

Transcanicular Laser Dacryocystorhinostomy in Patients with Epiphora and Midfacial Fractures

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Abstract: *Dacryocystorhinostomy (DCR) is a surgical operation performed to treat recurrent dacryostenosis and epiphora in which an anastomosis is created between the lacrimal sac and the nasal cavity. Epiphora occurs in cases of midfacial trauma but is often overlooked. The present study aimed to present the results of post-traumatic transcanicular laser DCR. We have defined traumatic dacryocystitis as a disease entity in which the anatomy of the orbital and nasolacrimal region has been distorted due to facial trauma which causes epiphora and discharge due to recurrent episodes of infection. Five patients were included in the study that underwent DCR with bicanalicular silicone intubation. In our study, we analyzed the causes and results of the operation of 5 patients. In all the patient bicanalicular silicon intubation could be performed. The silicone stent is removed after 4 months which is sufficient for fibrosis of the tract to occur. All five of our patients had complete resolution of epiphora after stent removal*

Keywords: Dacryocystorhinostomy, laser transcanicular approach, fracture, stent

1. Introduction

Epiphora occurs in cases of midfacial trauma but is often overlooked. Although these fractures can be easily diagnosed using computer tomography, it is difficult to predict whether nasolacrimal duct obstruction will develop.

Regarding anatomical considerations [1], the bony aspects of the nasolacrimal excretory system exist at the medial wall of the anterior orbit and extend to the lateral wall of the nasal cavities. The lacrimal fossa is a shallow depression bounded by the anterior lacrimal crest and the posterior lacrimal crest. The maxillo-lacrimal suture runs vertically within the lacrimal fossa. The lacrimal fossa of the orbit is composed of the maxilla anteriorly and the lacrimal bone posteriorly.

Epiphora in the early stage of trauma that may be caused by facial and conjunctival edema, nasolacrimal duct obstruction, or reactive hypersecretion due to pain. As the facial edema and hypersecretion usually resolve quickly, the accompanying epiphora may improve in a relatively short time, but that due to nasolacrimal obstruction can last for months [2].

The lacrimal system is not frequently injured in facial injuries in the absence of medial canthal avulsion or obvious lacrimal system damages [3]. The incidence of late lacrimal obstruction requiring dacryocystorhinostomy was 5–10% following acute fracture management [4].

The nasolacrimal duct obstruction after injury may be temporary and spontaneously recover over time, however, the development of prolonged obstruction is possible due to soft tissue stricture, adhesions, or bony fractures.

It is difficult to approach the nasolacrimal duct at the time of initial treatment, the attempt itself may worsen the injury. Currently, there is no consensus on which method should be practised. Several studies have reported that lacrimal intubation is a useful prophylactic procedure at the time of injury to prevent obstruction, whereas other studies have recommended delayed assessment [5].

The management of nasolacrimal duct fractures in this area, when extensive, is completed utilizing open reduction, rigid osteological fixation, and plate implants as required.

The indications for surgery in a nasolacrimal duct trauma are those outlined above. Restoration of pre-injury facial aesthetics and function is the goal of treatment. Since these injuries are usually associated with significant cosmetic and functional sequelae, expeditious restoration of injuries and function prevents latent cosmetic and functional deficits. Longer-term follow-up allows the surgeon to assess for both early and late sequelae of injuries [6].

In principle, dacryocystorhinostomy is the removal of bone lying between the lacrimal sac and the nose and making an anastomosis between the medial wall of the sac and nasal mucosa. Time has witnessed many modifications in the procedure as described by Toti, an ophthalmologist in 1904 almost a century ago, but the basics remain the same [7]. The success rate of external DCR has been reported up to 90% depending upon the surgeon's experience [8]. Various other methods have also been adopted successfully such as endoscopic DCR, endonasal laser DCR, dacryocystoplasty and Radio Frequency assisted DCR [9]. However, the procedure of external DCR rules the roost in the management of epiphora in both the sexes of all age groups. According to Keel et al. external DCR is better than endoscopic and endonasal laser-assisted DCR [7]. Though a highly successful surgery, sometimes DCR can be a failure due to fibrous tissue growth, inappropriate size and location of the bony ostium, common canalicular obstruction, synechia or an active systemic disease [8].

