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COMPARISON OF EARLY VERSUS LATE TIMING FOR SILICONE STENT REMOVAL FOLLOWING TRANSCANALICULAR LASER-ASSISTED DACRYOCYSTORHINOSTOMY

ABSTRACT

Background: Laser-assisted dacryocystorhinostomy (DCR) is a surgical operation performed to treat recurrent dacryostenosis in which an anastomosis is created between the lacrimal sac and the nasal cavity. The role of intubation in dacryocystorhinostomy is the subject of debate in the field of lacrimal surgery.

Aims & Objectives: The present study aimed to present the results. A factor that has not received much attention is whether or not the duration of intubation may affect the outcome. No consensus exists regarding the duration of intubation among surgeons advocating silicone stent intubation in published studies.

Methods: In our study, we analyzed the results of the operation of 20 patients in two groups. Each of these groups consisted of 10 patients. In the first group, the stent was removed in the third week and in the second group in the 16th week.

Results: From the group in which the stent was removed in the two weeks, we had 1 patient with recurrence who was operated again

Keywords:

Dacryocystorhinostomy, laser, transcanalicular approach, stent.

Introduction

The most common cause of lacrimal drainage system obstruction is nasolacrimal duct obstruction. The obstruction can be congenital or acquired. Acquired nasolacrimal duct obstruction is mostly seen in aged patients and its incidence rapidly increases in those aged >60 years [1]. Primary acquired nasolacrimal duct obstruction is mostly idiopathic. The goal of the treatment is to maintain the drainage of tears. The primary option in surgery is dacryocystorhinostomy, namely creating a new permanent pathway between the lacrimal sac and the nasal mucosa. The first known external dacryocystorhinostomy operation was described by *Toti in* 1904 [2].

Although treatment via an external surgical approach is still the gold standard with the highest success rate, the latest development is the transcanalicular diode laser approach.

Laser-assisted DCR application was introduced by *Massaro et al.* in 1990 with cadaver studies using a blue-green argon laser. Subsequent studies have shown delayed postoperative wound healing and prolonged inflammation in laser-treated tissues in CO2 laser and Nd: YAG laser applications [3].

Eloy et al. first described transcanalicular dacryocystorhinostomy using a diode laser in 2000[4]. This method is cost-effective. The diode laser produces a wavelength of 980 nm and 7-20 W of power, and it can ablate bone and soft tissues without causing excessive collateral damage by using a 400-600-μ optical fiber. Variable success rates have been reported for transcanalicular dacryocystorhinostomy with diode lasers ranging from 64% to 90%. These values were based on an absence of epiphora 3 months after surgery. However, the rates have improved over the years and have reached over 80%[5]. Toti's classic transcutaneous approach has shown higher success rates than minimally invasive procedures, as evidenced by a wider neo-ostium and less fibrosis. This may

be explained by thermal damage from the laser energy causing more fibrosis at the neo-ostium and resulting in obstruction of the nasolacrimal pathway[6].

The retrospective study aimed to compare the surgical outcomes of the transcanalicular diode laser DCR surgery with and without bicanalicular silicone tube intubation in the treatment of 61 patients. In recent years, the diode laser has emerged as the preferred laser for performing transcanalicular dacryocystorhinostomy.

The role of intubation in dacryocystorhinostomy is the subject of debate in the field of lacrimal surgery. Previously the focus of the discussion has been stenting versus no stenting with some surgeons recommending stenting[7].

Others argue that they are not needed in cases showing any canalicular stenosis, fibrotic lacrimal sac or other complicating factors[8]. Published studies have given contradictory results and they are difficult to compare as they vary regarding inclusion criteria and follow-up. Concerns have been raised that some of the studies were underpowered to detect a difference. A major review by *Kalin-Hajdu et al* in 2016 revealed no evidence supporting routine intubation[9]. One recent meta-analysis of randomized controlled trials showed a 5% higher success rate with silicone intubation[10].

A factor that has not received much attention is whether or not the duration of intubation may affect the outcome. No consensus exists regarding the duration of intubation among surgeons advocating silicone stent intubation in published studies. The duration varies between four weeks and six months. Few studies have taken the length of silicone stent intubation into account. *Vicinanzo et al* investigated the consequence of premature silicone stent loss in primary external dacryocystorhinostomy and did not find any significant difference in success rate[11]. In a retrospective chart review combined with a telephone survey, *Charalampidou and Fulcher* compared external dacryocystorhinostomy with early silicone stent removal (<8 weeks), routine silicone stent removal (8–16 weeks) and late silicone stent removal (>16 weeks) and found 95%/90.5%/91.3% of patients with complete or partial resolution of epiphora but this result was not statistically significant[12].

