

Case Report

Retrograde Pigtail Probing Through the Internal Common Canalicular Orifice via the Lacrimal Sac Lumen for Identification of the Distal End of a Delayed Lacerated Common Canaliculus

Mayari Ito ¹, Muhammad Abumanhal ^{1,2} and Yasuhiro Takahashi ^{1,*} 

¹ Department of Oculoplastic, Orbital and Lacrimal Surgery, Aichi Medical University Hospital, Nagakute 480-1195, Japan; itomayari@gmail.com (M.I.); mabumanhal@hotmail.com (M.A.)

² Department of Ophthalmology, Tel Aviv Sourasky University Medical Center (Ichilov), Tel Aviv 6423906, Israel

* Correspondence: yasuihiro_tak@yahoo.co.jp; Tel.: +81-561-62-3311 (ext. 12314)

Abstract

A 52-year-old man presented with an unrepaired common canalicular laceration resulting from a traffic accident 1.5 months prior to referral. Cutaneous and conjunctival scars were identified medial to the right lower lacrimal punctum. During surgery, the skin, subcutaneous tissue, and conjunctiva were incised along the existing scar, and the plane under the orbicularis oculi muscle was dissected to expose the lacrimal sac. The anterior wall of the lacrimal sac was incised, and a pigtail probe was inserted through the internal common canalicular orifice via the lacrimal sac lumen to identify the distal end of the common canaliculus. A bicanalicular lacrimal tube was inserted into the identified distal end, followed by suturing of the Horner's muscle surrounding the lacerated canaliculus and skin closure. At 6-month follow-up, the patient was free of epiphora, with a normal tear meniscus height.

Keywords: old common canalicular laceration; pigtail probe; retrograde probing; common canalicular orifice; approach to the lacrimal sac

1. Introduction

Canalicular laceration is the most common injury affecting the lacrimal drainage system and usually requires meticulous reanastomosis as early as possible to minimize the risk of potential epiphora. However, canalicular lacerations are occasionally overlooked [1]. In such cases, scar tissue surrounding the distal end of a previously lacerated canaliculus can obscure its identification [2].

Most cases involve laceration of a single horizontal canaliculus [2]. To identify the distal end of a lacerated horizontal canaliculus, several techniques have been described, including insertion of a straight or pigtail probe, injection of fluorescein-stained saline or air into the uninvolved canaliculus, and transillumination of the laceration site using a light pipe introduced through the uninvolved canaliculus [3–6]. However, these methods are not applicable in cases involving common canalicular laceration.

Herein, we successfully identified the distal end of a previously lacerated common canaliculus using retrograde pigtail probing through the internal common canalicular orifice via the lacrimal sac lumen.



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2. Case Presentation

A 52-year-old man was referred to our clinic 1.5 months after a traffic accident. The lacerated lower eyelid was sutured by an emergency physician at the time of injury. After the eyelid swelling subsided, the patient noticed persistent epiphora.

At the initial examination, a short cutaneous scar extending to the conjunctiva below the lacrimal caruncle was identified medial to the right lower lacrimal punctum (Figure 1a). There was no evidence of lower eyelid malposition. The tear meniscus height was increased. Lacrimal syringing through both the right upper and lower puncti demonstrated complete obstruction of the lacrimal drainage system, and a probing revealed a soft stop in both the right upper and lower lacrimal canaliculi.