Eloy et al. first described transcanicular dacryocystorhinostomy using a diode laser in 2000 [10]. 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 transcanicular 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% [11]. 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 [12].

2. Materials and Methods

This study was conducted at a university hospital in Burgas, Bulgaria from February 2017 to January 2019. We have defined traumatic dacryocystitis as a disease entity in which the anatomy of the orbital and nasolacrimal region has been distorted due to facial trauma which causes epiphora. Five patients were included in the study that underwent DCR with bicanalicular silicone intubation.

All the patients underwent complete ENT examination. The nasolacrimal system of patients was assessed by performing syringing, probing, nasal evaluation. Patients were examined for canalicular, common canalicular or nasolacrimal duct blockage. CT scan was done in all cases. All patients were systemically evaluated and investigated to rule out any contraindication for surgery under general anaesthesia.

3. Results

In our study, we analyzed the causes and results of the operation of 5 patients according to the method.

The average time from injury to initial surgery was 3.2 months. Three patients underwent diode laser transcanalicular laser-assisted dacryocystorhinostomy. The other patients two were not suitable for this type of surgery. In these two patients, the operation was performed with external access.

In all the patient's bicanalicular silicon intubation could be performed.

The silicone stent is removed after 4 months which is sufficient for fibrosis of the tract to occur.

All five of our patients had complete resolution of epiphora after stent removal

Functional success (resolution of preoperative symptoms) was achieved in all cases (100%).

4. Discussion

The incidence of persistent nasolacrimal system obstruction requiring DCR ranged from 5 to 21% [13]. As previously mentioned, the management of lacrimal sac and nasolacrimal duct injuries should not be explored at the initial surgery if there is no obvious laceration [14]. Trauma to lacrimal pathways can produce temporary or permanent dysfunction. Temporary dysfunction is caused by lacrimal compression by posttraumatic edema. There were studies [15] that showed spontaneous resolution of traumatic epiphora within

6 months after primary fracture repair. The rationale is that it is difficult to adequately assess and repair especially the severe injury because of soft tissue edema and haemorrhage.

Definitive treatment of epiphora and nasolacrimal injuries should be deferred until the patient has been stabilized regarding any concomitant, compromising, or life-threatening trauma. During this time, systemic deficits can be corrected while giving the surgeon time for an accurate assessment before the operative procedure. As with any operative procedure, the risks of general anesthesia and the stresses of surgery must be weighed against medical contraindications. These injuries should be addressed and stabilized before surgical intervention, since osseous manipulation may exacerbate damage to the eye. Some injuries may not need correction, provided that the patient is satisfied with the appearance and function.

Irrigation of the system during primary fracture reconstruction or early postoperative period is not helpful due to edema and inflammation of the nasolacrimal duct. We recommend better assessment 3–6 months after trauma when the resolution of edema and soft tissue injuries permit the definitive evaluation. The other investigation that is useful for evaluating post-traumatic nasolacrimal duct obstruction is CT scan and dacryocystography [16] or combined CT and dacryocystography. The combination of CT and dacryocystography will give useful information of the complexity of anatomical change after trauma and repair, identify the location of the lacrimal sac, bony structure, plate and screw implantation, and nasal septum which help in planning surgery.

External Dacryocystorhinostomy with Silicon intubation is one of the most effective surgical procedures for such patients [17]. Routine use of silicon intubation as a useful adjunct to external DCR procedure was advocated by Older [18]. The advantages of silicone intubation are the maintenance of patency of the tract. Fibrosis and inflammation could not obstruct the tract thus allowing adequate drainage of the secretions.

Till now very few studies have been carried out on the management of traumatic dacryocystitis. So, we have taken the opportunity to do such a study and calculate the success rate. The purpose of this study is to determine the most direct approach to the management of such cases. We have also tried to explain the importance of Silicon tubes in traumatic dacryocystitis.

The success rate of our study was 100% which was following other study groups. The global value for a success rate of DCR with Silicone intubation in DCR cases with a high failure rate is 85% out of which it is 90% in post-traumatic cases [19].

5. Conclusions

The success rate of our study was 100% which was following other study groups.

The success of laser-assisted transcanalicular dacryocystorhinostomy surgery is the same as with the classic external dacryocystorhinostomy.

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