

A modified method for punctoplasty: “Excisional punctoplasty with the guidance of a 27 G Rycroft cannula”

Punktoplasti operasyonunun bir modifikasyonu: “27G Rycroft kanül kullanarak yapılan eksizyonel punktoplasti”

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Introduction

Epiphora is one of the most mentioned symptoms by patients that apply to the ophthalmology departments with a wide range of differential diagnosis. External lacrimal punctal stenosis is one of the causes of epiphora [1]. Anatomically, acquired punctal stenosis is a condition in which the external opening of the lacrimal canaliculus, located in the nasal part of the palpebral margin, is narrowed or occluded [2]. In literature, many factors have been reported in the pathogenesis of acquired external punctal stenosis [3]. The supposed pathogenesis is involuntional changes involving the external lacrimal punctum leading to its narrowing or occlusion. Aging has been identified in several studies as a cause of punctal stenosis. Chronic lid inflammation, especially chronic blepharitis, remains a widely identified cause of acquired punctal stenosis. The pathogenesis asserted is chronic inflammation of the external punctum leading to gradual fibrotic changes in the ostium, followed by progressive occlusion of the duct. Infections involving the eyelid, such as trachoma and herpes simplex, may also result in stenosis [4,5]. Other factors associated with punctal stenosis have been shown in Table 1.

Table 1: Etiology of acquired punctal stenosis

	Etiology
Involuntional	Tobramycin
Aging	Indomethacin
Inflammatory	Dexamethasone
Chronic blepharitis	Tropicamide
Ocular cicatricial pemphigoid	Naphazoline
Graft-versus-host disease	Artificial tears
Dry eye syndrome	Mitomycin-C
Eyelid malposition	Systemic medications
Infectious	5-Fluorouracil
Chlamydia trachomatis	Docetaxel
Actinomyces	Paclitaxel
Herpes virus	Idoxuridine
Human papilloma virus	Neoplastic (rare)
Topical medications	Peripunctal tumors
Timolol	Systemic diseases
Latanoprost	Acrodermatitis enteropathica
Betaxolol	Porphyria cutanea tarda
Dipivefrine hydrochloride	Other
Echothiophate iodide	Local irradiation
Pilocarpine	Photodynamic therapy for macular disease
Prednisolone acetate-phenylephrine hydrochloride	Trauma
Adrenaline	Idiopathic
Chloramphenicol	

In 1853, Bowman et al. [6] presented a 1-snip procedure, supported in 1873 by Arlit [7]. The procedure involved an incision of the entire length of the canaliculus with a canaliculus knife. This had the significant disadvantage of destroying the capillary action of the canaliculus. In 1926, Graves described his posterior ampullectomy, refined into the modern 3-snip by Thomas [8] in 1951 and Viers [9] in 1955. In 1962, Jones [10] re-popularized the 1-snip with a single vertical snip down the ampulla.

Basic surgical techniques for punctal stenosis involve 1, 2, or 3-snip punctoplasty. The difference between procedures is the number of cuts or the direction of the snip(s) that is best to prevent recurrence of epiphora and achieve anatomic and functional success. The 1-snip procedure refers to a single vertical snip down to the ampulla, which produces a high rate of failure attributable to the fusion of cut edges [11].

Jones et al [10] suggested a 2-snip variation of the surgery that consists of removing a V-shaped wedge from the vertical portion of the canaliculus on the conjunctival surface. Recently, the 3-snip procedure has become more applicable 1 or

2 snip procedure. The traditional 3-snip, specifically the triangular 3-snip procedure, is a posterior ampullectomy, which removes the triangular-shaped ampulla by a first cut at the vertical canaliculus, followed by a second cut along the horizontal canaliculus and a final snip at the base. A rectangular 3-snip punctoplasty, which involves 2 vertical snips at either side of the ampulla and a cut at the base, was recently reported to have high functional and anatomic success rates. The higher success rates are thought to be attributable to the preservation of physiology, as only the vertical portion of posterior ampulla is excised, and the anatomy and physiological functions of the lacrimal system are preserved [12].

