Scleral lens as reservoir of Riboflavin during soaking phase before corneal crosslinking

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Financial disclosure

Local representative of scleral lens manufacturer:

LCS, AKS scleral lens

Introduction

- Transepithelial crosslinking (TE-CXL) offers quick healing, less pain and haze.
- The epithelium integrity can reduce the penetration and the concentration of Riboflavine within the corneal stroma.

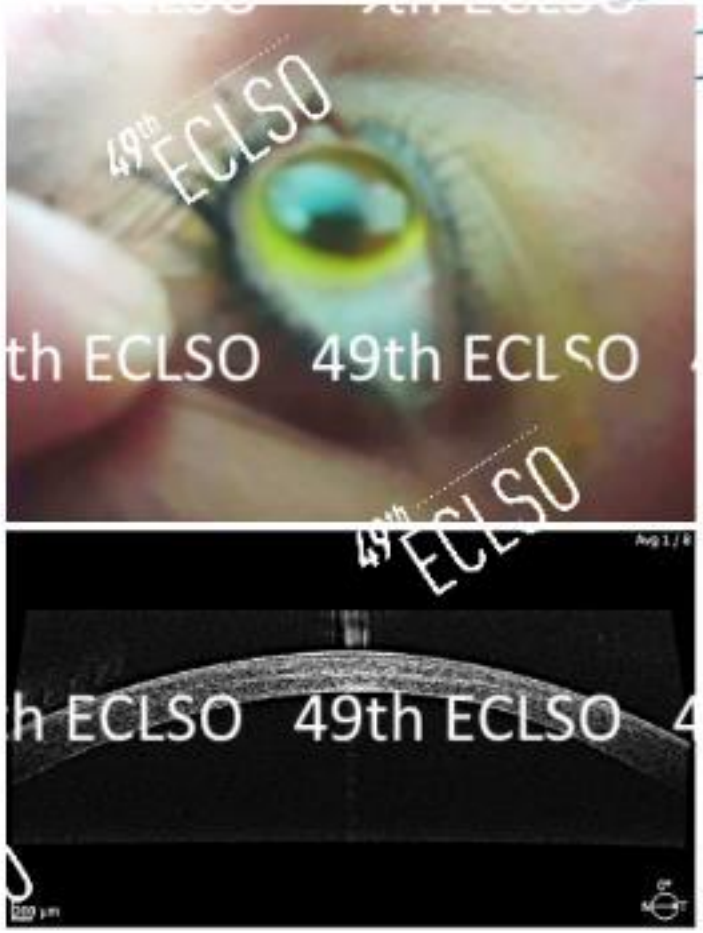
- We propose the use of scieral lens filled with TE Riboflavin and fitted on the eye to soak continusely the cornea before CXL.

