

Successful Outcome of Autologous Simple Limbal Epithelial Transplant (Slet) in Unilateral Paediatric Limbal Stem Cell Deficiency

Akanksha Sinha, MBBS, MS

Cornea Specialist, Shankara Hospital, Mandhana, Kanpur



Introduction:

Corneal epithelium is a thin transparent layer of cornea which needs to be replenished by the limbal stem cells throughout the life and any loss of function of this non-keratinised layer leads to severe opacification resulting in reduced vision or blindness.¹ Such loss of limbal stem cells can

be primary, when there is no microenvironment to help limbal stem cells thrive, like in aniridia or sclerocornea or it can be secondary to traumatic destruction of limbal stem cells by chemical or thermal injury or secondary to Steven Johnson Syndrome and ocular cicatricial pemphigoid or following multiple ocular surgeries. The triad of signs seen in patients with limbal stem cell deficiencies (LSCD) are progressive vascularization, conjunctivalization, and scarring of the corneal surface.²

Management options depend on whether LSCD is partial or total and whether it is involving one or both eyes. Variety of techniques have been described which include Conjunctival limbal autograft (CLAU), Cultivated limbal stem cell transplant (CLET) to the most recent and preferred revolutionary technique Simple Limbal Epithelial Transplant (SLET) described by Sangwan et al in 2012 which involves direct transplantation of small donor limbal tissue on amniotic membrane after pannus excision for ocular surface reconstruction.^{2,3}

Case vignette :

A 5yr old girl child presented to us with whitish lesion along with poor vision in her left eye following an unknown injury to her left eye at the age of 10 months. On examination child's left eye was found to have total LSCD with 1 quadrant symblepharon (Fig.1a, 1b)

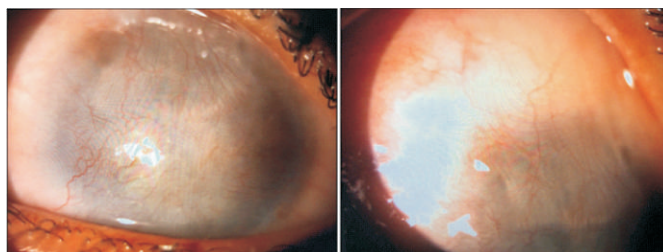


Figure 1 a :

Figure 1 b :

Total LSCD with 1 quadrant symblepharon

esotropia and amblyopia.

Her right eye was within normal limits. In view of normal B-scan and child being able to perceive projection of light rays accurately along with wet ocular surface SLET with symblepharon release and conjunctival auto graft was done. She is able to fix though unsteadily with the left eye now and is planned for lens aspiration and squint surgery subsequently along with amblyopia therapy.

Surgical technique :

Procedure was done under general anaesthesia in view of paediatric age group. Pre operative brimonidine eye drops were used twice 10 minutes prior to surgery with an aim to achieve a relatively bloodless field during surgery. Donor limbal biopsy and conjunctival auto graft was harvested from the healthy right eye. 4mm was measured with a caliper and marking of superior conjunctiva was done behind the limbus taking care not to damage limbal stem cells. A bleb was created to lift a conjunctival flap and fine dissection using a no.15 blade was done until the clear cornea was reached. Conjunctival auto graft part was excised off using a Westcott scissors and carefully placed on teflon block to be later used in the area of symblepharon. 1 clock hour donor limbal biopsy was also excised and placed on teflon block and both conjunctival graft and limbal biopsy were kept wet using balanced salt solution (BSS). The donor site was closed after repositing the conjunctival flap using fibrin glue (Tissel kit, Baxter). Recipient

eye preparation was done by complete symblepharone release and careful and gentle dissection of conjunctival pannus using a combination of blunt and sharp dissection starting from periphery. Gentle cautery was used to achieve haemostasis. Conjunctival auto graft was placed in the area of symblepharon using fibrin glue following which human amniotic membrane was placed over the recipient bed with basement membrane side facing up and secured using fibrin glue. Tucking of amniotic membrane under conjunctival edge all along the four quadrants using a blunt spatula was done ensuring it to be smooth with no folds. Limbal tissue was cut into 8 pieces and placed over the mid periphery of the cornea in a concentric pattern ensuring epithelial side of the limbal tissue was facing up. Fibrin glue was used to secure the tissue and following it a bandage contact lens was applied. Postoperatively topical prednisolone acetate 1% and moxifloxacin 0.5% was started 6 times and 4times respectively for the first week. Topical steroids were tapered weekly. Bandage contact lens was removed after 1st month and complete epithelialisation of ocular surface was noted .

