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Simple Limbal Epithelial Transplant (SLET) for Severe Chemical Injury of Grade 6 Dua's Classification

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Chemical burns are considered potentially blinding injuries of the eye and constitute a true ocular emergency requiring instant assessment and commencement of treatment. Alkali burns may result in corneal damage via changes in local pH, ulceration, proteolysis and defects in collagen synthesis. The basic substance tends to deposit rapidly within the tissues of the ocular surface resulting in a local saponification reaction. The damaged tissues secrete proteolytic enzymes as part of an inflammatory response which further worsen the damage. Injury to the corneal and conjunctival epithelium from an ocular burn could be severe enough to damage the pluripotent limbal stem cells, causing a limbal stem cell deficiency, as witnessed in this case of a 52 year old male who presented with chief complaint of reduced vision in the left eye following an episode of chemical (lime) injury. Dua et al. proposed a classification scheme for ocular burns based upon clock hour limbal involvement as well as a percentage of bulbar conjunctival involvement. The examination of the patient's affected eye revealed a leucomatous corneal opacity with total (12 clock hours) limbal involvement, corresponding to Grade 6 of Dua's classification. There was complete limbal stem cell deficiency with diffuse corneal neovascularization (Figure 1). The following day, he underwent a Simple Limbal Epithelial Transplant (SLET). Firstly, a 4 mm x 2 mm autograft from the contralateral superior limbus was harvested. The autograft was then cut into twelve pieces and stored in normal saline. Thereafter, a 360 degree conjunctival peritomy was made in the injured eye. Dissection of the corneal neovascularization and the anterior superficial layers was performed. The dissected specimen was then sent for histopathological evaluation. Next, the twelve SLET grafts were adhered circumferentially with fibrin glue onto the first layer of amniotic membrane (Figure 3). The patient did remarkably well. The amniotic membrane dissolved, and on post-operative day 11, anterior chamber structures were now visible (Figure 5).

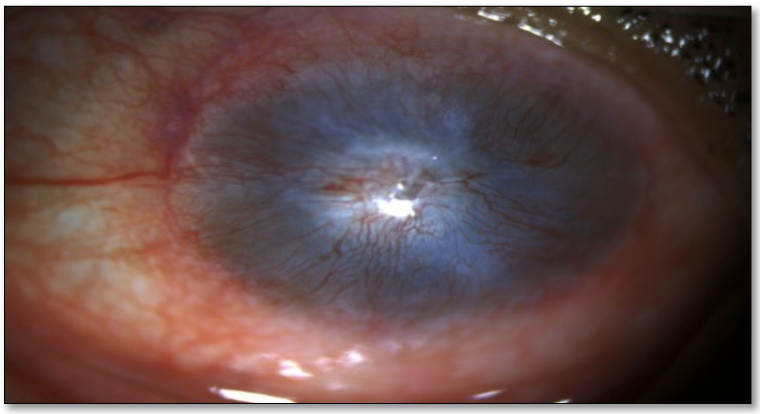

Figure 1. Pre-operative slit lamp photograph of the left eye with Grade 6 Dua's classification chemical injury secondary to lime (chuna). 360° of limbal stem cell deficiency and diffuse corneal neovascularization was noted.

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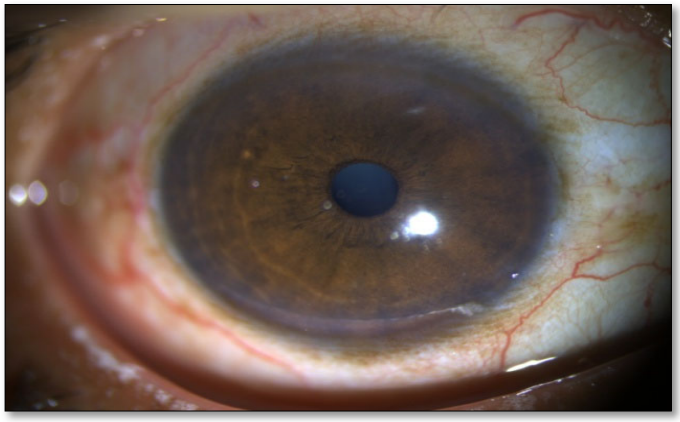


Figure 2. Pre-operative slit lamp photograph of the right eye prior to a 4 mm x 2 mm limbal autograft harvest from the superior limbus.

