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# Application Of theSMILE Lenticule in Corneal Tear Repair- A Case Report

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***Abstract:***
*Corneal foreign bodies are common ocular emergencies reported in ophthalmology emergency. Small incision lenticule extraction (SMILE) is an advanced femtosecond laser refractive technique used to correct myopia and myopic astigmatism through extraction of an intrastromal corneal lenticule without a corneal flap. As the Small incision lenticule extraction lenticule is removed as a single slice, it can be re-implanted for the treatment of corneal perforations. This case report is about a 24-year-old who reported with an injury to his right eye by metal (iron) piece while cutting the iron sheet. On slit lamp examination, it revealed a deep intrastromal foreign body at 1 'o clock position paracentrally away from pupillary area with surrounding stromal edema in the right eye. An Anterior Segment Optical coherence tomography was done which showed deep foreign body embedded in the deep stroma but not intruding in to the anterior chamber. He underwent foreign body removal with Conjunctival Auto graft was sutured and Bandage contact lens was placed. On Post operative day 1, tear was repaired well and CAG was on place and the anterior chamber was well formed. Patient was called for follow up after 4 months. On follow up, suture removal was done, but the Anterior chamber was not formed as there was wound gap,so we planned for application of lenticule obtained fromsmall incision lenticule extractionon the wound. Following that on first day post op, small incision lenticule extraction lenticule was in-situ, Anterior chamber was well formed. Uncorrected visual acuity was 6/24. Hence it is concluded that the lenticule patch graft is a safe,feasiblesurgical option for the treatment of keratohelcosis or partialthickness corneal defects, especially in small perforation and defects.*

***Keywords:****Corneal tear repair, corneal foreign body, conjunctival autograft, fibrin glue, Small incision lenticule extraction*

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## I. Case Report-

A 34-year-old male patient, came to the OPD with chief complaints of sudden blurring of vision, Redness, pain, watering and foreign body sensation in Right eye for 5 days. He inflicted an injury upon the right eye, 5 days ago, while cutting an iron sheet.

On examination, the unaided visual acuity in his right eye was 20/40 with perception of rays accurate and in left eye it was 20/20. On slit lamp examination (Figure 1), the right eye showed conjunctival congestion, with deep intrastromal iron foreign body at 1'o clock position in paracentral area with surrounding mild stromal haze, anterior chamber showed 2+ cells and flare. Pupillary reaction was normal both direct and consensual. Left eye was within normal limits.

Anterior segment optical coherence tomography right eye was done and it showed deep foreign body with tear. (Figure 2)

He underwent corneal foreign body removal with corneal suturing with cyanoacrylate glue application. Bandage contact lens was placed.

On post operative day 1, the anterior chamber was well formed with sutures and patient was doing well. Bandage contact lens was present. He was started on topical steroid, antibiotic and lubricants.

Bandage contact lens was replaced after 5 days. On 14$^{th}$ day Bandage contact lens was removed and Seidels test was negative.

He was called for follow ups and was doing well. Retina examination was done on 1-weekpost-surgery. Retina of both the eyes were within normal limits.

After 4 months, suture removal was done. The seidels test was positive (leak noted), anterior chamber was shallow. Anterior segment optical coherence tomography showed wound gapping. (Figure 3)

The same day patient was taken again for surgery, and this time repair of wound with SMILE lenticule withfibrin glue was done. The lenticule was transferred from refractive operating room, where ReLExSMILE was scheduled. The availability of donor subject was ensured. The VisuMax FS laser system (Carl Zeiss Meditec, Jena, Germany) was used for lenticule creation during the SMILE procedure in the donor cornea for

correctionof 5-10 D myopia, using a cap thickness of 100 microns, optical zone of 6 mm and a superior 2 mm incision through which the lenticules were extracted by a single and experienced refractive surgeon. The fresh lenticule tissue was then carefully transferred in a sterile Petri dish containing phosphate buffer solution under strict aseptic conditions. It was ensured that the tissue was used within one hour of extraction in order to minimise the risk of contamination.

Next day on post operative day 1, patient was doing extremely well and there was no leakage noted. (Figure 4) Anterior optical coherence tomography showed well attached lenticule with sealed wound. (Figure 5)

Topical medication was started. On 7$^{th}$ POD, patient was doing well and seidels test was negative. Best corrected Visual acuity at 3 months post op was 20/20.