Aim

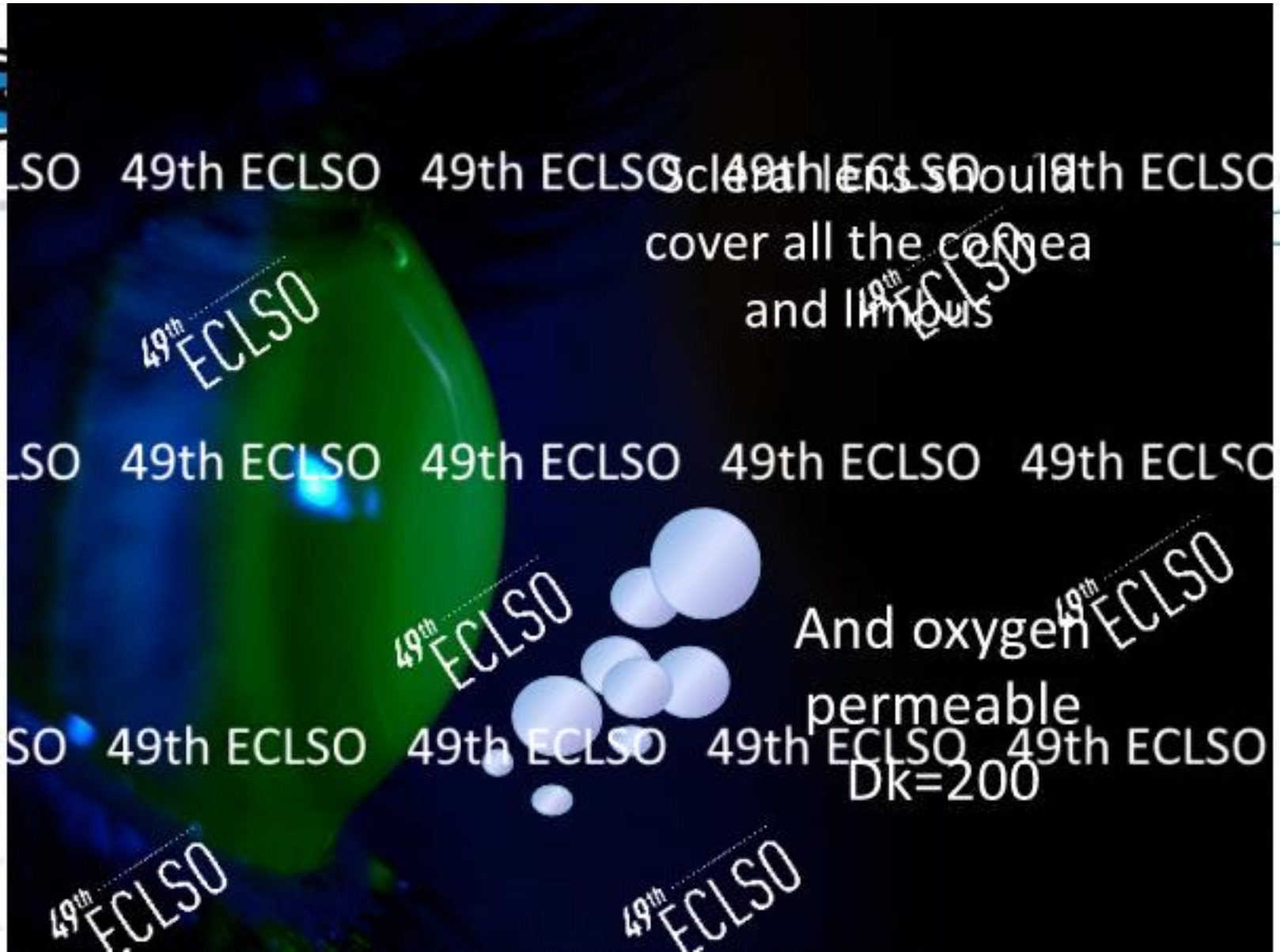
To evaluate the efficacy and the safety of corneal soaking using ***high vault scleral lens*** filled with ***transepithelial Riboflavin*** before collagen corneal crosslinking

Materials and Method

- Retrospective study
- 70 eyes of 50 patients with progressive corneal ectasia who underwent accelerated transepithelial CXL (10 mW/cm^2 for 9 minutes) after 30 mn of wearing ***(in dim conditions)*** then removing appropriate scleral lens filled with 0.5 cc of Transepithelial Riboflavin during corneal soaking.
- Sub 400 protocol or CL assisted TE-CXL were performed without removing the epithelium when the thinnest corneal pachymetry is less than 400 µm.
- Corneal OCT at 1 month: Demarcation line depth.
- Belin ABCD progression Display every 6 months.



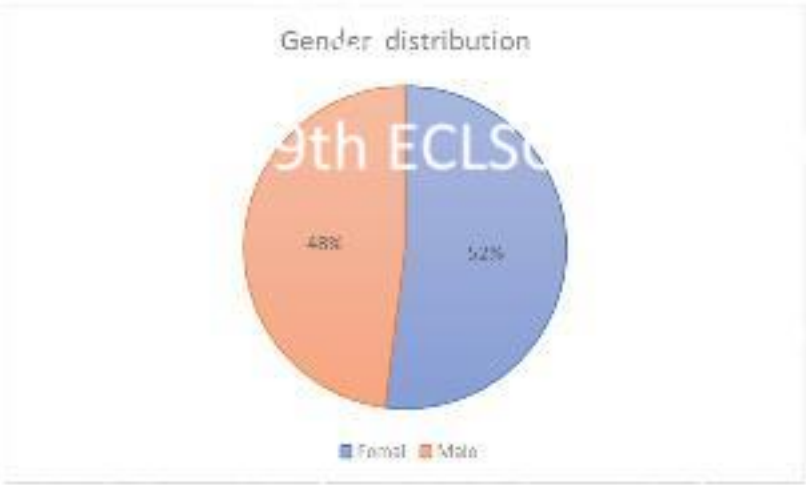
- Vega CBM X-Linker, CSO*: 8 mm diameter except in PMD.
- AKS scleral lens from LCS*: DK=200/ D= 15 mm/ V= ACD+corneal pachy+400 µm
- Peschke® TE
- Revo nx, Optopol*
- Oculus, Pentacam*

