

# To Study the Outcome of Simple Limbal Epithelial Transplant (SLET) in Unilateral Limbal Stem Cell Deficiency (LSCD)

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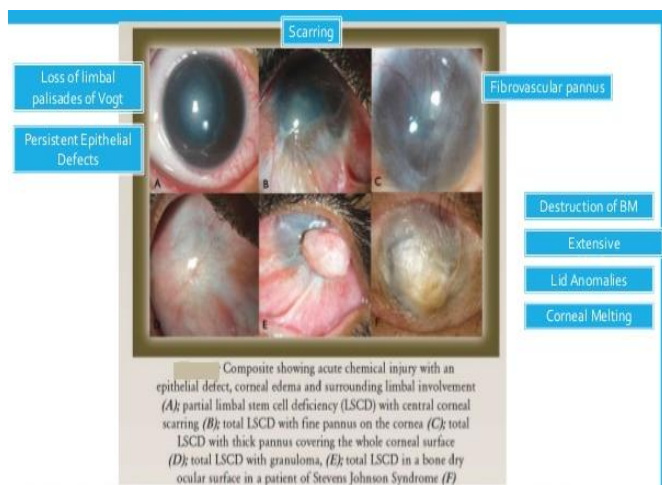
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**Abstract:** **Aim:** To share our experience of simple limbal epithelial transplant (SLET) in unilateral limbal stem cell deficiency (LSCD). **Methods:** This study included 12 patients suffering from unilateral limbal stem cell deficiency secondary to thermal / chemical burns. SLET was performed in all these cases over period of 1.5 years. Superior limbal tissue from contralateral eye was harvested and placed over the ipsilateral eye after dissecting it from pannus and glued on Amniotic membrane graft, bandage contact lens was applied. **Results:** there was a significant improvement in the vision of 7 out of 12 patients, and stable ocular surface 5 out of 12 patients. **Conclusion:** SLET seems to be a viable option in patients with ocular surface burns. it is simple to perform, easily replicable and a cost effective technique.

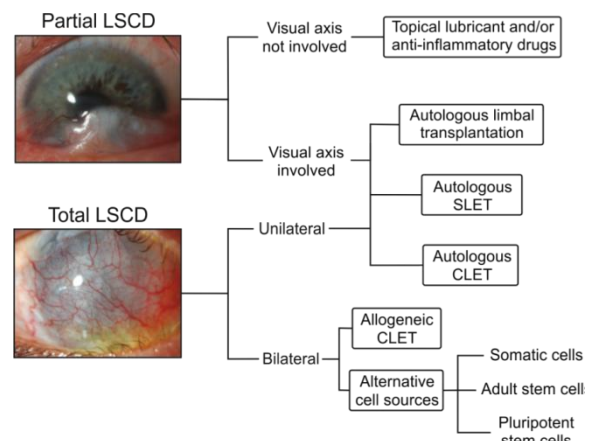
**Keywords:** LSCD (limbal stem cell deficiency), SLET (simple limbal epithelial transplant), AMG (amniotic membrane graft)

## 1. Introduction

1) Simple limbal epithelial transplantation (SLET) is a novel technique of stem cell transplantation developed for the treatment of unilateral limbal stem cell deficiency in 2012.



- 2) Thermal/Chemical burns are one of the major causes which can cause irreversible blindness if left untreated.
- 3) Disruption of the limbal niche by various pathological conditions (e.g., severe immune response and wounding) can lead to LSCD.
- 4) Why SLET??
- 5) Simple and pocket friendly surgery which causes minimum iatrogenic LSCD in contralateral eye.
- 6) No special labs for stem cell cultivation.
- 7) Due to autologous nature, chances of limbal stem cell survival rate increase (in contrast to allograft procedures)
- 8) No need of long term immunosuppression!



## 2. Aims and Objectives

To share our experience of Simple limbal epithelial transplantation (SLET) in unilateral limbal stem cell deficiencies (LSCD).

### Study Details

- **Study Design:** This is a single centre prospective interventional case series.
- **Study Setting:** C.H. Nagri Eye Hospital
- **Participants:** This study included 12 patients, 4 out of these cases were in the preadolescent age group. They all suffered from unilateral limbal stem cell deficiency secondary to thermal or chemical burns. SLET was performed in all these cases between December 2017 to June 2019.

### Inclusion Criteria

- 1) All age groups
- 2) Confirmed unilateral LSCD
- 3) Chemical or thermal ocular surface burn,

**Exclusion Criteria**

- 1) Bilateral LSCD
- 2) Unknown cause of LSCD
- 3) Ultrathin corneas
- 4) Intracorneal chemical imbibition
- 5) History of glaucoma
- 6) History of recurrent pterygium or primary pterygium in the contralateral eye
- 7) History of ocular surface neoplasia
- 8) Coexisting lid pathologies

**3. Materials and Methods**

We harvested 1-clock hour of superior limbal tissue from the contralateral eye. Ipsilateral eye was dissected free from fibrovascular pannus and human Amniotic membrane was stuck on the bare area using fibrin glue. The harvested limbal tissue was chopped into small pieces and glued on AMG overlying the mid peripheral cornea. A bandage contact lens was thereafter placed on the well adhered limbal tissue.

**Post-Operative Care**

Patients were seen on days 1, 7, at 1 month or at 6 weeks, 90, and at 3-month intervals thereafter. Rx: Moxifloxacin 0.3% eye drops 4 times daily for 1 week and prednisolone acetate 1% eye drops 6 times daily tapered weekly over 6 weeks in both eyes.