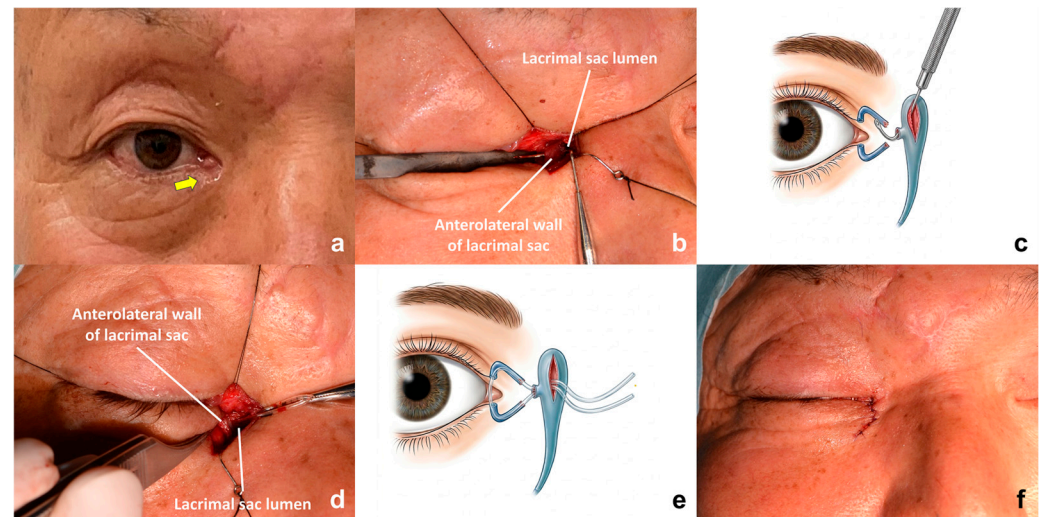


Figure 1. Intraoperative photos and illustrations. (a). Cutaneous scar located medial to the right lower punctum (arrow). (b,c). After opening the lacrimal sac, a pigtail probe was inserted through the internal common canicular orifice to identify the distal end of the common canaliculus. (d,e). A bicanalicular tube was inserted through the upper and lower puncti, advanced into the identified distal end of the common canaliculus and picked up from the lacrimal sac lumen. (f). The wound was closed.

Reanastomosis of the lacerated common canaliculus was performed under general anesthesia. The skin, subcutaneous tissue, and conjunctiva were incised along the scar. Despite careful dissection toward the lateral wall of the lacrimal sac using a microscissors and cotton swabs, the distal end of the lacerated common canaliculus could not be identified due to overlying scar tissue. The proximal end was identified by probing from the upper and lower lacrimal puncti. Then, the plane under the orbicularis oculi muscle was dissected to expose the anterior wall of the lacrimal sac, which was vertically incised. Lacrimal sac irrigation via the vertical incision of the anterior lacrimal sac wall showed no obstruction of the nasolacrimal duct. After identification of the internal common canicular orifice, a rigid, metallic pigtail probe (Probe Lachrymal NAKAMURA Pigtail Large Right [anticlockwise]; length, 102 mm; Inami & Co., Ltd., Tokyo, Japan) was inserted through the internal common canicular orifice via the lacrimal sac lumen, which enabled identification of the distal end of the lacerated common canaliculus on the lateral wall of the lacrimal sac (Figure 1b,c). After meticulous excision of the overlying scar tissue, a bicanalicular lacrimal tube (PF catheter; Nidek Co., Ltd.; Gamagori, Aichi, Japan) was then inserted through both the upper and lower puncti and advanced into the identified distal end of the common canaliculus (Figure 1d,e). The tube tips were initially retrieved from the vertical incision of the lacrimal sac and then advanced into the nasolacrimal duct (Figure 1e). The Horner's muscle surrounding the lacerated canaliculus was sutured and reanastomosed using 6-0 PDSII®

sutures (Ethicon, Somerville, NJ, USA) to maintain horizontal tension of the lower eyelid [7] and to facilitate approximation of the proximal end of the lacerated common canaliculus to its distal end. The anterior lacrimal sac wall and skin were closed using 6-0 PDSII® sutures (Figure 1f). The total operative time was 116 min.

The lacrimal tube was removed at 3-month follow-up visit. At 6-month follow-up, the patient was free of epiphora, and the tear meniscus height was normal. Postoperatively, lacrimal syringing through both the right upper and lower puncti demonstrated patency of the lacrimal drainage system. No complications related to lacrimal intubation were observed, and there was no lower eyelid malposition.

