

Surgical Management of Dry Eye Disease

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Surgical Options for the Treatment of Dry Eye Disease

- Punctal Cautery
- Superficial Keratectomy
- Phototherapeutic Keratectomy
- Amniotic Membrane Transplantation
- Conjunctival Surgery
 - Conjunctival Resection
 - Conjunctival Flap
 - Pterygia/Pinguecula
 - Boston Kpro
 - Osteo-Odonto Keratoprosthesis (OOKP)
- Lid Surgery
 - Tarsorrhaphy
 - Lid Malposition
- Ocular Surface Transplantation
 - Conjunctival Limbal Autograft (CLAU)
 - Conjunctival Limbal Autograft (CLAL)
 - Keratolimbal Allograft (KLAL)
 - Cultured Limbal Epithelial Tx
 - Simple Limbal Epithelial Tx
- Keratoprosthesis

Punctal Cautery

Indications

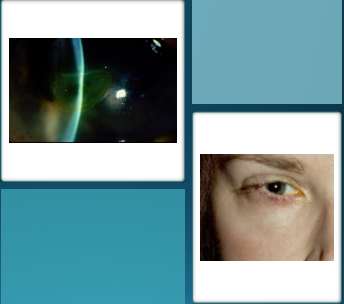
- Significant Dry Eye
- Intolerant to Punctal Plugs
- Collagen Vascular Disease
- Schirmer Scores of less than 5

Figure 1. A Bovie electrocautery device is used to create a 1-mm groove in the punctum to facilitate the step.
Figure 2. The application of electrocautery creates a 1-mm groove and indurates the punctum.
Figure 3. The application of electrocautery produces a stable indurated punctum.

Tarsorrhaphy

Indications


- Persistent Epithelial Defect
- Neurotrophic Keratitis
- Aqueous Tear Deficiency
- Evaporative Dry Eye



Glue Tarsorrhaphy

Indications

- Temporary Ocular Surface Disease
- Neurotrophic Keratitis
- Physical and Emotional Evaluation of need for a Permanent Tarsorrhaphy



Cyanoacrylate Temporary Tarsorrhaphy in the Management of Corneal Epithelial Defects
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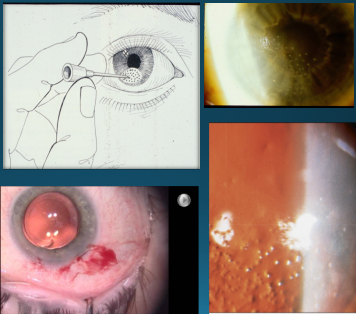
Anterior Stromal Puncture (Anterior Epithelial Reinforcement)

Indications

- Traumatic Erosion
- Recurrent Erosion in Dry Eye Disease

Procedure

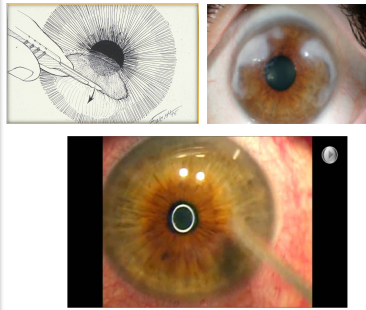
- Minimal depth application of tip of 27 or 25 ga needle
- Apply straight on not oblique



Superficial Keratectomy

Indications

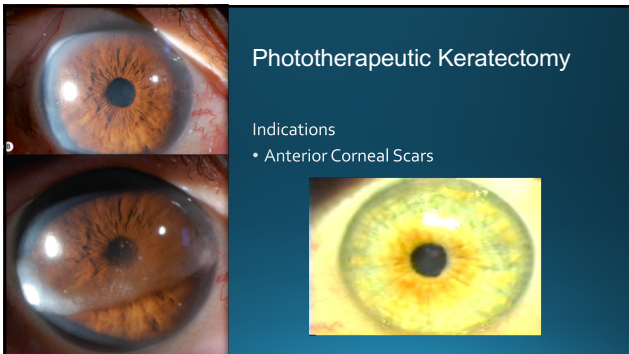
- Superficial Scarring due to Dry Eye
- Limited erosions in dystrophies and degenerations



