Prevention of Prolapsed Silicone Stents in Lacrimal Intubation Using an Intrasac Fixation Suture

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Silicone stents are routinely used for the maintenance of patent mucosal passages in patients with nasolacrimal disorders. A common complication associated with the use of silicone stents is lateral migration or displacement of the tubes, which can be difficult to correct. This report describes a modified Quickert-Dryden approach with fixation of the tubes by an intrasac suture. From 1990 to 1996, 53 patients had silicone stents placed by this method with no complications related to tube displacement. The intrasac fixation suture has distinct advantages over other fixation methods.

Silicone intubation of the lacrimal system has been successful in maintaining patency of the drainage system in cases of stenosis, obstruction, laceration of canaliculi, and in conjunction with dacrocyctosthorhinostomy (DCR). Quickert and Dryden described a method of guiding silicone tubing through the lacrimal drainage system using an attached wire probe. During bicanalicular-nasal intubation, both the upper and lower canaliculi are occupied by a continuous loop of silicone. The lateral aspect of the loop lies exposed at the medial canthus between the upper and lower puncta, and the ends of the silicone tubing exit the nasolacrimal duct through the inferior meatus into the nasal cavity.

While relatively little major morbidity occurs with this procedure, a chief postoperative complication of bicanalicular intubation is the lateral displacement of the silicone loop at the medial canthus, resulting in a prolapsed stent. This usually occurs as a result of the patient pulling on the exposed segment of tubing. In some cases, the ends of the tubing can be located in the nose and pulled back into proper position. However, in other cases, the ends are deep within the lacrimal duct or lacrimal sac and cannot be seen. The silicone tubing must be removed prematurely, which can prove challenging depending on the method used to join the ends of the tubing.

A variety of methods have been applied to join and secure the silicone tubes to prevent lateral displacement, each with its own drawbacks. One method uses a lacrimal intubation set with a suture in the lumen. This allows the ends of the silicone tubes to be joined together, but does not prevent lateral displacement of the tubes. An alternative method is to knot the distal ends of the silicone tubes together, creating a mass in the nose. However, lateral displacement of the tubes can still occur with passage of the knot into the inferior nasal meatus, nasolacrimal duct, lacrimal sac, or common canaliculus. In this situation, removal or repositioning of the tubes can be challenging. Romano describes passing the silicone tubing through a segment of silicone sponge rod 5 mm in diameter, creating a larger mass in the nose, which is more difficult to displace into the nasolacrimal duct. The ends of the silicone tubing can also be secured to the nasal vestibule using a non-absorbable suture. This method does not eliminate the potential for lateral tube displacement because the suture tends to erode free from the nasal mucosa.

All of these methods require securing the tubes intranasally and do not allow the precise adjustment of the silicone tube tension at the puncta. Excessive tension on the puncta results in another postoperative complication of intubation, punctal erosion.

An ideal method of securing the silicone tubes that prevents lateral displa-
ment and allows for adjustment of tension has been described for use in external DCR. After placement of the silicone stents, the tubes are retrieved and externalized through the skin incision and tied together with a 6-0 silk suture. The suture is placed to reside in the lacrimal sac, forming a closed loop of tubing through the canalicular system. Proper proximal placement of the suture controls the size of the segment of silicone tubing exposed at the medial canthus, prevents lateral displacement of the tubing, and allows precise control of the stent tension on the puncta.

Formation of a similar short loop of tubing, which was limited to the canalicular system but created without access to the lacrimal sac and which used 3 slits in the tubing and a preplaced intralumen monofilament, was described. While possibly preventing lateral migration, this method has several disadvantages, including the necessary preoperative manipulation that risks breakage of the tubing, need for re-sterilization, and preselection of loop size, which cannot be varied intraoperatively.

This report describes a unique and simple method of placing an intrasac fixation suture without external access to the lacrimal sac, and without necessary alterations in the standard silicone tubing, which can be applied to all forms of lacrimal intubation.

**PATIENTS AND METHODS**

All cases of lacrimal intubation without DCR, performed by or under the supervision of 1 of us (N.T.I.) between 1990 and 1996, were retrospectively reviewed. Sixty-six patients who underwent silicone tube placement with the intrasac fixation suture were identified. Of these patients, 53 had complete follow-up until the time of tube removal and were selected for the study. Indication for intubation, results, and complications were noted.

Most procedures are performed while the patient is under general anesthesia. Prior to intubation, the nose is packed with a 50:50 mixture of 10% cocaine and 2% lidocaine with 1:100,000 epinephrine. A technique for silicone intubation, similar to that described by Quickert and Dryden, is used to place a bicanalicular silicone stent (Guibor Canalicular Intubation Set; Xomed Surgical Products Inc, Jacksonville, Fla).

