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ROYAL MAXIM PALACE KEMPINSKI, CAIRO

**Effect of topical losartan in a
case of corneal thermal injury**

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MSc, FRCS ed



Special thanks to

- **Dr Ahmed Rashad**, cornea consultant, Kasr El Einy Hospital, Cairo university
- **Dr Nermeen Bahgat**, pediatric ophthalmology consultant, Abu Elrish Hospital, Cairo university

Case Introduction

- A 4 year old male patient presented with his mother to the Abu el rish hospital pediatric ophthalmology clinic, with history of trauma to his left eye with a throwdown firework 2 weeks prior.
- Initially after the trauma before presenting to us he had a lid wound for which he underwent a lid repair and corneal epithelial defect and stromal edema for which he was prescribed
 - Moxiflocacin eye drops.
 - cyclopentolate HCL 1% eye drops.
 - sodium hyaluronate eye drops.

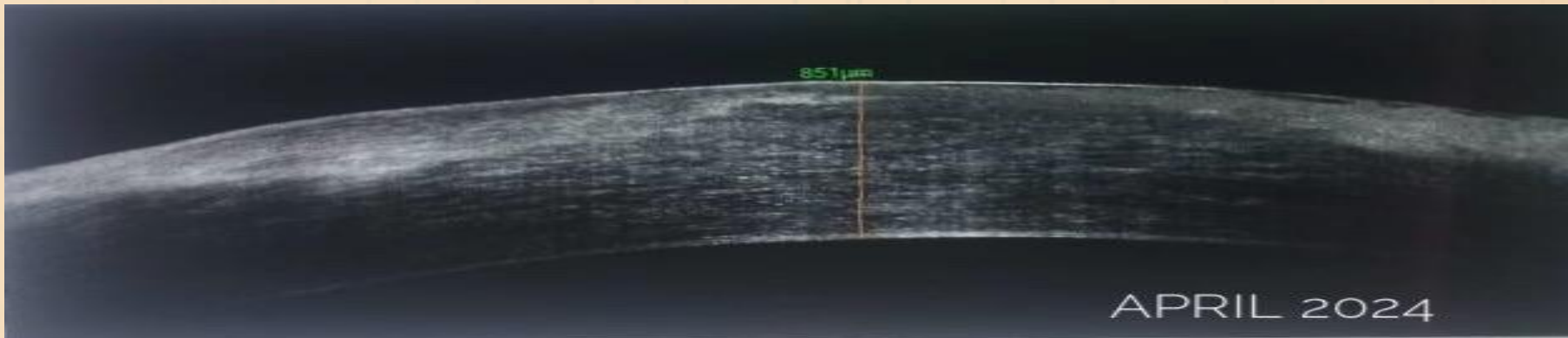
Initial examination of the injured eye

- Visual acuity : 1/60
- Slit lamp biomicroscopy examination:
 - Cornea:
 - diffuse stromal edema and epithelial irregularities.
 - No limbal stem cell deficiency.
 - -ve staining with fluorescein.
 - Fundus:
 - Hazy view.
 - B scan ocular U/S → clear lens / clear vitreous/ retina in place.
- IOP: Normal
- Ocular balance and motility: Normal



Initial Anterior segment OCT

- Corneal edema with central corneal thickness of 851 microns
- Superficial and mid-stromal opacities.



- To manage the corneal edema and the ongoing corneal inflammatory process the patient was started on
 - *difluprednate 0.05%* four times per day
 - *optic saline 5%* four times per day.

Follow Ups

- On subsequent follow ups visual acuity kept on improving and corneal edema gradually resolved
- Until visual acuity was stable to 6/60 for 2 consecutive months.
- AS-OCT demonstrated resolution of the edema accompanied by a thin film of subepithelial fibrosis (Central corneal thickness of 450 μm & areas of dense subepithelial fibrosis)



Management plan

- Continue on steroids for a few more months
- Surgical intervention
- Start losartan eye drops, which is an emerging off-label treatment.

What is losartan eye drops

Losartan is an angiotensin-converting enzyme (ACE) II receptor antagonist, one of the most commonly used oral medications for hypertension.