Phototherapeutic Keratectomy

Indications

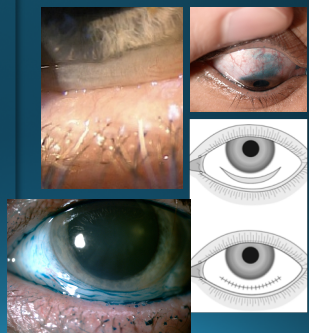
- Anterior Corneal Scars



Conjunctival Resection

Indications

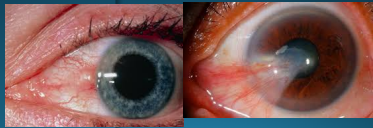
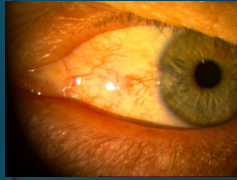
- Superior Limbic Keratoconjunctivitis
- Conjunctivalchalasis



Pterygium and Pinguecula Surgery

Indications

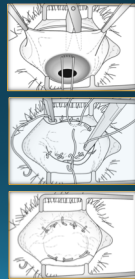
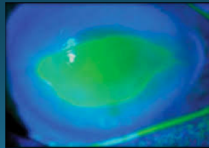
- Decreased Vision
- Tear film disruption
- Cosmesis



Conjunctival flaps

Indications

- Persistent epithelial defect
- Neurotrophic Dry Eye
- Severe Dry Eye
- Corneal thinning



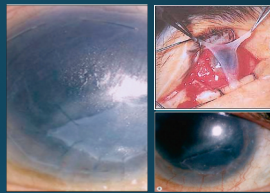
Amniotic membrane transplantation (AMT)

Indications

- Conjunctival reconstruction
 - Pterygium
 - conjunctival scarring/symphepharon
- Cornea surface reconstruction
 - persistent epithelial defect
 - neurotrophic keratopathy
 - partial LSCD
 - Salzmann's nodular degeneration
- As an adjunct to mox stem cell transplant

Commercially available

- Dehydrated



Lid Malposition Affecting Tear Film


Etiology

- Entropion/Ectropion
- Floppy Eyelid Syndrome
- Lid Imbrication



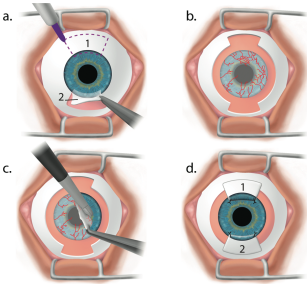
Ocular Surface Transplantation Techniques

- Conjunctival Limbal Autograft
 - Donor - Fellow Eye
- Living-related Conjunctival Limbal Allograft
 - Donor - Relative
- Keratolimbal Allograft
 - Donor - Deceased
- Cultivated Limbal Epithelial Tx - CLET
 - Donor - Relative / Cadaver / Self
- Simple Limbal Epithelial Transplantation (SLET)
 - Donor - Relative / Cadaver / Self



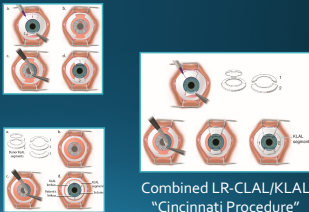
Conjunctival Limbal Autograft - CLAU

- Procedure of choice for Unilateral Injuries
- Eliminates rejection
- Need the fellow eye to have normal conjunctiva and limbus
- Only have one chance for fellow eye to be donor



