients while an 8 mm collar diameter GNC may be useful in pediatric patients or when using an endonasal approach to DCR.

### Technique

The GNC can be placed either by external or endonasal approaches [5, 6]. With the endonasal approach, once intubation is performed, the tubes are placed within the lumen of the catheter. The catheter is then advanced in the nostril with bayonet forceps until the proximal collar is in the lacrimal sac fossa. If an external approach is used, the catheter is placed into the rhinostomy without suturing of flaps.

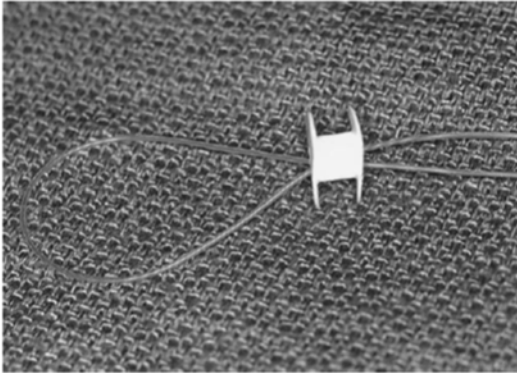
The tubes and catheter may be removed in the office setting after remaining in place for 6 months. After removing the intubation tube, the catheter is grasped from the intranasal portion

---

A.L. Grigalunas, M.D. (✉)  
Department of Ophthalmology, Rush University  
Medical Center, Harrison Street 1725, Chicago,  
IL 60612, USA  
e-mail: [alexander\\_grigalunas@rush.edu](mailto:alexander_grigalunas@rush.edu)

A.J. Cohen, M.D.  
Eyelid and Facial Plastic Surgery, Private Practice,  
Glenview, IL, USA

Assistant Professor, Section Director  
of Oculoplastic and Reconstructive Surgery,  
Rush University Medical Center,  
Chicago, IL, USA  
e-mail: [acohen@theartofeyes.com](mailto:acohen@theartofeyes.com)



**Fig. 21.1** Griffiths nasal catheter with silicone intubation tube



**Fig. 21.2** Endoscopic view of Modified Rains Stent within the ostium. Notice the tip is well positioned away from the nasal septum. Image courtesy of Aaron Fey, M.D.

and removed from the nostril. Sedation may be needed for removal in pediatric patients, but topical anesthesia is usually sufficient for removal in adults.

### Modified Rains Stent [7]

The Modified Rains Stent (MRS) is created from a silicone Rains frontal sinus stent. The top of the bulbous end is cut with scissors so the ribs are separated, but remain in a bulb shape to prevent dislodgment. The tubular portion is trimmed to a length that avoids contact with nasal septum (Fig. 21.2). Once in place, the bulb collects tears and directs them through the tube into the nasal cavity.

### Technique

The MRS is placed using an external approach. The anterior portion of the lacrimal sac is opened, and a small hole is created in the posterior aspect of the sac. Once a 4 mm diameter ostium is created, the device is placed in the lacrimal sac and the tubular end is placed through the ostium. The anterior lacrimal sac incision is closed and the overlying surgical incision site is closed in normal fashion.

The MRS has been left in place for extended periods of time without complication. Regular endoscopic exams to look for possible mucosal erosion and debridement of the tube may be required.

### Discussion

Previous reported success rates for primary and secondary DCR are 90–95 % [8, 9]. The GNC has been used in multiple studies for primary and secondary DCR with 100 % patency at 3 years and 98 % patency at 2.5 years respectively [6] without pyogenic granuloma formation in any cases.

The use of the GNC may also be indicated in patients with significant sinonasal disease or congenital nasolacrimal duct obstruction associated with craniofacial abnormalities, as these cases tend to develop cicatricial stenosis at higher rates than cases with relatively normal nasal mucosa.

The Modified Rains Stent, a potentially permanent silicone stent, has shown promise in these difficult cases with 8 of 9 patients asymptomatic at 2.5 years [7].