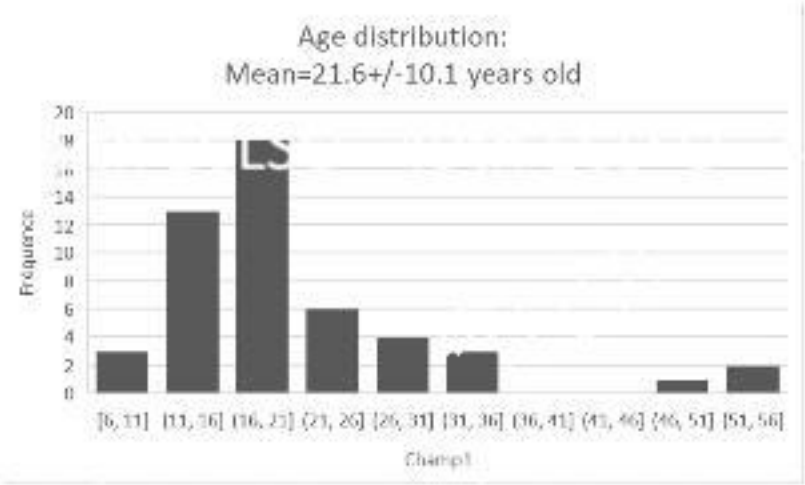

LSO 49th ECLSO 49th ECLSO 49th ECLSO 49th ECLSO
Scleral lens should
cover all the cornea
and limbus
LSO 49th ECLSO 49th ECLSO 49th ECLSO 49th ECLSO
And oxygen
permeable
Dk=200
SO 49th ECLSO 49th ECLSO 49th ECLSO 49th ECLSO

Materials and Method

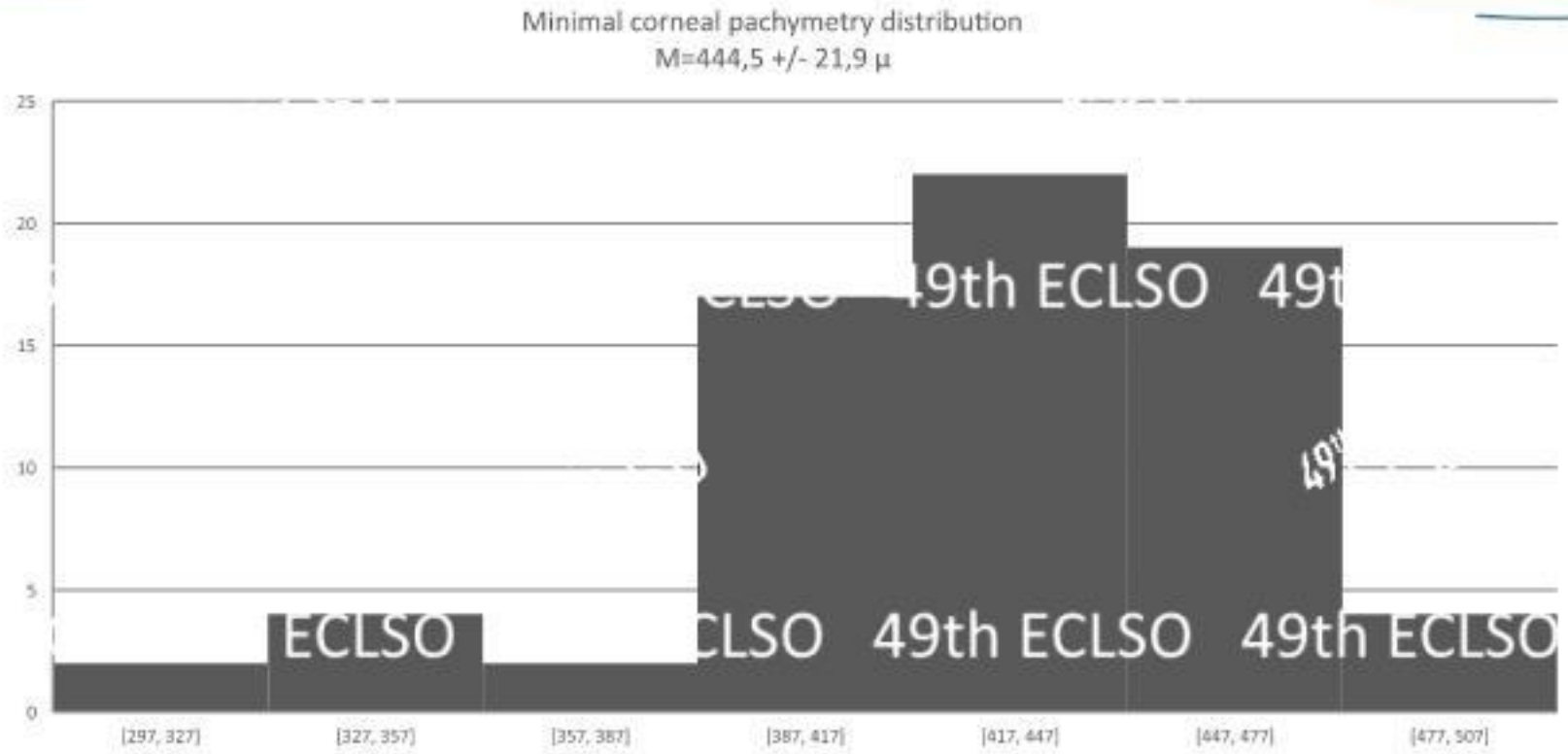
- After 30 mn of corneal soaking with this technic, the scleral lens is removed.
- Riboflavin diffuse to all the cornea and the anterior chamber when checked at slit lamp examination.
- CXL is than performed without risk to the endothelium and to the deeper eye structure, aiming max of efficacity.