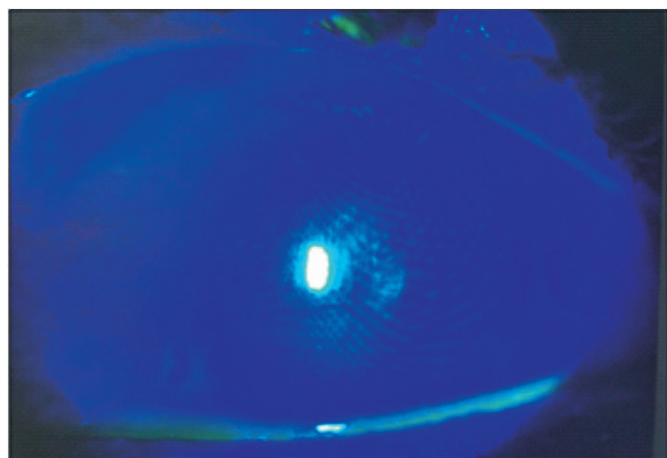


Figure 2 : Complete epithelialisation

Exuberant stromal bed

vascularity decreased with significant clearing of cornea over a period of 3 months with visible iris and lens details.

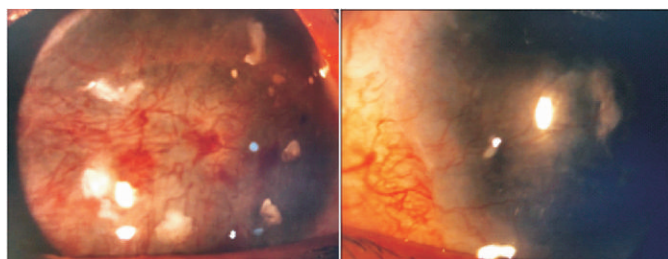


Figure 3 a : Exuberant stromal vascularity with corneal haze at 1 week decreasing at 1 month

Figure 3 b : and 3 months

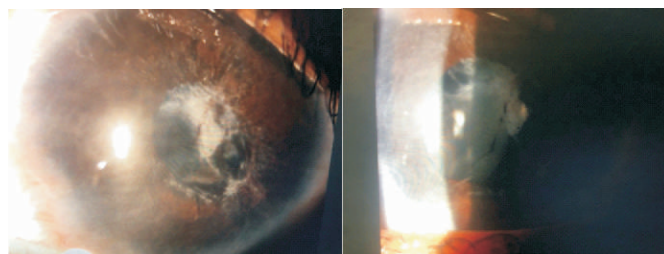


Figure 3 c : with visible iris and lens details

Figure 3 d :

No recurrence of symblepharon or LSCD was noted

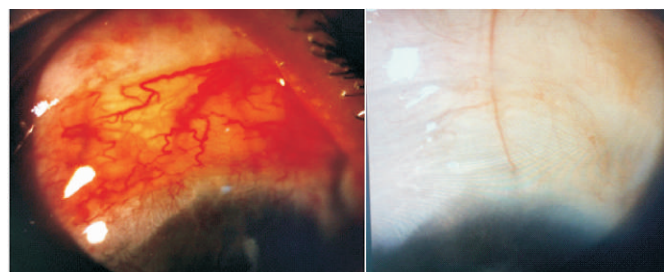


Figure 4 a :

Figure 4 b :

Conjunctival autograft well secured in the area of symblepharon with no recurrence of symblepharon at the last follow up of 6 months

Donor site was healthy. She was able to fix with her left eye, though unsteadily and is planned for lens aspiration and amblyopia therapy and subsequent squint surgery.

Discussion :

The most common indication of autologous SLET is unilateral LSCD secondary to ocular burns.

SLET is contraindicated in dry ocular surface with disorganised anterior segment and uncorrected adnexal pathologies.¹ SLET has an advantage of being a single stage procedure. It utilises a small amount of donor tissue and does not require a stem cell laboratory. SLET works by multidirectional growth of epithelial cells from each explant until a uniform confluent epithelial sheet is formed and amniotic membrane acts as a scaffold for this growth.³ This multidirectional growth with complete epithelialisation in 2 weeks was beautifully demonstrated on serial imaging and fluorescein staining by Mittal et al and on high definition spectral domain OCT by Chaudhuri et al.^{4,5} SLET being only epithelial regenerative procedure does not have an effect on stromal opacification which needs to be addressed with corneal transplant. In addition, any associated symblepharon needs to be addressed separately by conjunctival autograft to prevent it's recurrence.

The long term outcomes of SLET have been very encouraging

with achievement of a stable epithelised corneal surface in 78% of cases.^{6,7}

Conclusion :

Following an accurate diagnosis of LSCD and stabilisation of ocular surface, epithelial regeneration to restore corneal epithelium by limbal stem cell transplantation is the ultimate solution. Autologous SLET has successful and encouraging outcome in patients, including paediatric age group, with unilateral LSCD with wet ocular surface.

