

# Chapter 6

## Restoration of Fornix Tear Reservoir by Amniotic Membrane Transplantation in Conjunctivochalasis

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**Abstract** Conjunctivochalasis (CCh) presents as loose and redundant conjunctival folds interspersed between the globe and eyelids (Surv Ophthalmol 43:225–232, 1998) and may cause a variety of ocular symptoms that mimic dry eye (Br J Ophthalmol 88:388–392, 2004). CCh disturbs the precocular tear film by blocking the tear drainage, disrupting the tear meniscus, and obliterating the fornix tear reservoir (Cornea 35:736–740, 2016) to interfere tear flow from the fornix reservoir to the tear meniscus (Ophthalmology 120:1681–1687, 2013). A number of surgical procedures have been advocated to treat CCh. Most of these procedures focus on elimination of conjunctival folds close to the tear meniscus but do not address obliterated tear reservoir in the fornix. In this chapter, we summarize a novel surgical technique not only to eliminate the wrinkled conjunctiva in the tear meniscus but also to restore the tear reservoir in the fornix by a significant rearrangement of conjunctival tissue by recession from the limbus to the fornix and by ocular surface reconstruction with amniotic membrane transplantation for the missing Tenon’s capsule and the bulbar conjunctiva. Consequently, such a procedure addresses a major disturbance of the tear spread from the fornix to the tear meniscus, which is one important strategy as a practical and effective clinical management algorithm for dry eye (Cornea 35:736–740, 2016).

**Keywords** Amniotic membrane • Anti-inflammation • Anti-scarring • Anti-vascularization • Aqueous tear deficiency • Conjunctivochalasis • Cryopreserved • Dry eye • Fornix • Recess • Tear • Forniceal restoration

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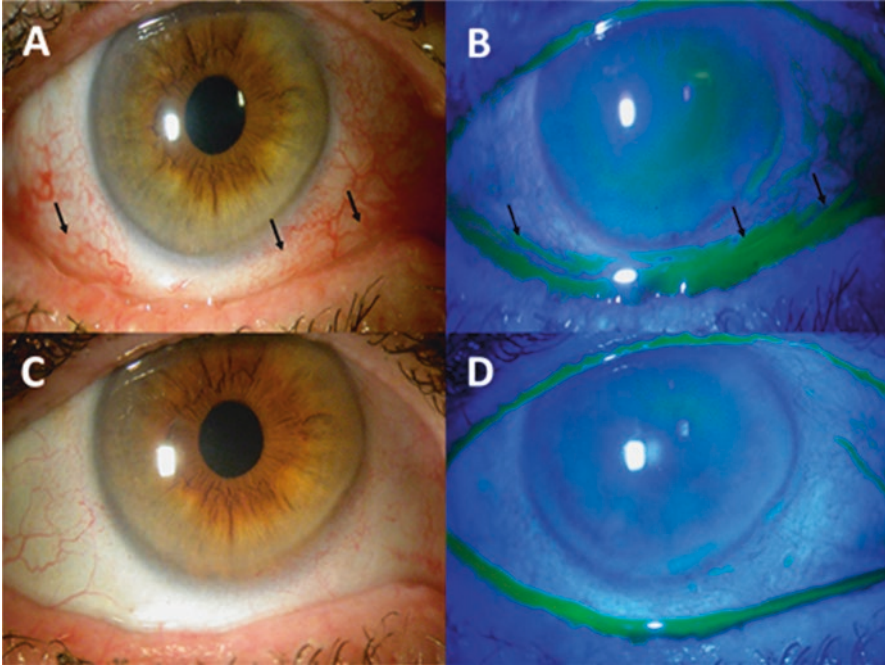
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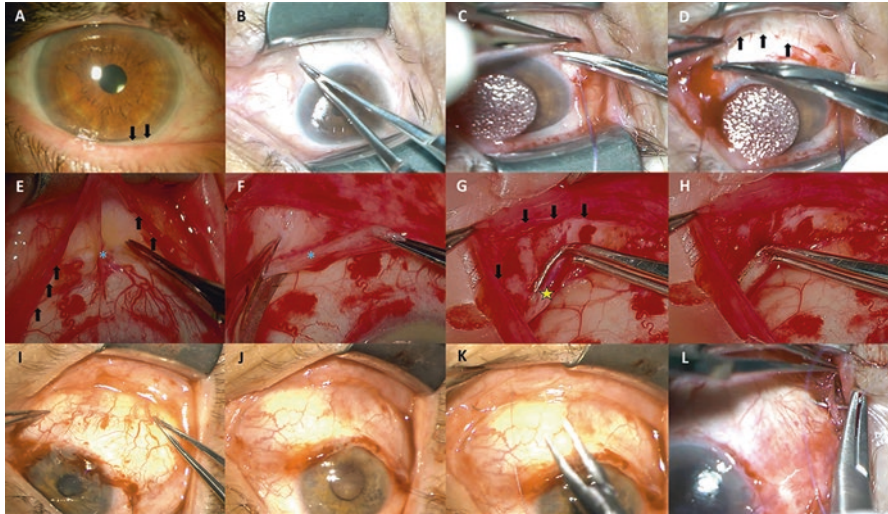
**Fig. 6.1** Representative surgical outcome. Preoperative (a, b) and postoperative (c, d) of representative patient with fornix reconstruction. This patient presented with chronic redness and epiphora due to redundant conjunctival folds (*arrow*) interposed between the lid margin, and the eye globe obliterated the tear meniscus (a, b) and the tear reservoir in the fornix. One month after reservoir restoration by amniotic membrane transplantation, the eye regained a smooth, quiet, and noninflamed bulbar conjunctiva (c) and a continuous tear meniscus without epiphora (d)