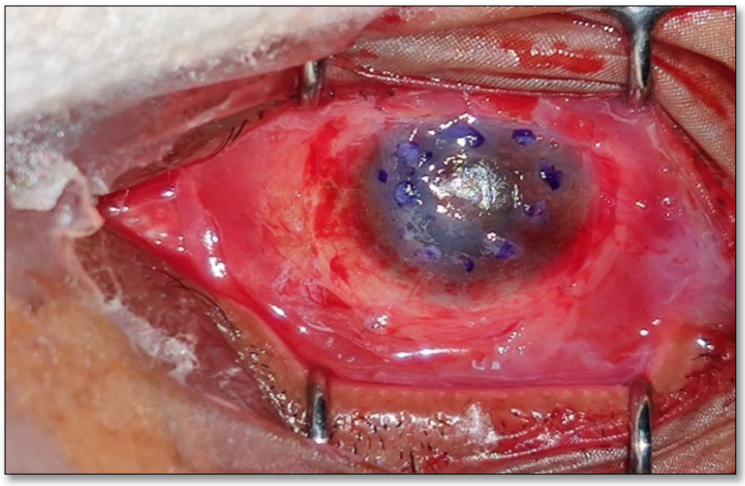


Figure 3. Intra-operative photograph of the left eye post SLET (Simple Limbal Epithelial Transplant) with twelve SLET grafts (purple dye) from the contralateral eye, overlying the first layer of amniotic membrane.

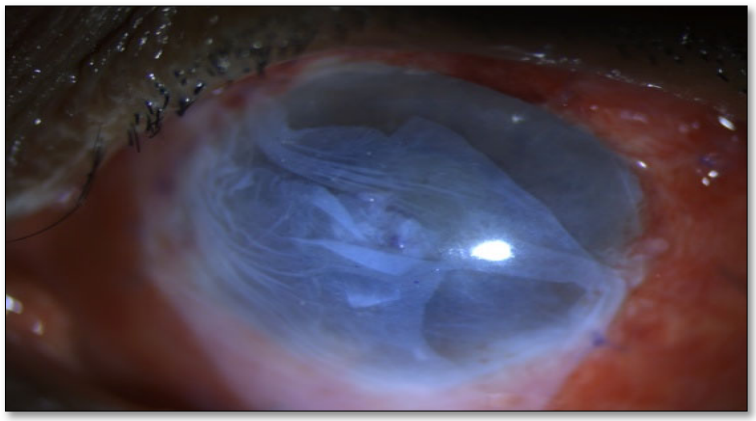


Figure 4. Slit lamp photograph of the left eye status post Simple Limbal Epithelial Transplant (SLET) post operative day #2, with a double layer amniotic membrane graft in place.

Figure 5. Slit lamp photograph of the left eye status post Simple Limbal Epithelial Transplant (SLET) post operative day #11, with improved visibility of the anterior chamber structures and significant resolution of the corneal neovascularization.

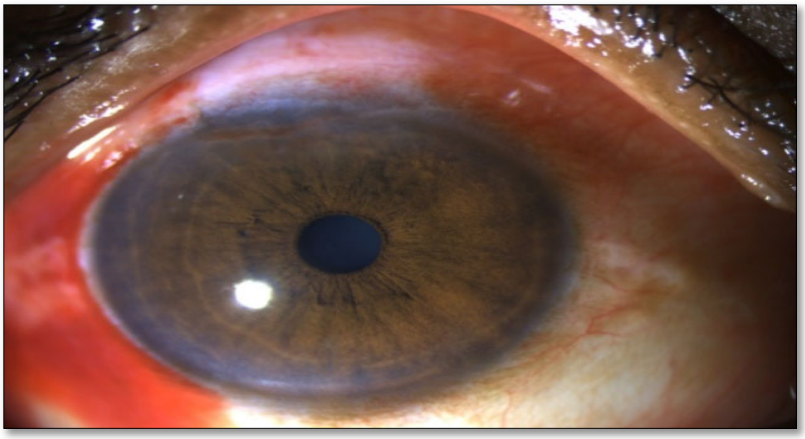


Figure 6. Slit lamp photograph of the right eye on post operative day #2 after the 4 mm x 2 mm autograft harvest from the superior limbus.

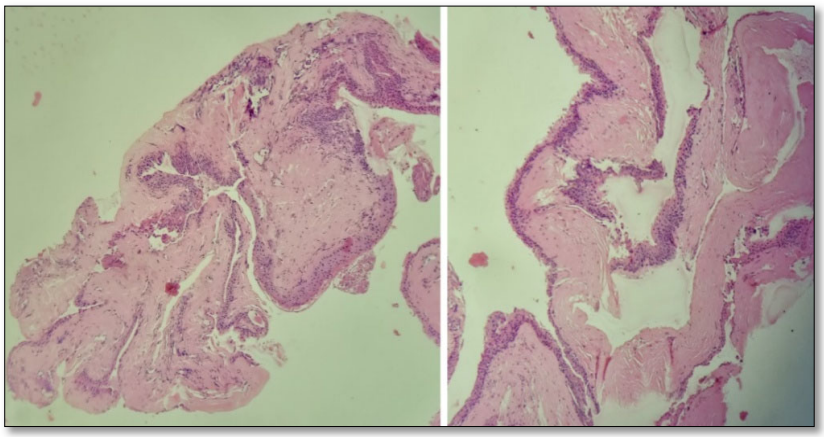


Figure 7. Photomicrograph (H&E x 40) of limbal tissue from the left eye showing linear tissue lined by conjunctival epithelium. The sub-epithelial layer shows dense fibro collagenous tissue. Focally, granular golden brown pigment is seen, which is suggestive of hemosiderin. Mild cystic infiltration and areas of hemorrhage are noted.

