




Kelly punch punctoplasty vs. simple punctal dilation, both with mini-monoka silicone stent intubation, for punctal stenosis related epiphora

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Abstract

Objectives To compare the outcomes of stenotic punctal dilation by means of a punctal dilator alone vs. a Kelly punch punctoplasty, both followed by insertion of a mini-monoka stent, for treatment of symptomatic punctal stenosis.

Methods A retrospective, comparative study. The participants were patients with punctal stenosis related epiphora treated at the Goldschleger Eye Institute, Sheba Medical Center. All patients were treated either by simple punctal dilation (group 1) or Kelly punch-assisted punctoplasty (group 2), both followed by mini-monoka stent insertion. Symptoms relief and subjective epiphora scoring (Munk score) were compared and analysed.

Results Fifty patients were included in the study; Mean age (\pm SD) of the participants was 60 years (\pm 12, range 30–86 years). Baseline characteristics (age, gender distribution, and visual acuity) were similar in both groups. The mini-monoka stent was placed for an average period of 2 weeks, and all patients received postoperative steroids and antibiotic treatment for 1 week. The Munk score decreased significantly in both groups following the procedure, dropping from 4.9 to 1.9 in group 1 and from 4.3 to 1.2 in group 2 ($P < 0.005$ for both groups). There was no difference in the delta Munk score between the two groups.

Conclusions Simple punctal dilation followed by insertion of a mini-monoka stent is effective in alleviating the symptoms of punctal stenosis-related epiphora. There was no added benefit when the more invasive Kelly punch-assisted punctoplasty was used, raising some doubt about its justification in these cases.

Introduction

Epiphora is a common ocular complaint that may develop as a result of tear hypersecretion or reduced drainage. Epiphora is most commonly associated with ocular surface compromise, such as aqueous tear insufficiency or meibomian gland dysfunction. Tearing in those conditions is considered to be a reflex compensatory mechanism to sustain ocular surface integrity [1, 2].

Punctal stenosis is another common finding that may be associated with epiphora, whether it precedes or results from ocular inflammation is yet undetermined [1]. A stenotic punctum can be easily diagnosed by slit-lamp

examination, while probing and irrigation of the lacrimal pathway is usually required to exclude a more distal obstruction. Many conditions associated with punctal stenosis have been identified, including involuntional changes with aging, chronic lid inflammation, longstanding use of topical medications, dry eye disease, ocular infections and trauma [3–6].

There are currently no standard clinical guidelines for the management of punctal stenosis. The various commonly accepted surgical procedures involve punctal dilation or surgical punctal enlargement that may be followed by lacrimal stenting or perforated punctal plugs [5, 7, 8]. The 2 most commonly used procedures applied in our facility are dilation by means of a punctal dilator alone or a Kelly punch-assisted punctoplasty, both being followed by the insertion of a mini-monoka stent. Notably, the Kelly punch-assisted punctoplasty is more invasive and tissue-traumatizing than punctal dilation. Additionally, it requires operating room conditions while the non-surgical dilation can be performed as an office procedure. The

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purpose of this study was to compare the clinical long-term outcome of patients with symptomatic punctal stenosis who underwent simple punctal dilation with that of patients who underwent Kelly punch-assisted punctoplasty, both followed by mini-monoka stent insertion.

Methods

The Goldschleger Eye Institute of Sheba Medical Center is a tertiary university-affiliated referral centre that treats patients in a large catchment area in central Israel. We conducted a retrospective analysis of patients treated for punctal stenosis-related epiphora with or without previous topical steroid treatment. This study was approved by the medical centre's institutional review board which waived informed consent.

Group 1 consisted of patients who underwent dilation of the stenotic punctum with a punctal dilator followed by placement of a mini-monoka stent (FCI Ophthalmics, France Chirurgie Instrumentation, Paris, France). Group 2 patients underwent a Kelly punch-assisted punctoplasty from the inner punctal wall followed by placement of a mini-monoka stent. Patients with <3 months follow-up were excluded. All procedures were performed under local anaesthesia (bicarbonate/lidocaine 1% mixture 1:10 ratio) by 2 of the authors (GBS, AP), each performing one type. All patients received topical steroids and antibiotic eyedrops for the first week following the procedure and were examined 2 weeks, 1 month, and 3 months postoperatively. The stent was removed at the 1-month postoperative visit.

Epiphora was graded using the Munk score (0–5 scale): 0 = no epiphora, 1 = occasional epiphora requiring dabbing less than twice a day, 2 = epiphora requiring dabbing 2–4 times per day, 3 = epiphora requiring dabbing 5–10 times per day, 4 = epiphora requiring dabbing more than 10 times per day, and 5 = constant tearing [9]. Success was defined as a patent punctum on clinical evaluation and alleviation of tearing symptoms by the 12-month follow-up.

Statistical analysis

Paired samples *t*-tests were used to calculate differences in numeric variables (such as visual acuity, intraocular pressure, Munk score) pre- and post-treatment. A chi-square analysis and the Fisher Exact test were used to calculate differences in categorical variables (such as gender, success of procedure, and additional procedures). Snellen acuity was converted to logarithm of minimal angle of resolution values. The statistical analysis was carried out with Microsoft Excel™ 2019 Version 16.23 for Mac (Microsoft® Corporation, Redmond, WA) and SPSS™ version 25 for Mac (SPSS©, Inc., Chicago, IL).