Materials and methods

The method involves the use of diode lasers. A few studies have shown that DCR using diode laser is effective and has the shortest surgical time, with success rates similar to those of external or endonasal DCR. A diode laser is a semiconductor that converts electrical energy into light energy that is mainly absorbed by the soft tissues.

With this technique, the laser is inserted into the lacrimal sac and points toward the lateral nasal wall, which means that penetration into the orbit and protrusion of fat can be avoided. In all our patients we were able to create a bony window of 5 × 5 mm with 6-7 W of energy. No complications, such as bleeding or infection, occurred. The technique can be performed under general anaesthesia as day-case surgery. This procedure is faster than conventional endonasal DCR.

Silicone tube intubation during dacryocystorhinostomy is used to prevent occlusion of the lacrimal passage and to provide epithelization. Silicone is an inert substance, does not harm the conjunctiva, and can be well tolerated in the canaliculi. As noted above, silicone tube intubation's mean follow-up period was 6 months, the follow-up period varied greatly among the patients. This variation could be explained by two factors. It was not a short period if we checked the follow-up period in each operation. The second factor was that, in the present study, patients who were satisfied with the surgery did not visit the hospital for follow-up despite having appointments for the same.

In our study, we analyzed the results of the operation of 20 patients in two groups. Each of these groups consisted of 10 patients. We performed the operations and the follow-up in 2018 and 2019. Patients were selected between the ages of 18 and 60 years and have not been operated on before. In the first group, the stent was removed in the third week and in the second group in the 16th week.

Results

All surgical procedures were performed between 2018 and 2019.

All cases were uncomplicated as complicating factors such as canalicular stenosis, fibrotic lacrimal sacs or suboptimal flaps would prompt the surgeon to decide to let the silicone stent remain in place longer than 4 mounts.

Of the 20 cases, 12 (60%) were women, and 8 (40%) were men affected by the lacrimal drainage system. The mean age was 52 years.

From the group in which the stent was removed in the two weeks, we had 1 patient with recurrence who was operated again

Our analysis has not demonstrated a difference in the outcome or complication rates when comparing silicone stent removal at two weeks to stent removal at 16th weeks.

This is reassuring given some evidence that the two groups differed in baseline characteristics.

No significant differences were found in the complication rates between the two groups. No complications were recorded in any of the study patients at the time of the fourth follow up appointment, fourth months after surgery. Given that all complications were recorded before stent removal in both groups, it should be noted that the timing of stent removal does not appear to have influenced complication rates in this small cohort.

Discussion

This study is the first to present the outcome of laser DCR surgery with only two-week intubation. With a high rate of success and no cases of canalicular laceration, stent prolapse or extrusion it shows that short intubation time in uncomplicated cases is possible with results comparable to the highest reported success rates in the literature. It is also higher than the achieved success rate (90.5% partial or complete resolution of epiphora) in the routine intubation time group (8–16 weeks) reported by Charalampidou and Fulcher. In addition, a short intubation time is cost-effective and practical for the patient as it eliminates the need for a second routine follow-up visit.

A theory proposed by Rose suggests that the role of the stent is to prevent cross-adhesion due to epithelial abrasion in the puncta, canaliculi and valve of Rosenmuller caused by the insertion of the probe or in the case of endonasal DCR, the light pipe, by preventing the build-up of fibrin exudate in these areas[13]. This is even more important if the epithelium is inflamed, as in chronic

dacryocystitis. However, the stent would only be needed until fibrin exudation has ceased, i.e. a few days. This theory is in line with the proposed existence of an optimal duration of intubation, as suggested in the introduction, where it was proposed that the stent is beneficial initially, but may become a negative factor if left in place too long.

Rebeiz et al. [14] recommended 4–6 weeks for the duration of silicone tube intubation. To prevent granuloma formation, *Kong et al.* [15] suggested that the tubes should not be removed before 8 weeks. The bicanalicular tubes in the lacrimal ducts were well tolerated by all patients without any significant problems. In the study, during silicon tube placement, care was taken not to traumatize the tissues, but to tie the ends of the silicone tube with an ideal tension.

Conclusions

We believe that stent placement after laser surgery is mandatory. This is because there is significant thermal damage during these surgical interventions. Another problem is how long it is optimal for the stent to stand. We believe that in some patients the stent may be removed earlier.

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