Eyelid Reconstruction

Michael Underbrink, M.D.
Faculty Advisor: Karen Calhoun, M.D.
The University of Texas Medical Branch
Department of Otolaryngology
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Introduction

- Goal: restore normal anatomy and function
- Various reconstructive techniques
- Complex anatomy
Anatomy

- Eyelid functions
  - Protect eye (light, injury, desiccation)
  - Tear production and distribution
- Anterior/posterior lamella
- Extremely thin skin (upper > lower)
- Skin
  - Little subcutaneous fat
  - Adherent over the tarsus (levator aponeurosis)
Anatomy

- Horizontal length – 30 mm
- Palpebral fissure – 10 mm
- Margin reflex distance
  - Number of millimeters from the corneal light reflex to the lid margin
  - Upper lid – 4 to 5 mm (rests slightly below limbus)
  - Lower lid – 5 mm (rests at the lower limbus)
  - Reflex to limbus – 2.5 mm
Anatomy

♦ Tarsus
  - Dense, fibrous tissue
  - Contour and skeleton
  - Contain meibomian glands
  - Length – 25 mm
  - Thickness – 1 mm
  - Height
    • Upper plate – 10 mm
    • Lower plate – 4 mm
Anatomy – Muscles

- Protractor
  - Orbicularis
- Retractors
  - Levator
  - Müller’s
Orbicularis Oculi Muscle
Levator palpebral superioris and Müller’s muscle
Lower Lid Anatomy

Fig. 2-28  Cross-section of the lower eyelid retractors.
Anatomy

- Orbital Septum
  - Fascial barrier
  - Underlies posterior orbicularis fascia
  - Defines anterior extent of orbit and posterior extent of eyelid
Anatomy

♦ Canthal tendons
  – Extensions of preseptal & pretarsal orbicularis
  – Lateral slightly above medial
  – Lateral tendon attaches to Whitnall’s tubercle 1.5 cm posterior to orbital rim
  – Medial tendon complex, important for lacrimal pump function
Canthal Tendons

Deep head pretarsal orbicularis
  (Horner's muscle)

Posterior reflection of
medial canthal tendon

Posterior
lacrimal crest

Deep head preseptal orbicularis
  (Jone's muscle)

Anterior reflection of
medial canthal tendon

Lateral orbital tubercle

Lateral palpebral ligament

Lateral palpebral raphe

Whitnall's
  tubercle

Medial canthal tendon
posterior limb

Posterior
lacrimal crest

Lacrimal sac

Medial canthal tendon
  anterior limb

Anterior
lacrimal crest
Lacrimal System

Fig. 9-1  The anatomy of lacrimal system.
Lacrimal Excretory Pump

Lids Open

Blink

Lids Reopen

Lid fixation to lateral wall (orbital tubercle)

blink
Anatomy – Blood Supply

- Rich anastomoses from internal and external carotids
- Marginal arcades – 2 to 3 mm from lid margin
- Peripheral arcade – upper lid between levator aponeurosis and Müller’s muscle
Related Vocabulary

- **Ptosis** – upper eyelid margin abnormally inferiorly displaced
- **Entropion** – inward rotation of eyelid margin
- **Ectropion** – eversion of eyelid margin
- **Trichiasis** – misdirected eyelashes
- **Distichiasis** – aberrant eyelashes from metaplastic meibomian glands
- **Epiblepharon** – normal eyelashes pushed toward the eye by redundant folds of skin
- **Epicanthal folds** – vertical folds of skin over the medial canthus
Lower Eyelid Reconstruction

- Direct Closure
- Lateral Cantholysis
- Tenzel Rotational Flap
- Free Tarsal Grafts
- Hughes Procedure
- Mustarde (rotational cheek) Flap
Direct Closure

- 30% defects in young patients
- Up to 45% in older patients with more eyelid laxity
- Lateral cantholysis provides additional 5 mm
- Tarsal defect should be squared
- Temporal slant to musculocutaneous layer
Direct Closure

Diagram:
- Excised Tissue
- Placement of marginal sutures
- Lateral cantholysis
- Back cut
Lid Margin Repair

Fig. 11-12  Lid margin repair. A, Align the lid margin using a 7-0 Vicryl suture throughout the meibomian gland orifices. B, Suture the tarsal plate with 5-0 Vicryl sutures. C, Complete the lid margin closure, creating eversion of the wound edges with vertical mattress sutures.
Lateral Cantholysis