Results

Fifty patients were included in the study, with a mean (\pm SD) age of 60 years (\pm 12, range 30–86 years), 34 of which were females (68%). Twenty-six patients underwent simple punctal dilation (group 1) and 24 patients underwent Kelly punch-assisted punctoplasty (group 2), both followed by stent insertion. The baseline characteristics of age, gender distribution, and visual acuity were similar for both groups (Table 1).

The average 1-year postoperative Munk score decreased significantly compared to the preoperative score for both groups, dropping from 4.9 to 1.9 in group 1 and from 4.3 to 1.2 in group 2 ($P < 0.005$ for both groups). There was no group difference in the delta Munk score. One patient in each group underwent an additional dilation with stent insertion, and one patient in group 1 underwent a repeated Kelly punch-assisted punctoplasty. No additional procedures, such as bi-canalicular silicone stenting, a dacryocystorhinostomy alone or a dacryocystorhinostomy with a Jones tube were required. No complications were encountered with either procedure.

Discussion

Currently there are no standardised clinical guidelines for the treatment of epiphora caused by punctal stenosis, and therapeutic approaches vary among oculoplastic surgeons. Common treatment modalities include the one-, 2- or 3-snip punctoplasty, simple punctal dilation followed by stent intubation, and Kelly punch-assisted punctoplasty with or without stenting [5, 7, 8, 10, 11]. Despite the numerous studies on these approaches, there is still no consensus on the most effective technique for the long-term successful treatment of symptomatic punctal stenosis. The commonly used snip punctoplasty procedure in its many variations has been evaluated in many studies, with variable rates of functional and anatomic success rates (64–92%) [8, 12, 13]. Among its reported disadvantages are restenosis of apposed cut punctal edges, disruption of the punctal and ampullar anatomy, and relative invasiveness compared to other treatment modalities [5, 13]. The use of Kelly punch-assisted punctoplasty, which is an easy and less invasive technique compared to the common 3-snip, was recently evaluated by Wong et al. [10]. Their results over 34 months of follow-up on 101 eyes, were a 94% anatomical success rate and a 92% functional success rate. The largest study to evaluate the use of punctal dilation alone followed with stenting without a surgical snip procedure was by Hussain et al. [14]. They examined 123 eyes with punctal/canalicular stenosis and demonstrated a significant improvement of symptoms in 88% of their patients at the 6-week follow-up.

Table 1 Baseline characteristics and final outcomes of patients undergoing punctal dilation and mini-monoka stent insertion (group 1) compared to Kelly punch-assisted punctoplasty with mini-monoka stent insertion (group 2).

Characteristic	Dilation and MM	KP-assisted punctoplasty and MM	<i>P</i>
<i>N</i>	26	24	
Gender			
Male	6	10	NS ^a
Female	20	14	
Age (\pm SD) years	60 (\pm 11)	61 (\pm 13)	NS ^b
VA	20/25	20/25	NS
IOP (\pm SD) mmHg	15 (\pm 3)	14 (\pm 2)	NS
Munk score			
Munk pre Tx.	4.9	4.3	0.01
Munk 3 months post Tx.	1.7	1.0	NS
Munk 1 year post Tx.	1.9	1.2	NS
Delta at 1 year post Tx.	3.0	3.1	NS
<i>P</i> value (within)	<0.005	<0.005	

MM mini monoka, KP Kelly punch, Tx. treatment, NS not significant, SD standard deviation, VA visual acuity, IOP intraocular pressure.

^aChi-square analysis.

^bIndependent variables *t* test.

While their study findings suggest a high success rate for stenting with dilation alone in the short-term, they do not provide any long-term outcomes. A comparison between the 3-snip punctoplasty and simple dilation followed by mini-monoka stenting was recently published by Singh et al. [13], with comparable anatomical and functional outcomes at 6-months follow-up.

All above mentioned procedures vary in their disruption of the original anatomy of the lacrimal punctum and canaliculi. Hirohiko et al. [15, 16] investigated that anatomical area on cadavers and revealed that the punctum and vertical canaliculus are part of the tarsal plate with the muscle of Riolan, whereas the horizontal canaliculus is surrounded by the Horner muscle. The implication of those findings confirms that any surgical intervention aimed to resolve the stenotic punctum also has the potential of disrupting the normal anatomy and physiologic punctal tear drainage function.

It should also be borne in mind that non-surgical dilation can be performed in the clinical setting while Kelly punch-assisted punctoplasty may need to be carried out in an operating room.

Our retrospective study results show similarly high success rates of symptomatic relief after treatment with simple dilation vs. Kelly punch punctoplasty, both followed with mini-monoka intubation. The Munk score decreased significantly 1-year postoperatively for both groups, and there were no significant group differences in the delta Munk scores. These results suggest that treatment by simple dilation and mini-monoka stenting has success rates comparable to those of Kelly punch-assisted punctoplasty for cases of simple punctal stenosis. The main

advantages of non-surgical dilation include reduced risk of disrupting the normal lacrimal pump anatomy and function, and the potential of safely performing the procedure in a clinical setting since there is no risk of bleeding or need for sutures.

The limitations of our study are its retrospective nature, the participation of two different surgeons (one for each technique), and the relatively small sample size.

In summary, we compared the outcome of simple punctal dilation to Kelly punch-assisted punctoplasty, both followed by stent insertion, for treatment of punctal stenosis-related epiphora. The former procedure was as effective in symptom alleviation as the latter. There was no added value when the more invasive and more tissue-traumatizing Kelly punch-assisted punctoplasty was performed, leading us to suspect that it may not be justified in these cases.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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