Studies led by Dr Steven E. Wilson for almost 3 decades have proven the efficacy of topical losartan for **corneal scarring and fibrosis**

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> *Cornea*. 2024 Oct 23;44(5):637-645. doi: 10.1097/ICO.00000000000003725.

Topical Losartan Dosage Response and Corneal Toxicity at Higher Concentrations

Barbara Araujo Lima Dutra ^{1, 2}, Valeria Villabona Martinez ¹, Marcony R Santhiago ², Steven E Wilson ¹

Affiliations + expand

PMID: 39441953 DOI: 10.1097/ICO.00000000000003725

Review > *J Ocul Pharmacol Ther*. 2023 Apr;39(3):191-206. doi: 10.1089/jop.2022.0174. Epub 2023 Mar 6.

Topical Losartan: Practical Guidance for Clinical Trials in the Prevention and Treatment of Corneal Scarring Fibrosis and Other Eye Diseases and Disorders

Steven E Wilson ¹

Affiliations + expand

PMID: 36877777 PMCID: PMC10079262 DOI: 10.1089/jop.2022.0174

Review > *Exp Eye Res*. 2024 May;242:109884. doi: 10.1016/j.exer.2024.109884. Epub 2024 Apr 1.

Two-phase mechanism in the treatment of corneal stromal fibrosis with topical losartan

Steven E Wilson ¹

Affiliations + expand

PMID: 38570181 DOI: 10.1016/j.exer.2024.109884

> *Transl Vis Sci Technol*. 2022 Jul 8;11(7):9. doi: 10.1167/tvst.11.7.9.

Topical Losartan and Corticosteroid Additively Inhibit Corneal Stromal Myofibroblast Generation and Scarring Fibrosis After Alkali Burn Injury

Lycia Pedral Sampaio ^{1, 2}, Guilherme S L Hilgert ¹, Thomas Michael Shiju ¹, Marcony R Santhiago ², Steven E Wilson ¹

Affiliations + expand

PMID: 35819289 PMCID: PMC9287619 DOI: 10.1167/tvst.11.7.9

Mechanism of action

THE MOLECULAR BLOCKADE



The Role of TGF-β

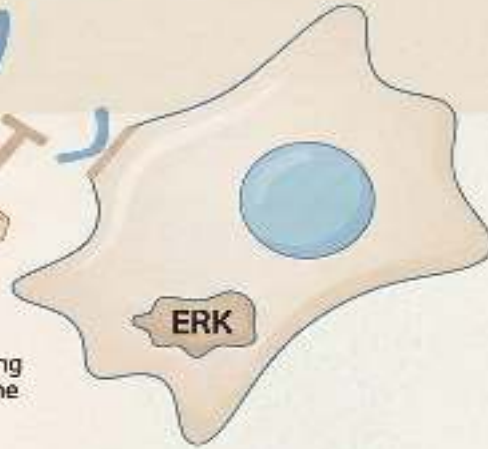
Transforming growth factor beta (TGF-β) is the primary driver of corneal myofibroblast development.

Losartan



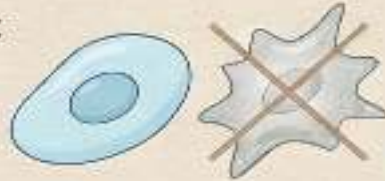
Inhibiting the ERK Pathway

Losartan inhibits TGF-β signaling by blocking the activation of the signal molecule ERK.



Blocking Myofibroblast Transformation

Interrupting this signal prevents normal cells from turning into the cells that cause scars.



CELLULAR IMPACT & RESTORATION

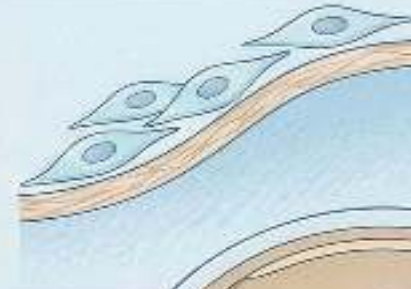
Inducing Myofibroblast Apoptosis

Without constant TGF-β signaling, existing myofibroblasts undergo programmed cell death.



