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Punctoplasty surgery combined with 22-gauge intracath intubation in punctal stenosis: A practical, cost-effective, and efficient method

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Abstract

Aim: To evaluate the outcomes of cases with epiphora due to punctal stenosis, in which intubation was performed using a 22-gauge (G) intracath in combination with the two-snip or three-snip technique.

Materials and Methods: The study included 45 eyes of 23 patients with punctal stenosis who presented to our clinic with epiphora. The severity of punctal stenosis in all cases was graded according to the Kashkouli classification; 32 eyes (71.1%) were graded as grade 1, and 13 eyes (28.9%) as grade 2. Epiphora was confirmed using the fluorescein disappearance test. Lacrimal system lavage was performed in all cases to evaluate the distal lacrimal system, and distal passage patency was observed. Cases were considered successful if they had a Munk score of 0 or 1 and a fluorescein disappearance test score of 0.

Results: The study included 10 male and 13 female patients, with a mean age of 62.09 ± 12.41 years. The mean follow-up period was 6.3 ± 4.56 months. Preoperatively, all cases had a Munk score of 4 and a fluorescein disappearance test score of 3. At the final follow-up, no epiphora was observed in 36 eyes (80%), while intermittent epiphora with a Munk score of 2 was reported in 9 eyes (20%). In four eyes with intermittent epiphora, the lavage time exceeded 5 seconds, and in two eyes (one patient), ocular surface disorder due to previous trauma was present. Revision surgery was required in five eyes due to restenosis. Conjunctival reaction developed in six eyes (three patients).

Conclusion: Punctoplasty surgery is an effective option in cases with punctal stenosis. The method we used is effective and cost-efficient in terms of punctal intubation, and it may serve as an alternative to silicone tube intubation.

Introduction

A dysfunction occurring at any point in the lacrimal drainage system clinically presents as epiphora. Punctal stenosis is also a significant cause of epiphora, commonly seen in elderly patients. Although the exact etiology is not fully known, several factors are implicated [1]. These include infections, inflammation, systemic diseases, medications, aging, tumors, and gender. The etiopathogenesis is attributed to fibrosis caused by chronic inflammation [2-6]. Kashkouli et al. classified punctal stenosis based on the morphological findings of stenosis [7,8] (Table 1). In the literature, this classification has no influence on the described treatment approaches. These treatment approaches include dilation, one-snip punctoplasty, two-snip punctoplasty, three-snip punctoplasty, four-snip punctoplasty, Kelly punctal punch, mitomycin C application, punctal plug placement, and silicone intubation [9,10].

The aim of this study is to describe a cost-effective and clinically effective method using a 22-gauge intracath and to present its results.

Materials and Methods

Patients who underwent surgery with 22-gauge intracath intubation due to punctal stenosis after being referred to our oculoplastic unit for complaints of epiphora between January 2020 and June 2024 were included in the study. Approval was obtained from the Clinical Research Ethics Committee of SBÜ Bursa Yuksek Ihtisas Training and Research Hospital (approval date: 13/12/2023; protocol number: 2011-KAEK-25 2023/12-29). Data on patients' demographic characteristics, symptoms, duration

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Table 1. Kashkouli classification.

Grade	Clinical finding on slit lamp examination
0	No papilla and punctum (punctal atresia)
1	Papilla is covered by a membrane (exudative or true 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)

of symptoms, previous clinical diagnoses, treatments, and long-term outcomes were evaluated retrospectively. During the diagnostic process, a 2% fluorescein disappearance test was performed on all patients, and distal lacrimal passage patency was examined. Our exclusion criteria in the study were cases with distal lacrimal passage obstruction detected by lavage examination and cases with epiphora due to dry eye. The severity of punctal stenosis in all cases was graded according to the Kashkouli classification.