While intubation for a lacerated inferior canaliculus is illustrated in the figures, the procedure is performed in the same fashion for simple silicone intubations (see below). With a muscle hook held under the portion of the tubing lying between the canalicles to relieve tension on the puncta, the tubes are stretched to exit from the nose and secured together with a 6-0 silk suture tied in a square knot at the nares (Figure 1). Multifilament silk sutures are used because their relatively soft and flexible ends are less likely to cause mucosal irritation than the stiffer monofilament ends. The remaining steps are performed to reposition this first suture so that it resides in the lacrimal sac.

Initially, a muscle hook is used to retrieve the silicone tubing from the laceration (Figure 1). Retrieval is continued using a needle holder or fingertips (Figure 2) to expose the suture in the laceration site (Figure 3). Care is taken to maintain intranasal access to the tubes. A second 6.0 silk suture, tied in a square knot, is placed (Figure 3, inset). Placement of this suture establishes the desired size of the silicone loop (Figure 4). The suture is placed so that when it resides in the lacrimal sac, undo tension on the puncta is avoided, and prolapse of the tubes to the limbus is restricted. The first knot is then carefully removed (Figure 3). The tubes are easily repositioned by gentle traction on the ends at the nares (Figure 4, inset). Typically, a “pop” is felt as the knot enters the lacrimal sac. Gentle traction on the lateral loop of the tubing at the medial canthus confirms the positioning of the second knot. The tubes are trimmed inside the nares and the laceration is closed in a standard fashion (Figure 5).

For simple silicone intubations, the first knot is retrieved from 1 of the puncta. The knot-repositioning step is performed at the medial canthus between the upper and lower puncta, setting exactly the amount of silicone tubing to be exposed at the medial canthus.

When removal of the tubes is desired, topical anesthetic is applied. The loop of silicone at the medial canthus is grasped with robust forceps or needle holders and is rotated to expose the intrasac fixation suture and tubing ends. If significant resistance is felt while rotating the tubing through one canaliculus, the tubes may be rotated through the other canaliculus. Once the intrasac fixation suture is exposed, the silicone loop can be cut and the tubes can be retrieved safely.

**RESULTS**

Twenty-three of the patients who underwent silicone intubation with an intrasac fixation suture also underwent repair for a lacerated canaliculus as illustrated in Figures 1 through 5.

The remaining 30 patients underwent silicone intubation for obstructive indications. In these 30 patients, the initial 6-0 silk knot was retrieved from one of the puncta and the knot was repositioned, a procedure analogous to the one illustrated in Figures 1 through 5. None of these patients sustained injury or permanent dilation of the punctum through which the tubes were prolapsed.

The average time until tube removal was 7 months (range, 2 months to 3 years). None of the 53 patients who underwent placement of the intrasac fixation suture had lateral migration of the silicone tubes or corneal irritation secondary to tube displacement. One of the 53 patients developed punctal erosion secondary to tube placement.

The intrasac fixation suture is well tolerated. We found no evidence of bacterial colonization of the silk suture. None of the patients developed discharge, acute or chronic dacryocystitis, or lacrimal sac tenderness while the suture was in place.

**COMMENT**

Placement of a silicone stent in disorders of the lacrimal drainage system is a well-established and typically successful procedure. The best
mechanism of tube fixation to prevent the complications of lateral tube displacement and punctal trauma is less well established. During an external DCR, an intrasac suture can be placed that virtually eliminates tube displacement. In this report, we describe a simple method to place an intrasac suture in cases of lacrimal intubation without DCR. We found the intrasac fixation suture to be well tolerated by all patients.
The tubes can be removed in the usual fashion by cutting the lateral loop of the tubing at the medial canthus and retrieving the tubes from the nose. However, finding the ends in the nose can be challenging, especially in children, and we have found removal through a punctum to be a simpler technique. We routinely remove silicone tubes, including tubes from cooperative young children, in the office this way with the patient under local anesthesia. The passage of 3 segments of silicone tubing through one canaliculus and punctum, at the time of suture repositioning or tube removal, has resulted in no cases of canalicular or punctal trauma and is easily performed.

The patient who developed punctal erosion deserves special note. The patient was a child who sustained substantial dog bite injuries, including an avulsed lower eyelid and canicular tear. The laceration involving the canaliculus tear extended inferotemporally 8 cm through the cheek. Substantial contracture of this scar resulted in unanticipated postoperative traction on the intubated lower lid and punctal erosion. This complication highlights the importance of proper knot placement and tension adjustment at the time of surgery.

Placement of an intrasac suture is simple once the repositioning step is well visualized. The procedure requires no additional equipment or modification to standard lacrimal intubation techniques and adds only a few minutes to the operation. The intrasac fixation suture minimizes the risk of tube displacement and allows careful adjustment of stent tension at the puncta.

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REFERENCES


Figure 5. Final tube and suture position. When the tubes are repositioned, the second knot resides in the lacrimal sac. A “pop” is usually felt as the knot enters the lacrimal sac.

A look at the past . . .

De Schweinitz reports a second case of the so-called angiod streaks in the retina which can be clearly traced to hemorrhages into the retinal substance. There were fresh hemorrhages in the right eye, while the left presented a typical picture of the anastomosing brownish streaks which characterize the disease.