Therefore, we tried to introduce a new revised method with the usage of cannula guidance for punctoplasty. The advantages of this method have been reported as the requirement of less surgical instrument, high rates of success, less recurrence of re-stenosis, easier way to perform, safer because of anatomical protection, application in less time and easy to apply in office conditions.

Materials and methods

This paper is related with the description of a revision in previous punctoplasty procedures. This study adhered to the tenets set forth in the Declaration of Helsinki, and the approval of local ethics committee was also obtained.

This new procedure has been performed to 10 eyes of 6 patients that applied to Istanbul Bilim University Ophthalmology Department with presenting epiphora. After detailed ophthalmologic examination including best-corrected visual acuity (BCVA), intraocular pressure measurement, slitlamp biomicroscopy, and dilated fundus examination; patients who had epiphora and severe stenosis of the lower eyelid puncta and/or the upper lid puncta included in this study. The punctal dilation was performed with a punctal dilator but was not sufficient to allow the 2 vertical cuts to the ampulla. The patency of the canaliculi and nasolacrimal duct was confirmed by probing and irrigation. Patients with other causes of epiphora, such as canalicular stenosis, nasolacrimal duct obstruction, punctal malposition, lid laxity, entropion, and ectropion, were excluded. After punctal stenosis is defined, all participants were evaluated according to the severity of punctum size by slit-lamp examination with the references of Punctum Size Grading by Slit-Lamp Examination (Table 2). All participants have defined with the presence of Grade 0-1 punctal stenosis.

All patients had undergone the standardized surgical procedure by the same surgeon (O.T). The surgical procedure started with the local injection of 0.3 cc of 2% lidocaine with 1:100.000 epinephrine that administered transconjunctivally, 2 mm below the punctum and later punctal dilatation was performed with punctum dilator. After the appropriate width has been provided, a 27G anterior chamber cannula, 40 x 22.0mm (27 G x 7/8 in), Anterior Chamber Cannula [Rycroft], angled 45 degrees, 6 mm from end, (BD Visitec™ from Beaver-Visitec International, South San Francisco, USA) which is actually manufactured for cataract surgery was inserted to punctum and pushed forward 2 mm vertically and 1 mm horizontally. After that the surgeon exposed the tip of cannulas by opening conjunctiva with conjunctival scissors (Westcott

Conjunctival Scissors with Lightly curved 16mm blades, blunt tips) from projection site of the tip of the cannula. The Rycroft cannula is used for better guidance for canaliculus anatomy instead of lacrimal cannulas. After canaliculus was hanged with cannula, a conjunctival incision was made from the entrance of cannula to the punctum towards the point where the cannula exposed from conjunctiva via Westcott scissors. In the next step, two sides of the formed flap were held with toothed forceps orderly and was removed by cutting with conjunctival scissors (Figure 1). This method is the first procedure described with cannula guidance for excisional punctoplasty. Topical antibiotics (Moxifloxacin hydrochloride 0.5% Vigamox, Alcon Canada Inc.; 4 times per day) and steroids (Loteprednol etabonate ophthalmic solution 0.5%, Lotemax, Bausch & Lomb Incorporated Tampa, Florida, USA; 4 times per day) were given for 1 week postoperatively, an approximate follow-up visit was 6 months.



Figure 1: Surgery Technique

Results

After 6 month follow-up, none of the patients complained of epiphora and satisfied with the surgery. In 3-month and 6-month follow-up; the patency of the canaliculi and the nasolacrimal duct was confirmed by probing and irrigation. All participants have been defined with the presence of Grade 3-5 punctal aperture with the references of Punctum Size Grading by Slit-Lamp Examination (Table 2). This grading scale is appropriate for anatomical surgical success evaluation but the functional surgical assessment is necessary for detection of the level of quality of life. The subjective epiphora score (Munk score, Table 3) is utilizable for functional success ratio [13].