Postoperative success was defined as a Munk score of 0 or 1 and a fluorescein disappearance test score of 0 (Table 2). All patients underwent either two-snip or three-snip punctoplasty, followed by intubation using a 22-gauge intracath. During intubation, fluid was passed through the intracath to ensure that it remained within the canal without creating an extra passage. The intracath was fixed to the skin with 6/0 vicryl sutures, and intubation was maintained for 7 to 12 days, depending on patient tolerance (Figure 1).

Table 2. Munk scoring.

Grade	Clinical finding
0	No epiphora
1	Epiphora that requires wiping 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 more than ten wipings per day

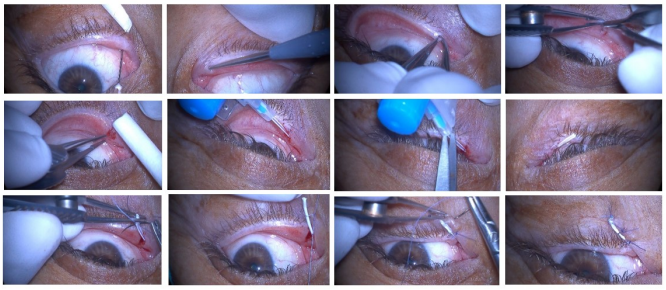

Figure 1. Procedures applied in order from top left to right. Local application of epinephrine-lidocaine HCL (jetocaine) to the surgical site, punctum dilation, application of three-snip punctoplasty, placement of a 22 G intravenous catheter, and skin-intracatheter suturing with 6-0 vicryl sutures.

To assess the normality of the patient data, the Shapiro-Wilk test was conducted, yielding a p-value of 0.3645. This result indicates that the data conform to a normal distribution. Therefore, continuous variables are summarized as mean and standard deviation (mean ± SD), while categorical variables are presented as counts and percentages.

Results

The study included 45 eyes of 23 patients who underwent surgery with 22-gauge intracath intubation due to punctal stenosis. Ten (43.48%) of the patients were male, and 13 (56.52%) were female, with a mean age of 62.09 ± 12.42 years (range: 36-86). The mean follow-up period was 6.30 ± 4.56 months (range: 1-13 months). Preoperatively, all cases had a Munk score of 4 and a fluorescein disappearance test score of 3. The degree of punctal stenosis in all cases was classified according to the Kashkouli classification. According to this classification, 32 eyes (71.1%) were graded as grade 1, and 13 eyes (28.89%) were graded as grade 2. At the final follow-up, no epiphora was observed in 36 eyes (80%), while intermittent epiphora with a Munk score of 2 was reported in 9 eyes (20%). In 4 eyes (9.3%) with intermittent epiphora, the lavage time exceeded 5 seconds and was considered as partial distal lacrimal passage insufficiency. Two eyes (1 patient) had ocular surface disorder due to previous trauma, and the persistence of epiphora was associated with this ocular surface disorder. Postoperatively, 5 eyes (11.63%) developed restenosis, requiring revision surgery. After revision surgery, epiphora was no longer observed. Six eyes (three patients) developed conjunctival reactions in the early postoperative period. This was considered a surgical-related reaction, and corticosteroid drops were applied at a dose of 4 times a day for 4 weeks. No change was observed in the reaction, and to benefit from its anti-inflammatory effect, the treatment was switched to cyclosporine. After cyclosporine application, a rapid clinical response was observed, and the reaction regressed.

Discussion

Punctal stenosis has been found to occur equally in the upper and lower puncta in some studies [11], while in a study by Kashkouli et al., it was localized in the lower punctum in 89.7% of cases [8]. In our study, stenosis was also localized in the lower punctum in all cases.

Although there is no significant difference in punctal stenosis incidence between genders, several studies suggest that it is more common in women, especially as age increases [1,8,12]. Our findings are consistent with the literature.

