Comparison of Tenon's patch graft and SMILE-derived lenticule in management of corneal defects and perforations

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Background and Rationale

- Corneal perforations may occur secondary to infection, inflammation, trauma and immune disorders.
- They are ophthalmic emergencies that require prompt intervention to retain ocular integrity and visual function. Delay in treatment may result in endophthalmitis and eventual loss of vision
- Current management includes bandage contact lens, tissue adhesives and surgical interventions like amniotic membrane transplantation & corneal patch graft.
- The current study compares the outcomes of Tenon's patch graft versus SMILE (Small Incision Lenticule Extraction) Lenticule Transplantation for management of corneal perforations/defects.

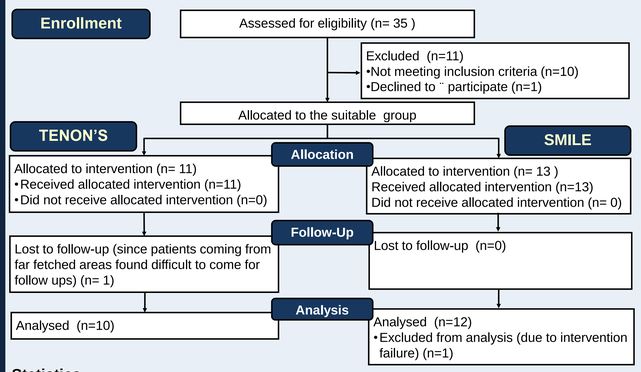
Objective

To compare the anatomical, functional and ocular surface parameters in patients managed with Tenon's patch graft and SMILE-derived lenticule for corneal defects and perforations

Methodology

- **Study Design**: Comparative interventional prospective study
- **Inclusion criteria:** Perforation size <6mm, Age >10years, written informed consent, patient willing to follow up.
- **Study parameters:** Best corrected Visual Acuity (BCVA), Anterior Chamber Depth (ACD), Tear Meniscus Height (TMH), Lipid Layer Thickness (LLT), Meibomian Gland Loss (MGL), Non-invasive tear film Break Up Time (NIBUT), were measured preoperatively, at Day 1, 1 week, 1 month and 3 months following surgery in both the groups.
- Institute Ethics approval was obtained.

STUDY FLOW



Statistics

- Independent sample t test/Wilcoxon Ranksum test for comparing baseline and endline outcome parameters between the two groups.
- P value less than 0.05 was taken as significant.

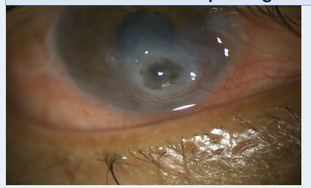
Results

BASELINE CHARACTERISTICS

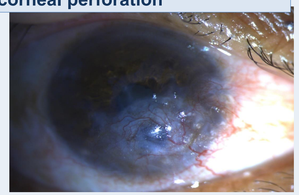
	Tenon's patch graft (n=10)	SMILE-derived lenticule (n=13)	P value
Mean Age (years)	48 ± 11.9	45.4 ± 14.3	0.30
Gender			
Males	60%	61.5 %	0.15
Females	40%	38.5 %	**0.04**
Duration (days)			
Perforation	109 ± 119 (n=8)	45 ± 93 (n=5)	**0.02**
Thinning	60 ± 42 (n=2)	170 ± 138 (n=8)	0.31
Eye			
RE	60%	46.15%	
LE	40%	53.84%	
Size of defect			
Horizontal (mm)	1.9 ± 0.7	1.4 ± 0.5	0.84
Vertical (mm)	1.9 ± 0.7	1.3 ± 0.4	0.81
Site of defect			
Central	50 % (n=5)	61.5 % (n=8)	0.47
Paracentral	33 % (n=3)	38.5 % (n=5)	0.65
Peripheral	20 % (n=2)	0 % (n=0)	0.0
Partial/full thickness			
Perforation	80% (n=8)	38.4% (n=5)	0.47
Thinning	20% (n=2)	61.5% (n=8)	0.15
Previous surgery			
Glue + BCL	40% (n=4)	23% (n=3)	0.44

RE= Right Eye; LE= Left Eye; BCL= Bandage Contact Lens

Tenon's patch graft in corneal perforation



Preoperative clinical presentation of a patient with 2*2 mm corneal perforation

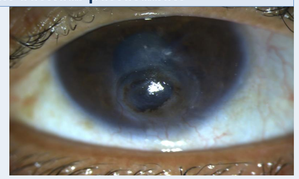


Clinical picture at 3 months with formed anterior chamber and vascularized corneal opacity

SMILE-derived lenticule in corneal perforation



Preoperative clinical presentation of a patient with paracentral corneal perforation of size 2*2 mm



Postoperative clinical picture showing clear cornea at the site of previous perforation