## Indications

Ocular surface dry eye irritation that remains symptomatic despite maximal medical therapies including topical artificial tears and anti-inflammatory drops; [2] recurrent subconjunctival hemorrhage; [2] visual disturbance due to redundant conjunctival tissue interposed between the lid margin and the eye globe (Fig. 6.1).

## Essential Steps

1. Excision of pingueculae (Fig. 6.2)
2. Conjunctiva recession from the limbus to the fornix following peritomy [3, 4]
3. Thorough removal of degenerated Tenon's capsule [3, 4]
4. Restoration of tear reservoir in the fornix by significant rearrangement of recessed conjunctiva to the fornix [3, 4]
5. Amniotic membrane transplantation (multiple layers) to replace Tenon and conjunctival tissue [3, 4]



**Fig. 6.2** Surgical steps of reservoir restoration procedure by fornix reconstruction, conjunctival recession, and amniotic membrane transplantation. Poor conjunctival adhesion to the sclera from dissolution of the Tenon capsule is noted as evidenced by easy separation of the conjunctiva from the sclera simply by forceps grabbing (**a arrow**, **b**). After using several drops of epinephrine 1:1000 for hemostasis and 2% lidocaine gel for anesthesia, a traction suture made of 7-0 Vicryl is placed 2 mm posterior to the limbus at the 3 and 9 o'clock position and used to rotate the eye upward. An inferior conjunctival peritomy is created 2–3 mm posterior to the limbus (**e**) and extends to remove pinguecula, if present. Rearrangement of conjunctiva by recessing (**d**, **arrow**) from the limbus to the fornix. The abnormal Tenon's capsule (**asterisk**) is grabbed and dissected off from the overlying conjunctival epithelial tissue and thoroughly removed by a pair of sharp scissors (**f**). The recessed conjunctiva (**arrow**) is lifted up by a forceps to identify the prolapsed fat (**star**) that is distributed in the fornix (**g**) and cauterized to create a gap (**h**) for prevention of fat herniation through fornix. Two separate layers of cryopreserved amniotic membrane are laid down to replace Tenon (**i**) and the conjunctival tissue (**j**), respectively. The recessed conjunctiva is anchored at the fornix with 8-0 Vicryl (**k**, **l**)