Various methods have been described for the treatment of punctal stenosis. These treatment methods generally include dilation using a simple dilator, more invasive techniques such as one-snip, two-snip, three-snip, and four-snip punctoplasty, punctoplasty performed with a punch, and various devices used to maintain the patency of the surgically enlarged punctum. Devices such as punctal plugs, mini-monoka stents, self-retaining bicanalicular intubation sets, FCI Nunchaku silicone tubes, and Kaneka Lacrimal silicone sets are used for this purpose.

According to Kashkouli, in cases of stage 2 punctal stenosis, repeated simple dilation methods may be tried. However, repeated dilations will stimulate fibrosis, and iatrogenic stenosis will increase in the long term.

Functional success rates of 92% have been reported with the Reiss punctal punch method [13]. Later developments of the Kelly punch are thought to allow more controlled ampulla resection and cause less damage to the Riolan muscle [14].

In the literature, snip punctoplasty (SP) techniques and their modifications, ranging from one to four snips, have been described. This technique is the oldest and most frequently used method. In a study by Chak and Irvine, they used the 3-SP technique and found a success rate of 89.8% [15]. In another study by Ali et al., they used the 3-SP method and reported a success rate of 74.7%. In a group of 10.3%, anatomical success was achieved, but epiphora persisted [16]. Kim et al. found a success rate of 93.3% in their patient group using the 4-SP technique [17]. In our study, the rate of patients whose epiphora complaints completely resolved was found to be 80%. In 4 eyes (9.3% of patients), the distal passage lavage transition time was longer than 5 seconds, which was evaluated as partial lacrimal passage insufficiency.

In a study by Ali et al., restenosis developed in 5.7% of patients [16]. In our study, restenosis developed in 5 patients (11.68%). The stenosis was reopened with repeated surgical intervention, and during follow-up, the punctum remained patent.

After punctoplasty, intubation materials placed in the punctum can be used to prevent the re-adhesion of the wound lips. In the early stages, after performing punctoplasty with the punch method, silicone punctal plugs were used. However, due to inflammation caused by the silicone material itself, the use of more hydrophilic materials (such as Polyvinylpyrrolidone - PVP) has been adopted [18,19]. Studies have shown that punctoplasty surgery performed with intubation using perforated punctal plugs coated with PVP hydrophilic material yields better results [19].

Intracath tubes, commonly used as intravenous catheters, are frequently made of Teflon by manufacturers. In recent years, Vialon biomaterial has also been preferred. Teflon is a fluoropolymer made of polytetrafluoroethylene (PTFE) [20]. Vialon, on the other hand, is made of polyether urethane and is more flexible, softer, microtextured, and hydrophilic compared to Teflon [21]. The intracath used in this study is made of Teflon (B-cat2 I.V. cannula, intra-cath-2 I.V. cannula) and has a hydrophobic character. However, no studies comparing silicone material and Teflon material have been found in the literature. This could be further supported by future studies.

Mini Monoka (MM) tube implantation can also be performed after punctoplasty surgery. In a study by Hussain et al., they performed intubation with the MM tube for 6 weeks after probing and reported early success rates of 88% [22]. After the use of the MM tube, complications such as tube migration, early extrusion, and tube loss can occur [7]. In this study, the intracath used after intubation is sutured to the skin with 6/0 Vicryl. This helps prevent complications such as dislodgement and migration. Additionally, contact of the rigid tube material with the ocular surface can be avoided. Furthermore, during surgery, fluid is passed through the intracath to confirm that intubation within the canaliculus is performed peroperatively.

The limitations of our study include the absence of a control group for comparison and the lack of literature comparing Teflon and silicone materials, highlighting the need for further studies to support our findings.

Conclusion

In conclusion, we believe that punctoplasty surgery with the aid of a 22G intracath could be a reliable and low-cost alternative method.

Disclosures

Ethics Committee Approval: Ethical approval for this study was obtained from the Clinical Research Ethics Committee of SBU Bursa Yüksek İhtisas Training and Research Hospital (approval date: 13/12/2023; protocol number: 2011-KAEK-25 2023/12-29).

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