### Summary

The GNC and MRS have been successful in maintaining ostium patency following DCR. Once the technique is learned, insertion of the GNC has more successful outcomes and reduces operative time versus suturing flaps. The biocompatibility and ease of in-office removal further supports the use of the GNC. Furthermore the GNC and the MRS can be useful in cases with

significant sinonasal disease or congenital nasolacrimal duct obstruction due to craniofacial abnormalities; however, in these difficult cases, the MRS has shown high success rates.

---

## Canalicular Trephine

### Introduction

There are many different techniques prior to intubation of canaliculi for canalicular obstructions including probing, balloon canaliculoplasty, endocanicular laser, membranectomy, and punctoplasty. A technique using a microtrephine, first described by Sisler and Allarakhia in 1990 for distal canalicular obstructions, has been successful [10].

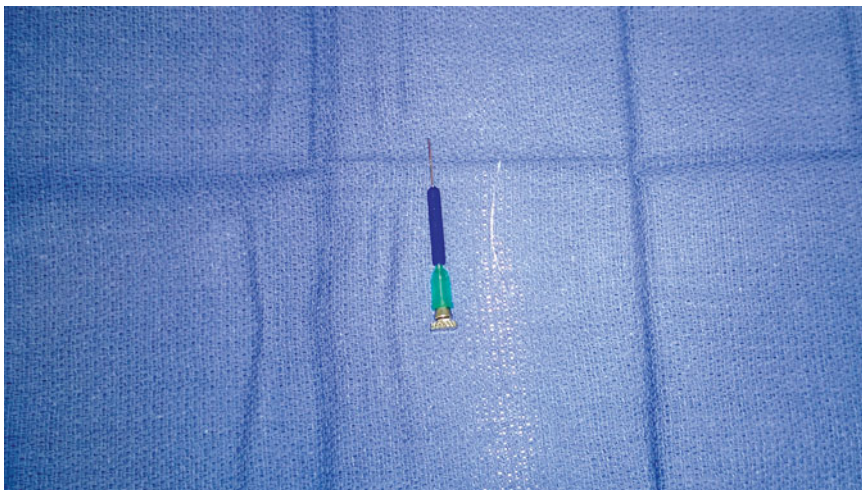
### Device

The Sisler Lacrimal Canalicular Trephine (SLCT) is a steel microtrephine 38 mm in length and 0.80 mm in diameter. The SLCT has a plastic grip at one end and a cutting trephine at the other end. The SLCT comes prepackaged over a blunt-tipped

advancing stylet that helps avoid damage to the surrounding tissues [11].

### Technique

Topical anesthesia with viscous lidocaine is used along with a nasociliary nerve block. The canaliculus is dilated with a probe. The stylet within the SLCT is advanced into the canaliculus until the blockage is found. At this time, the stylet is removed and the SLCT is rotated and advanced until the lacrimal sac fossa is reached. Care must be taken not to create a false passage while advancing the trephine. A 5 mL syringe may be attached to the SLCT and the plunger is drawn back to collect any scar tissue or debris during trephination. Once the SLCT is within the lacrimal sac fossa, it is removed. Irrigation is performed to ensure canalicular patency. A standard silicone stent may then be placed through the canaliculus, albeit the authors prefer a mini-Monoka or bicanalicular stent (FCI Ophthalmics, Marshfield Hills, MA, USA) (Fig. 21.3). These stents allow for an in-office procedure versus need for use of an operating room for placement of traditional stents. Patients are then instructed



**Fig. 21.3** Sisler Lacrimal Trephine on left and mini-Monoka stent tube on right

to use antibiotic/steroid drops for 2 weeks. The stent is removed at 2 months.

