The Wedge Punctoplasty for Treatment of Punctal Stenosis

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ABSTRACT
We describe a new instrument, the Reiss punctal punch, which is specifically designed to perform a "wedge" punctoplasty. The Reiss punctal punch was used alone to treat three eyelids of three patients, and in conjunction with horizontal tightening of the eyelid to treat 35 eyelids of 18 patients with symptomatic epiphora related to punctal ectropion with secondary punctal stenosis. After a mean follow up of 12 months, 36/38 (95%) of the eyelids demonstrated a patent punctum, and symptomatic relief was achieved in 35/38 (92%) of the eyes.

Punctal stenosis is a frequent cause of symptomatic epiphora. The treatment of punctal stenosis has a high success rate, particularly when the lacrimal pump function is maintained.1-7 Historically, the one-snip punctoplasty has been the most widely used technique, since it is a simple office procedure and preserves the function of the lacrimal ampulla.1-7 However, in our experience, recurrent punctal stenosis following one-snip punctoplasty may occur as a result of healing, with reapproximation of the cut edges.

The various methods used to augment punctal size include: punctal dilation;2,4 the one-snip,5 two-snip,9 or three-snip punctoplasty;4 electrocautery;7 laser treatment;8 "punctal puckering" with suture placement;5 temporary punctal stenting (suture6, steel rod,4 silicone,2 punctal plugs10); and the Holth6 or Haltz6 punches.

The Reiss punctal punch (Storz Instrument Co, instrument E2805, Fig 1) was designed to enhance the one-snip punctoplasty by providing greater uniformity and improved tear access to the punctum via an excised posterior tissue wedge, and by inhibiting recurrent punctal stenosis resulting from healing of the cut edges.

METHOD
In addition to punctal stenosis, all patients with symptomatic epiphora were examined for contributing factors such as punctal malposition, significant lower eyelid laxity, active infection, corneal abnormalities, keratitis sicca, dacryostenosis, and nasolacrimal duct obstruction. The study included only those patients in whom punctal stenosis was judged to be a significant contributing factor to the patient's tearing and for whom at least a 6-month follow-up examination could be documented.

Patients with prior punctual occlusion were excluded from the study, since their eyes lacked normal punctal architecture.

The primary and secondary fluorescein dye tests (Jones 1 and 2) may be used to determine the level of tear access into the lacrimal drainage system. The
failure to recover dye-tinged fluid from the nose before and after saline irrigation indicates that dye failed to enter the lacrimal drainage system.

The procedure is best performed at the slit lamp or with magnifying loupes, although it may be performed under direct visualization. After informed consent was obtained, topical anesthesia was administered to the punctum with a proparacaine-soaked cotton-tipped applicator for 1 minute. The punctum was carefully dilated with a 00-0 Quickert-Dryden probe or similar dilating device. The tapered end of the Reiss punctal punch was inserted into the punctum (usually about halfway), with the eyelid slightly everted (Fig 2); this allowed optimum positioning for excision of a smooth wedge of tissue. A wedge of the conjunctival portion of the punctum was excised with a single, quick snip of the punch. (There was little or no bleeding associated with the excision [Fig 3].) This left a funnel-shaped excision posterior to the open punctum. When desired, a second snip allowed deeper access to the vertical canaliculus and a wider excision of the tissue wedge. A topical antibiotic-steroid drop (neomycin, polymyxin B sulfates, and dexamethasone [Maxitrol]) was used for 1 week postoperatively.

RESULTS

The Reiss punctal punch was used alone to treat three eyelids of three patients, and in conjunction with horizontal tightening of the eyelid to treat 35 eyelids of 18 patients with symptomatic epiphora related to punctal ectropion with secondary punctal stenosis. After a mean follow up of 12 months (range, 7 to 17 months), 36/38 (95%) of the eyelids demonstrated a patent punctum, and symptomatic relief was achieved in 35/38 (92%) of the eyes.

There were three patients with punctal stenosis and mild punctal ectropion (just off the lacrimal lake). A deeper punctoplasty was made with the Reiss punch (creating a larger posterior tissue wedge) to allow tear access to the punctum. In these cases, the wedge punctoplasty alone allowed functional tear drainage; no eyelid repositioning was required.

Horizontal tightening of the eyelid was required in 18 patients to adequately position the punctum against the globe. The punctal malposition was associated with eyelid laxity in 10 patients, and with a cicatricial component in eight. In these cases, a block resection of the eyelid and/or a plication of the lateral palpebral tendon were performed in addition to the wedge punctoplasty.

The three eyes with symptomatic epiphora after the wedge punctoplasty all were from the cicatricial group. One developed recurrent punctal stenosis of both lower eyelids related to cicatrical changes from chronic blepharitis. A unilateral patient developed symptomatic epiphora from recurrent punctal ectropion, but the punctum remained patent.