Figure 8. Anterior Segment - Optical Coherence Tomography (AS-OCT) imaging of the left central cornea prior to Simple Limbal Epithelial Transplant (SLET).

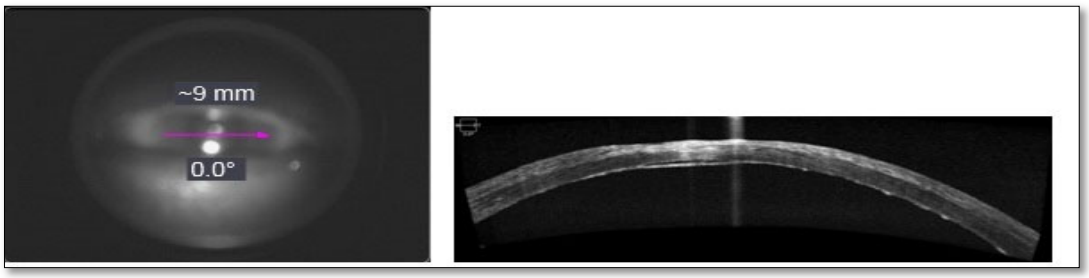
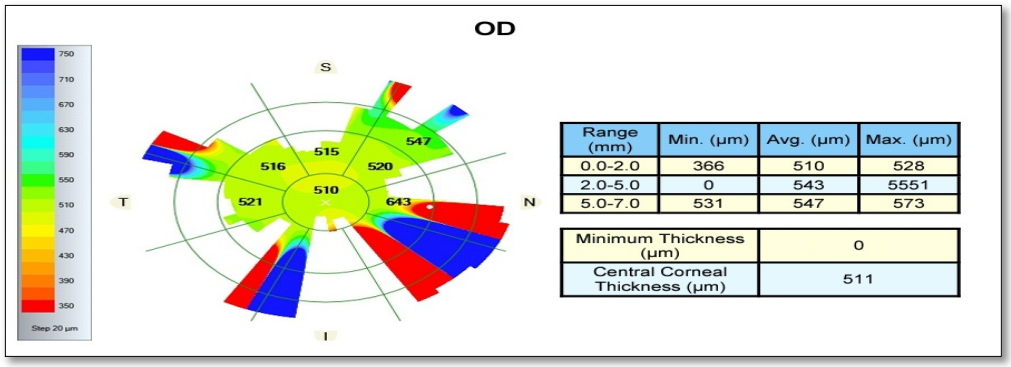


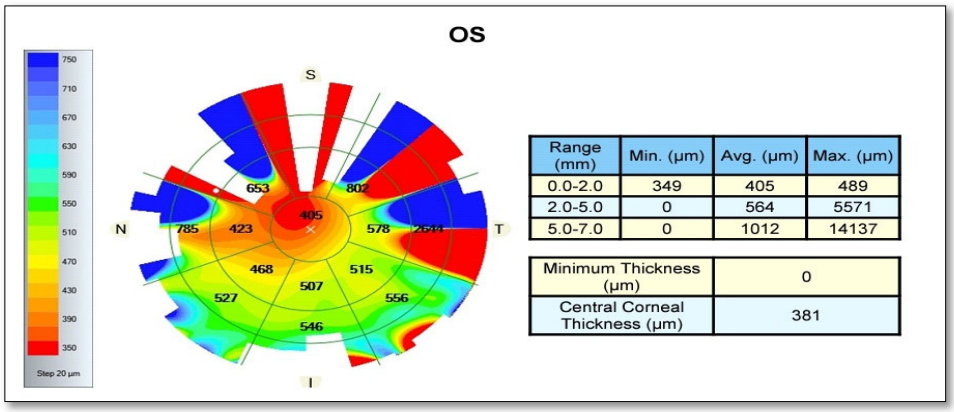
Figure 9. Anterior Segment – Optical Coherence Tomography (AS-OCT) imaging of the left central cornea status post Simple Limbal Epithelial Transplant (SLET) post operative day #11, showing reduced corneal thickness post-dissection.



Range (mm)	Min. (µm)	Avg. (µm)	Max. (µm)
0.0-2.0	366	510	528
2.0-5.0	0	543	5551
5.0-7.0	531	547	573

Minimum Thickness (µm)	0
Central Corneal Thickness (µm)	511

Figure 10. Corneal mapping and pachymetry (thickness) of the right eye on post operative day #11 after the 4 mm x 2 mm autograft harvest from the superior limbus.



Range (mm)	Min. (µm)	Avg. (µm)	Max. (µm)
0.0-2.0	349	405	489
2.0-5.0	0	564	5571
5.0-7.0	0	1012	14137

Minimum Thickness (µm)	0
Central Corneal Thickness (µm)	381

Figure 11. Corneal mapping and pachymetry (thickness) of the left eye status post Simple Limbal Epithelial Transplant (SLET) post operative day #11. Note the reduced central corneal thickness post-dissection (in comparison to right eye).