### Complications

- Focal conjunctival inflammation
- Focal conjunctival scar

### Template Operative Dictation

**Preoperative diagnosis:** Conjunctivochalasis (*OD/OS*) (CPT code: 68115, 65870)

**Procedure:** (1) Excision of conjunctival lesion, (2) fornix reconstruction with significant rearrangement of the conjunctiva, and (3) amniotic membrane transplantation, multiple layers for ocular surface reconstruction (*OD/OS*)

**Postoperative diagnosis:** *Same*

**Indication:** This \_\_\_\_-year-old (*male/female*) had developed (*decreased vision/ocular irritation/pain/redness/photophobia/gritty sensation/dryness/tearing*) despite the conventional maximal medical therapies including \_\_\_\_\_. After a detailed review of alternatives, risks, and benefits, the patient elected to undergo the procedure.

**Description of the procedure:** The patient was identified in the holding area, and the (*right/left*) eye was marked with a marking pen. The patient was brought into the OR on an eye stretcher in the supine position. A proper time-out was performed verifying correct patient, procedure, site, positioning, and special equipment prior to starting the case. After intravenous sedation, the (*right/left*) eye was prepped and draped in the usual sterile fashion.

The operating microscope was centered over the (*right/left*) eye and an eyelid speculum was placed in the eye. A 1:1000 epinephrine was instilled to create vasoconstriction for subsequent hemostasis control. Topical anesthesia was achieved by 2% Xylocaine gel instilled onto the ocular surface. A pair of 0.12 forceps was used to identify the loose and prolapsed conjunctiva distributed in the entire inferior fornix. (*Nasal/Temporal*) pingueculae were excised, and hemostasis was achieved with eraser. A 7-0 Vicryl suture was placed in the nasal and temporal limbal sclera with episcleral bites as a traction suture by hanging it with a heavy locking needle holder. The eye was reflected superiorly. A \_\_\_\_mm inferior conjunctival peritomy was created to connect both nasal and temporal bare sclera. The loose and wrinkled conjunctiva were readily separated from the sclera with blunt dissection due to the underneath degenerated and dissolved Tenon's capsule. The abnormal Tenon's capsule, which was distributed under the overlying recessed conjunctival epithelial tissue and adherent over the bare sclera, was dissected off from the overlying conjunctival epithelial tissue and thoroughly removed by a pair of sharp scissors toward the fornix region. The recessed conjunctiva was lifted up by a 0.12 forceps in order to identify the prolapsed fat that was distributed in the fornix, while the gap was cauterized using bipolar in order to create a strong orbital septum that prevented fat herniation through the fornix. Such thermal cauterization further recessed the conjunctiva, achieving a significant rearrangement of conjunctiva to deepen the fornix. Cryopreserved amniotic membrane was removed from the storage medium and cut into two layers. The first smaller layer was laid down to cover the inferior rectus muscle region as a new Tenon's capsule. The second, larger layer was used to replace the missing conjunctiva over the entire bare bulbar sclera with fibrin glue. The recessed conjunctiva was re-anchored back to the fornix with 8-0 Vicryl suture placed in a mattress fashion at inferior nasal and temporal quadrants, respectively.

***If the eye also exhibited superior conjunctivochalasis—The eye was then reflected downward by the traction suture. Peritomy was performed about 1–2mm from the superior limbus. The underlying degenerate mobile Tenon's capsule was removed by a sharp scissors. One layer of amniotic membrane was secured onto the bare sclera by fibrin glue as a new Tenon's capsule. The incised conjunctiva was closed by an 8-0 Vicryl suture in a running fashion.***

The traction suture was removed. Additional touchups were made at the limbal region that allowed the remaining limbal tissue to be flush with the edge of the amniotic membrane. After topical application of antibiotics (*with/without steroid*) ointment, the (*right/left*) eye was patched, and the patient was transferred to the post anesthesia care unit in stable condition.

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