- Additional 5 mm of advancement
- Split upper and lower canthal tendons
- Detach lower limb (upper limb)
- Angle skin incision superiorly
- Anchor muscle layer to periosteum after closure of defect
Lateral Cantholysis

Fig. 11-15 - Canthotomy and cantholysis for closure of a full-thickness lower eyelid defect.
A. Angle the canthotomy superiorly. B. Perform a cantholysis. C. Free the orbital septum and lower lid retractors. D. Perform a primary lid margin repair and close the canthotomy.
Tenzel Rotational Flap

- Semicircular musculocutaneous flap
- Defects up to 60%
- Flap must arch upward
- Fixation of muscle to periosteum superior to canthal attachment avoids droop of lid
- Additional support of lateral lid can be achieved with periosteal strip from lateral orbital rim
Tenzel Flap
Free Tarsal Graft

- Free tarsocunjunctival flap
- Harvested from ipsilateral/contralateral lid
- Posterior lamellar replacement
- Cover with myocutaneous advancement
Free Tarsal Graft

Figure 68.8. Free tarsal graft is removed from ipsilateral or contralateral upper lid; the donor site is not sutured.

Figure 68.9. This tarsal graft is sutured to the lateral aspect of the tarsus in the lateral lid segment. It is also joined to the upper limb of the lateral canthal tendon and lateral orbital tubercle. This should fit snugly.

Figure 68.10. Skin muscle flap, which has been moved medially from the semicircular flap, is sutured to the tarsal graft with 6-0 plain gut and the lateral skin edges are closed appropriately with Burrow’s triangles, as needed to avoid redundant skin. The tarsal graft helps to support the lateral skin segment.
Hughes Procedure

- Tarsocconjunctival Flap for posterior lamella
- Defects greater than 50%
- Vertical upper lid to lower lid sharing
- Anterior lamella reconstruction
  - Advancement musculocutaneous flap
  - Free skin graft
- Requires 2nd stage procedure
Hughes Procedure
Hughes Procedure (continued)
Mustarde Rotational Cheek Flap

- Good for very large defects
- Advantage – single stage procedure
- Preferable for patients with:
  - Monocular vision
  - Children with amblyopia
  - Active corneal disease
  - Glaucoma
- Disadvantages – lacks orbicularis, sagging
Mustarde Technique
Mustarde Technique
Upper Eyelid Reconstruction

- Direct Closure +/- lateral cantholysis
- Tenzel Flap
- Sliding Tarsocconjunctival Flap
- Posterior Lamellar Graft with local myocutaneous flap
- Cutler-Beard (Bridge) Flap
Direct Closure
Tenzel Flap

A

B

Lateral canthal tendon

C

Conjunctiva

D

Orbital rim

T. Mathews 09
Sliding Tarsocconjunctival Flap

- Isolated medial or lateral lid defects
- Borrows a sliding portion of remaining lid segment for posterior lamella
- Anterior lamella repaired with skin graft or local myocutaneous advancement flap
Sliding Tarsal Conjunctival Flap
Posterior Lamellar Graft with Local Myocutaneous Flap

- Good for patients with skin laxity or redundancy
- Posterior lamella defect
  - Conjunctival advancement (upper fornix, lower lid)
  - Supplement with ear cartilage
- Anterior lamella
  - Myocutaneous flap for blood supply
Posterior Lamellar Graft with Local Myocutaneous Flap
Cutler-Beard (Bridge) Flap

- Used for 60% to entire lid defects
- Borrows skin, muscle and conjunctiva from lower eyelid
- Autogeneous cartilage to provide support
- Requires 2\textsuperscript{nd} stage procedure
Cutler-Beard (Bridge) Flap
Cutler-Beard (Bridge) Flap – 2nd Stage Procedure
Pedicle Flap From Lower Lid
Lateral Canthal Reconstruction

A. Periosteal strip elevated
B. 4-0 prolene
Lateral Canthal Reconstruction
Medial Canthal Reconstruction

A
ant.reflection

B
NO

C
YES
Medial Canthal Reconstruction
Medial Canthal Reconstruction

defect in medial lid and lower canaliculus

A

canalicular edge to edge of lid margin

C lid edge to posterior reflection
**Decision Making**

**FIGURE 17-17** Clinical pathway—management of full-thickness upper eyelid defects.

**FIGURE 17-18** Clinical pathway—management of full-thickness lower eyelid defects.
Conclusion

- Thorough understanding of eyelid anatomy
- Understand basic techniques of repair
- Challenging problem due to complex nature of eyelid anatomy
- Careful attention to detail with delicate surgical technique required
References