3. Discussion

A pigtail probe is typically inserted through an uninvolved lacrimal punctum to identify the distal end of a lacerated canaliculus in cases of isolated horizontal canalicular laceration involving either the upper or lower canaliculus [6,8–16]. In a previous study, a pigtail probe was reportedly used to identify the distal ends of both lacerated upper and lower canaliculi in 2 of 222 cases; however, the details of surgical methods were not described [17]. Only a brief report has mentioned the use of a pigtail probe for retrograde probing through the common canalicular orifice via the lacrimal sac lumen in cases with common canalicular laceration [18]. This textbook briefly states that “if the laceration is very medial or involves the common canaliculus, it is difficult to identify the medial cut end. It may be necessary to do a dacryocystorhinostomy (DCR) with retrograde intubation” [18]. The present report is, to our knowledge, the first to describe in detail retrograde pigtail probing via the internal common canalicular orifice, and the technique presented here enhances the reliability of identifying the distal end of a lacerated common canaliculus, even in delayed post-traumatic cases.

In external DCR, a straight, curvilinear or W-shaped skin incision is made between the medial canthus and nose to reach the anterior wall of the lacrimal sac [19,20]. A subciliary incision is an alternative approach to the lacrimal sac [19]. However, in the present case, the lacrimal sac was approached via the existing wound along the original scar without creating an additional skin incision, analogous to a transconjunctival external DCR [21]. This approach is beneficial in avoiding an additional visible scar in the medial canthal region [19,20].

The lacrimal sac can also be approached endoscopically via the nasal cavity [18]. Although this approach avoids a visible external scar, it requires removal of bone adjacent to the lacrimal sac to gain access, even in cases with no obstruction of the nasolacrimal duct. In addition, retrograde insertion of a pigtail probe through the nasal cavity is not feasible. In contrast, a previous case report described a retrograde endoscopic technique for identifying the common canaliculus or one of the medial cut ends of the canaliculi by injecting saline into the common canaliculus orifice in the lacrimal sac and observing fluid egress from the wound site [22]. However, this surgical approach may be most suitable in cases without dense scar tissue overlying the distal end of the common canaliculus.

Since the lacrimal sac is an orbital structure [23], other approaches to the medial orbit, including transcaruncular, eyelid crease, and transorbital neuroendoscopic approaches [24,25], may also be considered. However, these approaches are primarily used to reach the deep orbit and are therefore less suitable for exposure of the superficially located lacrimal sac.

A delay in diagnosis may result in formation of scar tissue surrounding the distal end of a lacerated canaliculus, which can complicate its identification [2]. Nevertheless, a previous study demonstrated that delayed surgical repair of a lacerated lacrimal canaliculus did not affect surgical success [2]. However, in that study, surgery was performed within 12 days after injury [2], a period during which mature scar formation is unlikely. Another

study showed anatomical success in 132 of 136 patients (97.06%) undergoing anastomosis of a lacerated lacrimal canaliculus between 1 and 360 months after injury [26]. However, this series did not include cases with common canalicular laceration, and some patients required additional surgical procedures including conjunctival flap transposition and/or conjunctivo-DCR [26].

4. Conclusions

Repairing a lacerated common canaliculus is challenging, particularly in delayed traumatic cases. The technique described here is minimally invasive and enhances secure detection of the distal end of the common canaliculus.

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Informed Consent Statement: Written informed consent was obtained from the patient for publication of his face photographs and clinical course.

Data Availability Statement: The original contributions presented in the study are included in the article, further inquiries can be directed to the corresponding author.

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Conflicts of Interest: Y.T. received speaker and consultant honoraria from Amgen Inc., Chugai Pharmaceutical Co., Ltd., Santen Pharmaceutical Co., Ltd., and Ono Pharmaceutical Co., Ltd. The other authors have no financial or conflicts of interest to disclose. All authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Abbreviation

The following abbreviation is used in this manuscript:

DCR Dacryocystorhinostomy

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