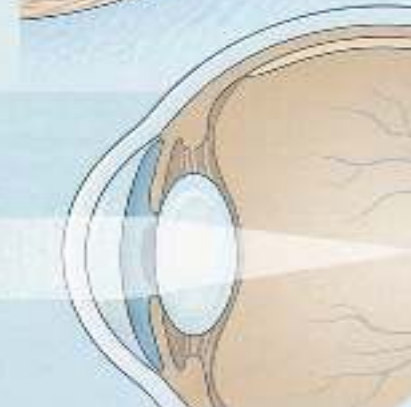
Regenerating the Basement Membrane

Normal corneal fibroblasts reoccupy the tissue to restore the epithelial basement membrane.



Restoring Visual Clarity

As disorganized collagen is removed, the cornea regains transparency and improves visual acuity.



Described as

The 'Two-Phase' Healing Process

Phase 1: Clearance

Weeks to 1 Month



Rapid clearance of myofibroblasts.
Opacity decreases.

Phase 2: Remodelling

Months to Years



Regeneration of Epithelial Basement
Membrane (EBM) and collagen reorganisation.

CRITICAL: Myofibroblasts must be suppressed until the EBM is fully functional to prevent recurrence. Treatment must continue well beyond initial visual clearance.

Preparation and dosing

The Formulation:

- Source:
Pure Losartan
Potassium powder.
- Vehicle:
Preservative-free
Balanced Salt
Solution (BSS).



Do NOT crush oral tablets as it contain 75% excipients which precipitate in solution and cause toxicity.

Concentration:

0.8 mg/mL

Standard for eyes with intact epithelium.
Higher concentrations were proven toxic.

0.2 mg/mL

For cases with epithelial defects, after epithelial healing dose can be increased to 0.8 mg/mL.



Dosing: 6 times daily

Duration: 3-6 months.

- Continue treatment until scar clears + additional months for EBM stability.

Monitoring Tools:

- Monthly Slit Lamp examination.
- AS-OCT (Densitometry): Track sub-clinical thinning .
- Visual Acuity

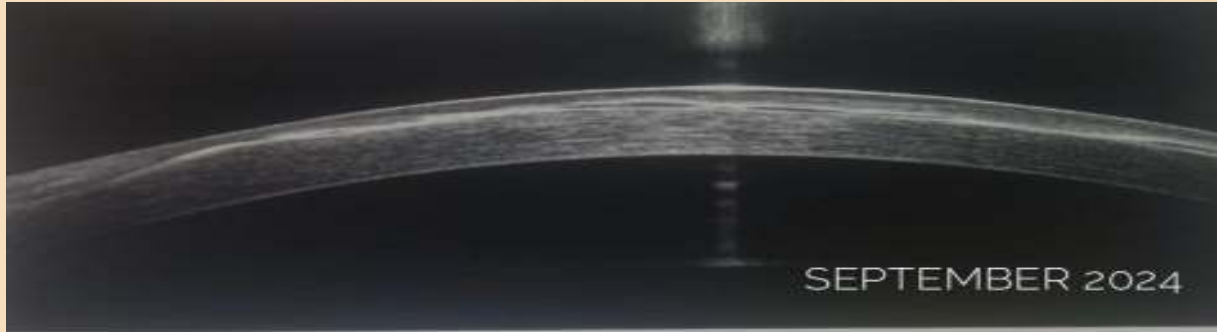
For our case

- *In our case*

- There was no epithelial defect so we started with the 0.8 mg/ml concentration.
- Given that he is in the pediatric age group we decided to start with four times frequency only.