The Reiss punctal punch also was used in two patients with symptomatic epiphora related to previous surgical punctal occlusion who were not included in the study. Pinpoint reopening of the puncta occurred spontaneously in both these patients before the planned wedge punctoplasty was performed. A deep posterior tissue wedge was used to enlarge the puncta, but recurrent punctal stenosis (not occlusion) developed in both of these eyes.

DISCUSSION

The lacrimal puncta allow tear access from the lacrimal lake to the lacrimal drainage system. Symptomatic epiphora may result from punctal stenosis, malposition, or obstruction preventing tear access to the lacrimal drainage system.
WEDGE PUNCTOPLASTY

FIGURE 3: Punctal stenosis (A) before and (B) after wedge punctoplasty.

The punctum plays an important role as “gatekeeper” in the functioning of the lacrimal pump. There are two theories regarding the action of the lacrimal pump. The first implicates a “push-pull” action during a blink with the lacrimal ampulla pushing tears toward the lacrimal sac, while negative pressure from the lacrimal sac draws the tears. The second theory describes a “crushing effect” during a blink, with the orbicularis muscle pushing tears from the upper to the lower lacrimal drainage system.

The shape of the punctum varies from round/oval to slit-like and may become smaller with age. In adults, the punctum averages 0.141 mm² in the upper eyelids and 0.32 mm² in the lower eyelids, although a wide interpersonal variation has been noted. The lower eyelid puncta are typically larger than the upper ones, possibly due to the effect of gravity on tears. However, the tear-flow rate has been reported as equal through both upper and lower canaliculi, and adequate tear drainage may be achieved with a single functional canaliculus.

Punctal stenosis may be related to primary congenital atresia or secondary to infectious etiologies (herpes simplex, zoster, trachoma, actinomyces israelii, Pityrosporum pachydermatitis, systemic conditions (porphyria cutanea tarda, acrodermatitis enteropathica), trauma (repeated dilation, laceration, burns, radiation, cicatricial changes, surgical occlusion), drugs (Phospholine iodide, epinephrine, idoxuridine, 5-fluorouracil), or tumors (basal/squamous cell carcinoma, benign cysts/papillomas).

Clinical significant punctal stenosis may be recognized by a pinpoint punctal opening in the presence of symptomatic epiphora. Fluorescein dye tests may be used to confirm a functional punctal obstruction (no recovery of dye). However, dye may be recovered if a single canaliculus remains functional or with epiphora due to hyperscretion. Therefore, the diagnosis of symptomatic punctal stenosis requires clinical judgement.

The basic principles in the treatment of punctal stenosis include creating an adequate opening, maintaining the punctal position against the lacrimal lake, enhancing tear access from the lacrimal lake to the punctal opening, and preserving the function of the lacrimal pump. Although the one-snipe procedure has been the most widely used, we (and others) have noted that recurrent punctal stenosis may be related to healing of the cut edges; in addition, the one-snipe procedure fails to improve tear access in the presence of mild punctal ectropion. The preferred treatment of punctal ectropion demands eyelid repositioning. However, certain patients who refuse a more extensive procedure may achieve functional tear drainage following the wedge punctoplasty. The two-snipe procedure has been advocated after a failed one-snipe procedure. However, we have found that it is technically difficult to obtain a consistent result with the two-snipe procedure and that it may damage the lacrimal ampulla.

The Reiss punctal punch addresses these concerns by offering a controlled, definitive method for punctoplasty. The concept of a punctoplasty punch is not unique, and high success rates have been reported with the Holt and Haitz punches. However, the Reiss punctal punch is an improvement over the glaucoma punches, since it is specifically designed for use on the punctum. The glaucoma punches were designed to create a larger opening and do not engage the punctum internally. As such, they are more difficult to use, fail to provide a consistent result, and may damage the lacrimal ampulla.

In our experience, the Reiss punctal punch has proved effective, easy to use, and has several advantages over other methods used for punctoplasty. The Reiss punch provides a uniform punctal opening. The excision of a conjunctival wedge creates a “funnel effect” whereby tears are drawn toward the opened punctum. This allows tear access from the lacrimal lake to the punctum, even in the presence of mild degrees of
ectropion (just off the lacrimal lake). The graded taper of the cutting blade prevents destruction of the lacrimal ampulla and allows adjustment of the excised tissue wedge. The excision of a tissue wedge prevents apposition of the cut edges. The instrument is self-sharpening, which allows greater patient comfort. Finally, the Reiss punch may be used in combination with other procedures to reposition the eyelid and/or punctum.

The wedge punctoplasty failures that occurred may have been related to cicatricial destruction of the normal fibroelastic ring surrounding the punctum. The absence of a normal fibroelastic ring reduces tissue retraction, promotes collapse of the cut punctum, and allows the existing fibrovascular tissue to heal. Therefore, we recommend that patients requiring punctal opening after surgical occlusion be treated with a supporting stent (ie, silicone intubation) to achieve a permanent punctal opening.

REFERENCES