## Discussion

Complete resolution of epiphora when using a microtrephine and stenting occurred in 49 % of patients in one study and partial relief in another 38 % [10]. Another study combined endoscopic DCR with lacrimal trephination and nasolacrimal intubation for distal and common canalicular obstruction [11]. They found an 80.6 % and 12.9 % complete and partial success rates respectively in 31 eyes.

The most common complication is trauma to the non-obstructed portion of the canaliculus [12]. Trauma, as well as the creation of false passages, may be avoided by dilation of the canaliculus and use of the blunt-tipped stylet. Additionally, re-occlusion may occur after removal of the stents. Adjuvant therapies, such as topical, low-dose mitomycin C, have been used in conjunction with silicone intubation during endoscopic DCR [13], and may be beneficial in reducing re-occlusion when combined a mini-Monoka stent.

Other modified lacrimal trephines using differing approaches have been used successfully as well [14]. As more options become available, more data will become available to assess the primary success rate, long-term patency, and risks of using microtrephines during repair of canalicular obstructions.

## Summary

The SLCT has the potential to turn treatment of a distal canalicular obstruction from an operation in an operating room into an in-office procedure with little patient recovery time and healthcare cost savings. The ease of use, in combination

with fairly high success in reducing epiphora, makes using the SLCT a strong option for distal and common canalicular obstructions.

## References

1. Toti A. Nuovo metodo conservatore di cura radical delle supporazioni chronicle dell sacco lacrimale. *Clin Mod Firenze*. 1904;10:385–9.
2. Javate R, Pamintuan F. Endoscopic radiofrequency-assisted dacryocystorhinostomy with double stent: a personal experience. *Orbit*. 2005;24:15–22.
3. Saint-Gobain Performance Plastics. C-Flex thermo-plastic elastomer. Pharmaceutical Products Brochure. <http://www.biopharm.saint-gobain.com/en/Products/PDFs/FLS-5067D.C-FlexBrochure.pdf>. Accessed 30 Oct 2013
4. Mardis HK. Evaluation of polymeric materials for endourologic diseases. *Semin Int Radiol*. 1987;4:36–45.
5. Woog J, Metson R, Puliafito C. Holmium YAG endonasal laser dacryocystorhinostomy. *Am J Ophthalmol*. 1993;116:1–10.
6. Griffiths JD. Nasal catheter use in dacryocystorhinostomy. *Ophthal Plast Reconstr Surg*. 1991;7:177–86.
7. De Castro D, Santiago Y, Cunningham M, et al. A modified lacrimal sac implant for high-risk dacryocystorhinostomy. *Ophthal Plast Reconstr Surg*. 2013;29:367–72.
8. Romanes GJ. Dacryocystorhinostomy; clinical report of fifty cases. *Br J Ophthalmol*. 1955;39:237–40.
9. McLachlan DL, Shannon GM, Flanagan JC. Results of dacryocystorhinostomy: analysis of the reoperations. *Ophthalmic Surg*. 1980;11:427–30.
10. Sisler HA, Allarakhia L. New minitrephine makes lacrimal canalicular rehabilitation an office procedure. *Ophthal Plast Reconstr Surg*. 1990;6:203–6.
11. Baek BJ, Hwang GR, Jung DH, et al. Surgical results of endoscopic dacryocystorhinostomy and lacrimal trephination in distal or common canalicular obstruction. *Clin Exp Otorhinolaryngol*. 2012;5:101–6.
12. Khoubian J, Kikkawa D, Gonnering R. Trephination and silicone stent intubation for the treatment of canalicular obstruction. *Ophthal Plast Reconstr Surg*. 2006;22:248–52.
13. Nemet A, Wilcsek G, Francis I. Endoscopic dacryocystorhinostomy with adjunctive mitomycin C for canalicular obstruction. *Orbit*. 2007;26:97–100.
14. Haefliger IO, Piffaretti JM. Lacrimal drainage system endoscopic examination and surgery through the lacrimal punctum. *Klin Monbl Augenheilkd*. 2001;218:384–7.