BCL was removed from the recipient eye on day 15.

**4. Observations and Results**

All patients diagnosed with corneal burns attending the Cornea out patient department have been screened between December 2017 to June 2019. Total 12 patients who have had severe burns fulfilling the inclusion criteria were enrolled in the study and operated for SLET.

	<16 yrs	>16 yrs	%
<b>Sex</b>			
Male	2	7	75
Female	2	1	25
<b>Cause of ocular burn</b>			
Alkali	3	5	66.6
Acid	1	2	25
Thermal		1	8.3
<b>Prior ocular surgery</b>			
Only AMG	2	1	25
Symblepharon release with AMG	1	1	16.6
None			
<b>BCVA at presentation</b>			
<cf3m	3	6	75
>cf3m	1	2	25
<b>Symblepharon</b>			
Encroaching limbus	0	0	0
Extending to cornea	4	8	100
Absent	0	0	0
<b>Extent of LSC (clock hours)</b>			
total>12	3	6	75
partial <6	1	2	25
<b>Duration between ocular burn and SLET</b>			
<4months	2	3	41.6
>4months	2	5	58.4
Corneal transplantation after SLET	0	2	16.6

- 1) We included 12 patients of Uniocular ocular surface burns out which 4 patients were in paediatric age group and 75% of them i.e. majority were males.
- 2) 66.6% cases were due to limestone injury, 25% were acid injuries and remaining 8.3 % cases were of thermal injury
- 3) Majority of our cases (75%) had LSCD>6 clock hours
- 4) Time duration between injury and SLET was longer than 4 months in 58.4% cases.
- 5) 1 of 12 patients had conjunctival granuloma at presentation.
- 6) We received all advanced and referred cases, with a visual acuity cf<3 m (tertiary care centre) in 75% cases (including 3 out of 4 paediatric patients).
- 7) All patients had one or more than one symblepharon extending to the centre of cornea at the time of presentation. It is ironical that only 25% had received AMG as an acute phase treatment.
- 8) 16.6% (2 of 12) patients underwent a symblepharon release with AMG, in both of them symblepharon had recurred again.
- 9) At first post operative day the vision in all patients was cf <1 m which in 3 months eventually improved to cf 1m in 1 case, cf 1 1/2m in 1 case, cf 2m, cf2 1/2 m in 1 case, 6/60 in 1 case and 6/9 in one case (preop vn-6/36) and cf1 m and less in the rest of the cases.
- 10) 5 out of 12 patients had a 360 degree stable ocular surface
- 11) 2 out of 12 patients developed a conjunctival granuloma
- 12) 2 out of 12 developed 3-4 clock hours of pannus
- 13) 1 out of 12 patients developed a corneal melt following 10 days of SLET with an unusual Anterior Lamellar keratitis which further needed up in a total corneal melt within one month and urgent Tectonic penetrating keratoplasty was performed not eradicating the tendency of corneal (graft)melt in the patient.
- 14) 1 out of 12 patients unbent and optical PK after achieving a 360 degree stable ocular surface.

**5. Complications**

- 1) Recurrence of progressive conjunctivalization was the most common complication in 4 of 12 recipient eyes.
- 2) Progressive symblepharon was seen in 4 of 12 eyes.
- 3) Haemorrhage under amniotic membrane graft was observed in 5 of 12 eyes - resolved spontaneously,
- 4) Partial loss of SLET transplants was noted in 1 of 12 eyes
- 5) In this case, the patient had displacement contact lens within the first week and showed recurrence of LSCD over varying lengths of time.
- 6) Microbial keratitis developed in 1 of 12 eyes.

**6. Discussion**

- 1) A multicentre study on 68 eyes from patients who underwent SLET for unilateral LSCD reported promising results. Clinical success was achieved in 57 (84%) cases. With a median follow-up of 12 months, the survival probability exceeded 80%.
- 2) Recently, long-term clinical outcomes of a large cohort of patients (125 cases) with unilateral LSCD occurring after ocular burns showed that 76% patients maintained

a successful outcome. In addition to surface restoration, most patients undergoing SLET reported a significant improvement in visual acuity.

- 3) It is very simple and pocket friendly surgery which causes minimum iatrogenic LSCD in contralateral eye.
- 4) Due to immunoprivileged nature of the central corneal epithelium and stroma, transplantation of central cornea can cure many corneal pathologies that impair vision.
- 5) However, in defects extending peripherally beyond the limbal zone corneal transplantation is no longer a viable option.
- 6) This kind of situation is encountered in chemical and thermal burns where SLET proves to be miraculous.

## 7. Conclusion

- 1) In our view, SLET seems to be a viable option in patients with ocular surface burns. We were able to achieve a near stable ocular surface in 5 out of 12 cases and restoration of satisfactory vision in 7 out of 12 cases (including 1 post OPK). At least a stable ocular surface enables OPK in the following years.
- 2) Being a novel technique, though it seems promising the post-operative course in all cases still seems to be unpredictable. But it is definitely simple to perform, easily replicable and a cost effective technique.
- 3) Since, the sample size is small and the follow-up is limited, it is difficult to come to any conclusion, but it is worth a try.
- 4) However, as most failures after limbal transplantation usually occur within the first 6 months the results of this study are truly encouraging.

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