Follow ups

One month
follow up



Visual acuity → 6/60

2 months
Follow up



Visual acuity → 6/24

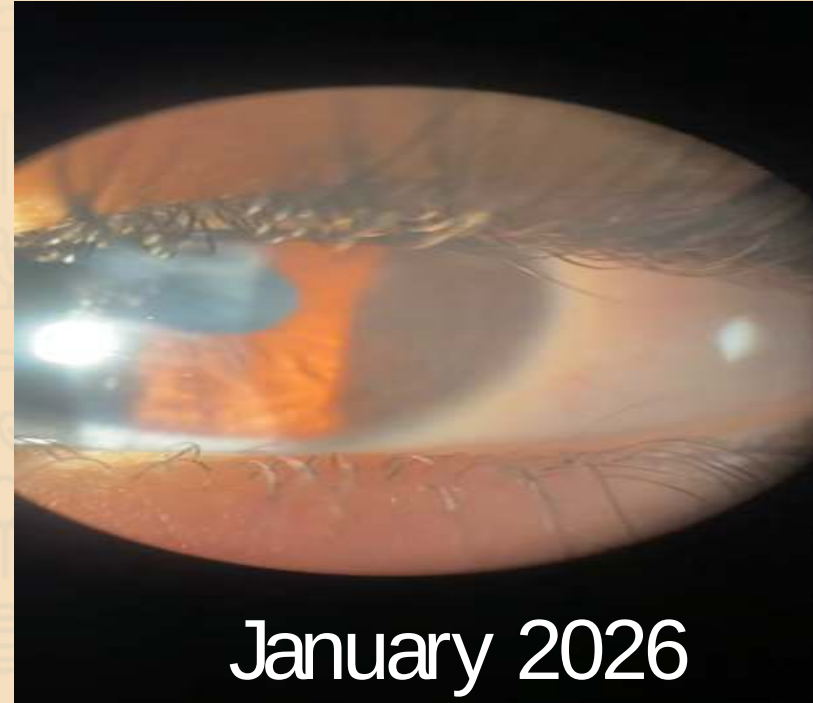
4 months
Follow up



Visual acuity → 6/24

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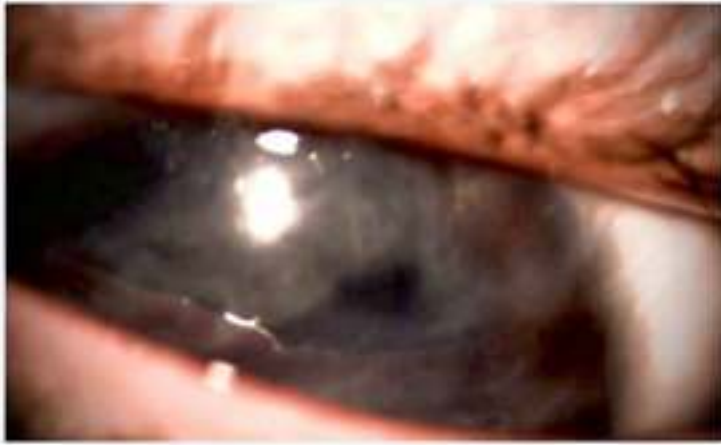
Follow ups



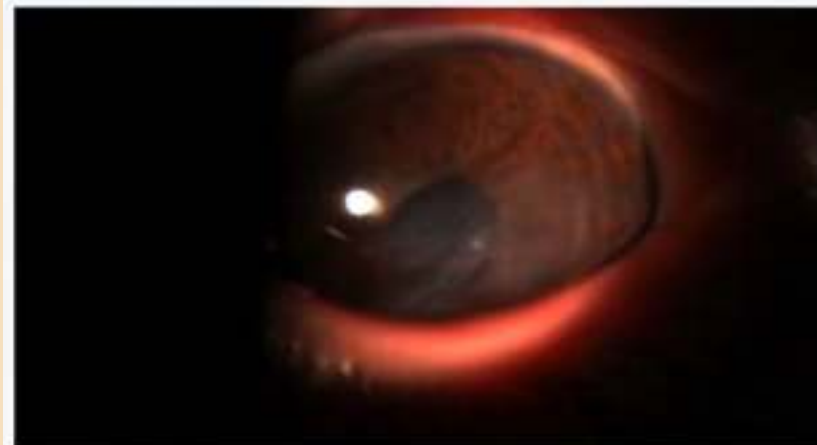
January 2026:
Visual Acuity 6/18
stable

At later follow ups there was no improvement in visual acuity or changes on AS-OCT or corneal clarity so topical losartan was stopped in 05/2025 (9th month on losartan). He remained stable with no regression till 01/2026.

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April 2024 (Baseline) - Vision: 1/60



January 2025 (Outcome) - Vision: 6/18

Conclusion

- Topical Losartan can be effective in subepithelial corneal fibrosis after traumatic injuries.
- Further studies are needed to provide more insights and data on its effects on corneal opacities of different depths and etiologies across various age groups.

Thank you

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