## II. Discussion-

Ocular injury is common, with an estimated 24 million people suffering an eye injury.[1] Injuries to the eye vary in severity, from a small scratch to the cornea (corneal abrasion) to a split in the external structure (globe rupture).

Globe rupture can occur in various parts of the eye; one example is a corneal laceration. Corneal injuries of this nature can occur in two distinct populations – in young children from play-related activities, and in young adults from due to their work environment.

The repair of a corneal laceration often requires suturing; however, tissue adhesives or contact lenses can close lacerations less than 2 mm. [2]

Lamellar corneal defects and traumatic micro perforations resistant to conventional management remains a challenge. Accepted treatment modalities for such cases are tissue adhesives, conjunctival flaps, amniotic membrane graft [3], scleral lamellar graft, corneal patch grafts [4] and keratoplasty. The use of a patch graft derived from lenticules extracted from the small incision lenticule extraction (SMILE) procedure as a safe and feasible surgical option in the management of micro perforations and complicated corneal tears is a good option.

The use of cyanoacrylate glue as a bio adhesive has been reported in ophthalmology since 1963 [5] for sealing corneal perforations and attaching methacrylate contact lenses.

Fibrin adhesives have been successfully used in pterygium surgeries for attaching amniotic membrane graft or conjunctival autograft [6]

Small incision lenticule extraction (SMILE) is a new refractive procedure designed to treat refractive errors such as myopia and astigmatism. The procedure involves using a femtosecond laser to create a corneal lenticule which is extracted whole through a small incision without the use of an excimer laser.

Intra stromal lenticule removal during ReLEx SMILE (Refractive Lenticule Extraction, Small Incision Lenticule Extraction) for myopic correction and its implantation in allogenic subjects was first reported by Pradhan et al [7] for correction of aphakia.

ReLEx SMILE is the main refractive procedure in most of the hospitals, being performed in large numbers for correction of myopia. Thus, the availability of ample amount of lenticule tissue prompted us to use it as patch graft in this case of corneal perforation.

The use of corneal lenticules may be a safe and effective surgical alternative for corneal perforation closure, with potential clinical application as relatively simple and inexpensive temporary measures to improve the condition of the cornea.

Recently Wu et al[8] published a case series in which they used a SMILE lenticule obtained through SMILE surgery with central thickness more than 100 micron for sealing corneal perforation in 6 patients using 10-0 interrupted sutures to secure the lenticule.

Bhandari et al [9] also conducted a study, application of the SMILE-Derived Glued Lenticule Patch Graft in Micro perforations and Partial-Thickness Corneal Defects in 7 eyes of 7 patients and assessed its short-term outcomes.

It has been reported that lenticule implantation to the corneal stroma has been used in the treatment of keratoconus, hyperopia and presbyopia. [10, 11, 12, 13, 14]

Mohamed Samy Abd Elaziz et al [15] also conducted a study of 7 patients with corneal perforation being treated with application of stromal lenticules obtained from SMILE surgery.

Song YJ et al [16] performed a case series where SMILE-extracted stromal lenticule was useful for complication-free treatment of an Ahmed-valve-tube-exposure and bullous keratopathy patient.

Lenticule patch graft is a safe and feasiblesurgical option for the management of micro perforations and complicated corneal tears, especially in hospitals that perform the SMILE procedure in large numbers.[17]

It is thus suggested that the stromal lenticule, with its biocompatibility, sufficient strength, ease of handling and low cost, is a useful patch graft for different purposes in the ophthalmic field.

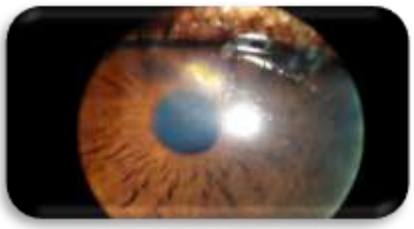

Figure 1- Corneal foreign body seen on SLE

Figure 2- AS-OCT showing deep stromal intracorneal foreign body

Figure 3- AS-OCT on 4th month

Figure 4- Application of SMILE lenticule and fibrin glue

Figure 5- AS-OCT showingcomplete approximation of the tear.

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