References:

1. Shanbhag, Swapna S1; Patel, Chaitali N1; Goyal, Ritin1; Donthineni, Pragnya R1; Singh, Vivek2; Basu, Sayan1,2, Simple limbal epithelial transplantation (SLET), Indian Journal of Ophthalmology: August 2019 - Volume 67 - Issue 8 - p 1265-1277 doi: 10.4103/ijo.IJO_117_19
2. Fernandes M, Sangwan VS, Rao SK,S Basti, Sridhar MS, Bansal AK, Dua HS. Limbal stem cell transplantation Current ophthalmology ,2004 (52) :1;5-22
3. Sangwan VS, Basu S, MacNeil S, Balasubramanian D. Simple limbal epithelial transplantation (SLET): A novel surgical technique for the treatment of unilateral limbal stem cell deficiency Br J Ophthalmol. 2012;96:931-4
4. Mittal V, Jain R, Mittal R. Ocular surface epithelialization pattern after simple limbal epithelial transplantation: An in vivo observational study Cornea. 2015;34:1227-32
5. Ray Chaudhuri B, Bhaduri A, Sengupta M. The ocular surface after simple limbal epithelial transplant (SLET): A high-resolution OCT study of the early postoperative period.Indian J Ophthalmol.2019;67(8):1348-1350.
6. Basu S, Sureka SP, Shanbhag SS, Kethiri AR, Singh V, Sangwan VS. Simple limbal epithelial transplantation: Long-term clinical outcomes in 125 cases of unilateral chronic ocular surface burns Ophthalmology. 2016;123:1000-10
7. Vazirani J, Ali MH, Sharma N, Gupta N, Mittal V, Atallah M, et al Autologous simple limbal epithelial transplantation for unilateral limbal stem cell deficiency: Multicentre results Br J Ophthalmol. 2016;100:1416-20



SCIENTIFIC AWARDS WINNERS



Name of Award	Winner	Topic
Dr.Mohan Lal Gold Medal	Dr Tejasvini Chandra	De facto stress on surgeons during cataract surgery
Dr Awadh Dubey	Dr Pratyush Ranjan	Ranjan MSICS marker
Dr P Awasthi	Dr Shefali Mazumdar	Efficacy of subconjunctival Bevacizumab in Keratoplasty on severely vascularised cornea
Dr V.N.Raizada	<ul style="list-style-type: none"> • Dr Shalini Singh • Dr Perwaz Khan 	<ul style="list-style-type: none"> • Diffuse Tensor Imaging in ethambutol induced optic neuropathy • Suprachoroidal injection: A novel technique for drug delivery in retinal diseases by indigenously designed needle
Dr.P K Pandey	Dr Anavi Munjal	Molecular correlation of dry eye and phacoemulsification
Dr.Jitendra Agarwal	Dr Madhvendra Singh Ahirwar	A comparison of single flap versus double flap external dacryocystorhinostomy
Best Video	Dr Vaibhav Kumar Jain	AGV implantation in ciliary sulcus using long sclera flap technique
Free paper session 1	Dr Ankit Agrawal	Low cost wide field OCT
Free paper session 2	Dr Vanchha Tripathi	A study of frequency of dry eye in type 2 DM patients
Free paper session 3	<ul style="list-style-type: none"> • Dr Anurag Kumar Kashyap • Dr Alok Ranjan 	<ul style="list-style-type: none"> • Effects of vitamin D supplementation and improvement in Dye Eye Disease patients • Isolated orbital cysticercosis : A major cause of ptosis in cabbage eaters in northern India
Free paper session 4	Dr. Rohan Mehra	Novel ultra structural markers of collagen distribution in keratoconus patients: Imaging with ultra-high resolution polarised sensitive OCT
Best of all paper session	Dr. Rohan Mehra	Novel ultra structural markers of collagen distribution in keratoconus patients: Imaging with ultra-high resolution polarised sensitive OCT
E-poster		
First	Dr Kirti Verma	To study platelets parameters in patients with Diabetic Retinopathy
Second	<ul style="list-style-type: none"> • Dr Aliya Yamin • Dr Rohit Sahi 	<ul style="list-style-type: none"> • Optic nerve glioma -case report • Orbital Rhabdomyosarcoma: A Diagnostic Challenges
Third	<ul style="list-style-type: none"> • Dr Obaid Imtiyazul Haque • Dr Ruhin Siddiqui 	<ul style="list-style-type: none"> • Bilateral serous retinal detachment: An usual complication of HELLP Syndrome • Floating vitreous cyst
Quiz winners 1st	Lt Col Bhupesh Bhatkoti	
2nd	Dr Isha Chaturvedi	
3rd	Dr Anchal Tripathi	



CHAIRMAN, SCIENTIFIC COMMITTEE

Dr. Deepak Mishra

Email: cscupsos@gmail.com, Mobile:+91 94153 60338

CO-CHAIRMAN SCIENTIFIC COMMITTEE - Dr Shashank Kumar

MEMBER SCIENTIFIC COMMITTEE

Dr. Diksha Prakash, Dr. Durgesh, Dr. Eram Parveen, Dr. S. K. Bhasker, Dr. Sanjiv Kumar Gupta