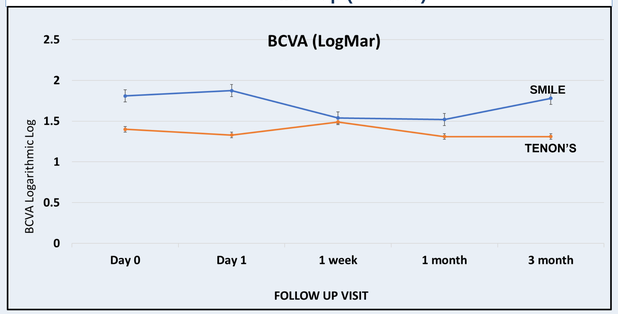
OUTCOMES AT 3 MONTHS FOLLOW UP

- Globe integrity was maintained, and anterior chamber was formed in 100% (n=10) cases in Tenon's patch graft and 100% (n=13) cases in SMILE-derived lenticule group at final follow up visit. However, 2 patients in SMILE-derived lenticule group required secondary intervention like corneal patch graft and Tenon's patch graft at one week and one month respectively.
- Best Spectacles Corrected Visual Acuity (BSCVA) and Best Contact Lens Visual Acuity (BCLVA) improved in both the groups from baseline; however BCVA at last follow up visit was significantly better in SMILE-derived lenticule group (P=0.03).
- SMILE-derived lenticule resulted in less astigmatism as compared to Tenon's patch graft (P=0.0001) used for sealing corneal perforations.
- Ocular surface analysis parameters were better in SMILE-derived lenticule group.

Parameter	Tenon's patch graft (Mean ± SD)	SMILE-derived lenticule (Mean ± SD)	P value
UCVA (LogMar)	1.76 ± 0.93	1.31 ± 0.89	0.23
BCVA (LogMar)	1.17 ± 1.15	0.38 ± 0.44	**0.03**
IOP (mm Hg)	14.1 ± 4.17	13 ± 1.52	0.38
CCT (µ)	637 ± 260	561 ± 384	0.62
ACD (mm)	2.41 ± 0.30	2.62 ± 0.26	0.09
TMH (mm)	0.32 ± 0.10	0.39 ± 0.13	0.21
LLT (nm)	69.12 ± 6.10	67.53 ± 5.74	0.87
MGL (%)	13.6 ± 6.56	16.7 ± 7.10	0.28
NIBUT (sec)	9 ± 4.5	13 ± 6.5	0.23
Induced Astigmatism (D)	10.25 ± 5.07	3.7 ± 1	**0.0001**

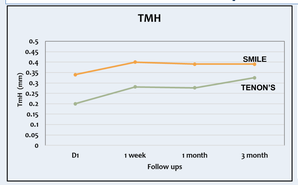
UCVA= Uncorrected Visual Acuity; BCVA= Best Corrected Visual Acuity; IOP= Intraocular Pressure; CCT= Central Corneal Thickness; ACD= Anterior Chamber Depth; TMH= Tear Meniscus Height; LLT= Lipid Layer Thickness; MGL= Meibomian Gland Loss; TBUT= Non-invasive Tear film Break Up Time

BCVA was significantly better in SMILE-derived lenticule group at 3 months follow up (P = 0.03)



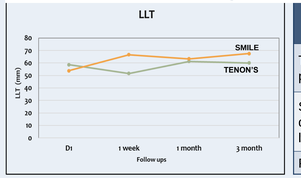
OCULAR SURFACE ANALYSIS

Mean TMH comparable in both groups at 3 months



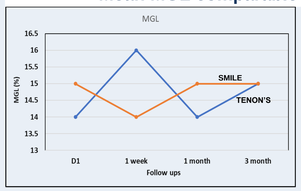
	Day 1	1 Week	1 Month	3 Months
Tenon's patch graft	0.2	0.3	0.3	0.3
SMILE-derived lenticule	0.3	0.4	0.4	0.4
P value	0.22	**0.01**	**0.03**	0.21

Mean LLT comparable in both groups at 3 months



	Day 1	1 Week	1 Month	3 Months
Tenon's patch graft	58.6	51.6	61.3	67.5
SMILE-derived lenticule	52.8	66.6	63.4	69
P value	0.41	0.13	0.86	0.87

Mean MGL comparable in both groups at 3 months



	Day 1	1 Week	1 Month	3 Months
Tenon's patch graft	14	16	14	15
SMILE-derived lenticule	15	14	15	15
P value	0.15	0.61	0.6	0.4

Conclusions and Recommendations

- Tenon's patch graft is effective in sealing small (<3mm) corneal perforations but corneal neovascularization and induced astigmatism are major problems.
- SMILE-derived lenticule using fibrin glue seems to serve as a safe, feasible, and inexpensive surgical option for the management of small corneal perforations/defects, wherever the facility is available. Visual and ocular surface outcomes were better in this group.

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Financial Interest: NIL