Ocular Surface Transplantation For Bilateral Disease

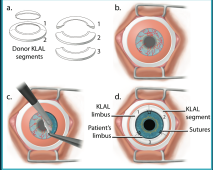
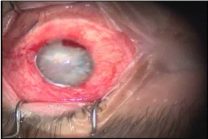
- **LR- Conjunctival Limbal Allograft**
 - Donor – Living Relative
- **Keratolimbal Allograft**
 - Donor – Deceased



Combined LR-CLAL/KLAL
"Cincinnati Procedure"

Keratolimbal Allograft – KLAL

- Deceased Donor

Advantages

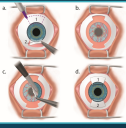

- One Procedure
- Does not involve a living donor
- Excellent number of Stem Cells

Disadvantages

- No tissue Typing
- Increased risk of rejection
- No source of conjunctiva

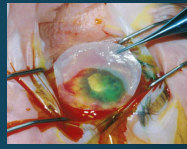
Living Related Conjunctival Limbal Allograft LR-CLAL

- **Advantages**
 - Allows for HLA matching
 - Reduce risk of rejection
 - Less systemic immunosuppression
 - Supplies Conjunctival Cells as well as LSCx
- **Disadvantages**
 - Two procedures
 - Theoretical risk to donor
 - Does not supply 360 degrees of SC

Cultivated Limbal Epithelial Transplantation (CLET)

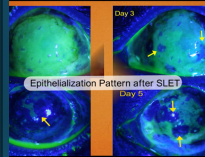
- Procedure:
 - 2-3mm of preserved healthy limbus is biopsied
 - Epithelial cells are expanded in culture
 - Cells are then placed on AM and continue to grow
 - AM is then transferred to recipient eye
- Indications:
 - Unilateral or partial bilateral stem cell disease



- Issues
- Expensive
 - Limited number of LSC
 - Long Term Survival ?
 - Cannot manage conjunctival disease

Simple Limbal Epithelial Transplantation (SLET)

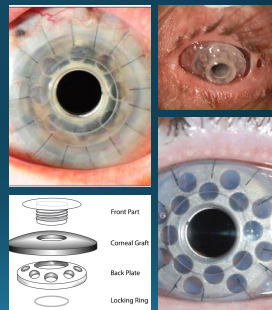
- Procedure:
 - 2-3mm length of superior limbus excised from healthy fellow eye
 - Limbal donor graft cut up into 10 pieces and distributed evenly over the AMT
 - Recipient cornea is covered with amniotic membrane
 - Tissue glue is used to secure the grafts in place
 - BCL is placed
- Indications:
 - Unilateral stem cell disease



- Issues
- Limited number of LSC
 - Long Term Survival ?
 - Cannot manage significant LSC or conjunctival disease

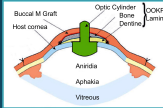
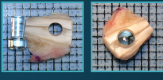
Boston Keratoprosthesis Type I

- Most commonly implanted KPro worldwide
 - Since 2000, more than 7,000 implantations
- Design:
 - Solid PMMA front plate
 - Carrier donor graft
 - PMMA back plate
 - Locking ring
- Higher complication rate in severe OSD



Osteo-Odonto Keratoprosthesis (OOKP)

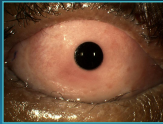
- Utilizes an autologous canine tooth and adjacent bone as support for a PMMA Kpro
- Indicated in cases of the most severe OSD
- Very Complex Surgical Procedure
- Surgical Team: 20 doctors (cornea, glaucoma, retina, oculoplastic, dental, radiologists, electrophysiologists)



Keratoprosthesis Surgery for End-Stage Corneal Blindness in Asian Eyes

The Singapore OOKP Study*

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Surgical Options for the Treatment of Dry Eye Disease

- Many options available for the treatment of OSD
- Several can be performed in the clinic or minor room
- Comprehensive ophthalmologist as well as the Cornea specialist can perform many of these procedures
- These techniques are underutilized and should be considered earlier and more frequently

Conclusion