Table 2: Punctum Size Grading by Slit-Lamp Examination

Grade	Clinical finding
0	No papilla and punctum (punctal atresia)
1	Papilla is covered by a membrane or fibrosis and difficult to recognize
2	Less than normal size but recognizable
3	Normal
4	Small slit (< 2 mm)
5	Large slit (> 2 mm)

Table 3: Subjective Evaluation of Tearing by Munk Score

Grade	Clinical finding
0	No epiphora
1	Occasional epiphora requiring wiping with a tissue less than twice a day
2	Epiphora requiring 2 to 4 wipings per day
3	Epiphora requiring 5 to 10 wipings per day
4	Epiphora requiring >10 wipings per day or continuous tearing

Discussion

Ordinarily, a few methods are currently used in the management of punctal stenosis. The simplest method involves the use of perforated punctal plugs, which is a reversible procedure. Minor surgical techniques require an incision of the puncta. In the 1, 2 or 3 snip punctoplasty, the main issue was the re-stenosis of punctum.

Different surgical procedures have been described to reduce further the risk of reapproximation. Placing the lid under tension with a 4-0 suture and anchoring the tarsus to a sterile button was contemplated by Dolin and Hecth in 1986 [14]. In 1993, Lam and Tessler [15] suggested topical instillation of mitomycin C as an adjunctive treatment. After that, Offutt and Cowen proposed a new approach in which the punctum was removed and the vertical canaliculus was externalized [16].

Success rates as high as 90% with the three-snip procedure were reported by Caesar and McNabb, but these results may not reflect sustained long-term success, because the duration of follow-up was not reported [11].

In a large retrospective study of 169 patients with appropriate preoperative evaluation, two-snip punctoplasty was compared with three-snip punctoplasty [17]. A two-snip procedure entails a vertical cut to the medial and lateral wall of the punctum, followed by removal of the tissue left between the incisions. This last step is accomplished by performing a third cut at the base of the tissue bridging the cuts). The three-snip punctoplasty involves a vertical cut down the ampulla, followed by a horizontal cut along the roof of the canaliculus, thus forming a free flap connected to the floor of the canaliculus-ampulla complex. Subsequently, the base of the flap is incised, leaving a broadened canalicular ostium. In this study, 91% of patients achieved anatomical success, while 64% achieved functional success. Partial functional success was evident in 14%. Seventy-one percent of the patients were satisfied with the results. The data suggest that both two-snip and three-snip punctoplasty were satisfactory in yielding anatomical success, with 91.1% for the two-snip procedure and 94.1% for the three-snip procedure (P = 0.7). The mean follow-up duration in this study was 23 (range 1–208) weeks, and so, once again, it is unclear whether the snip procedures provide long-term relief of epiphora.

Another retrospective study of 75 patients with a mean follow-up of 0.68 years suggested that rectangular punctoplasty (two vertical incisions at either side of the vertical canaliculus and one cut at the base) may be more effective than the common triangular three-snip procedure [12].

Even with the presence of different surgical approach, there is no gold standard surgical procedure. Most of these surgical methods require a blinded attempt to canaliculi to uncover the incision. In our revised surgical method, the application of 27 G anterior chamber cannula guidance provides a similar anatomical aperture in canaliculus and this technique distorts lacrimal drainage physiology lesser than conventional procedures. Because of the lack of removal of ampulla's posterior wall totally in other procedures, we performed adjustment of both up and down walls of ampulla properly via cannula guidance. so that we predict that the wound healing will

not cause re-stenosis. Also having a simple anterior chamber cannula can provide a safer method for punctoplasty with similar anatomical structure with proximal lacrimal duct system. The guidance of anterior chamber cannula maintains less hemorrhage because of the protection of the capillary system unlike other methods so that it can be applicable in office conditions.

In this article, we could apply this method to a very limited number of patients and our follow-up (6 months) is relatively short to claim the re-stenosis ratio but in the immediate postoperative period, we haven't encountered any re-stenosis. Also, we did not evaluate Munk score and this is one of the most important shortcomings of this study. Further prospective, randomized, and large-scale studies are needed to evaluate the results about re-stenosis and anatomical or functional success ratios in this excisional punctoplasty with a 27 G Rycroft cannula assistance method.

In conclusion, our modification can be implemented in surgeries which are performed in the shortage of equipment. Furthermore, the patency of punctoplasty is ensured due to the features of our technique. These properties make our technique unique, whereas, it should be confirmed by further researches.

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