Results


Gender distribution
48%
52%
Femal
Male


Age distribution:
Mean=21.6+/-10.1 years old
Frequence
[6, 11]
[11, 16]
[16, 21]
[21, 26]
[26, 31]
[31, 36]
[36, 41]
[41, 46]
[46, 51]
[51, 56]
Champ1

Results

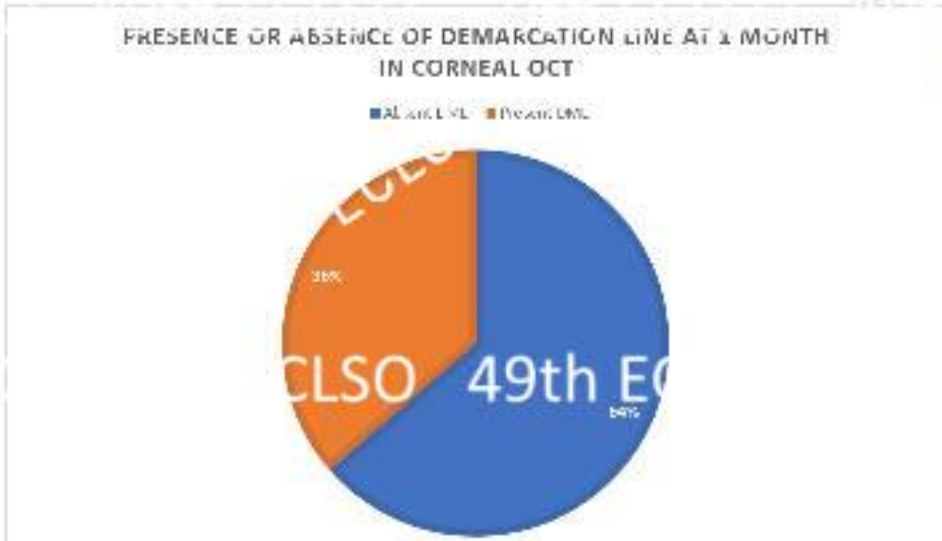

Minimal corneal pachymetry distribution
M=444,5 +/- 21,9 µ
25
20
15
10
5
0
[297, 327]
[327, 357]
[357, 387]
[387, 417]
[417, 447]
[447, 477]
[477, 507]
ECLSO
49th ECLSO
49th ECLSO
49th ECLSO

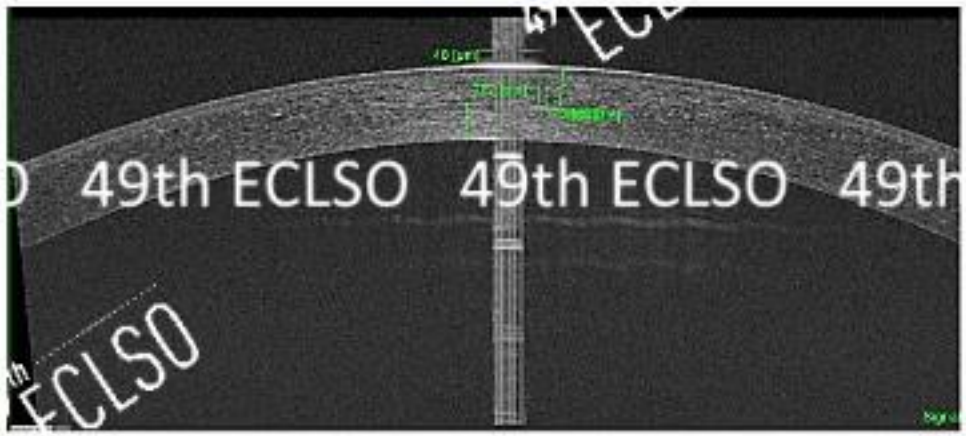
Results

Corneal OCT imaging at 1 month, showed a demarcation line (DML) in only 36% of cases, at:

- 299 +/- 55 µm of depth.
- 146 +/-27 µm above the endothelium

The demarcation line was not as clear as in Epi-off procedure.

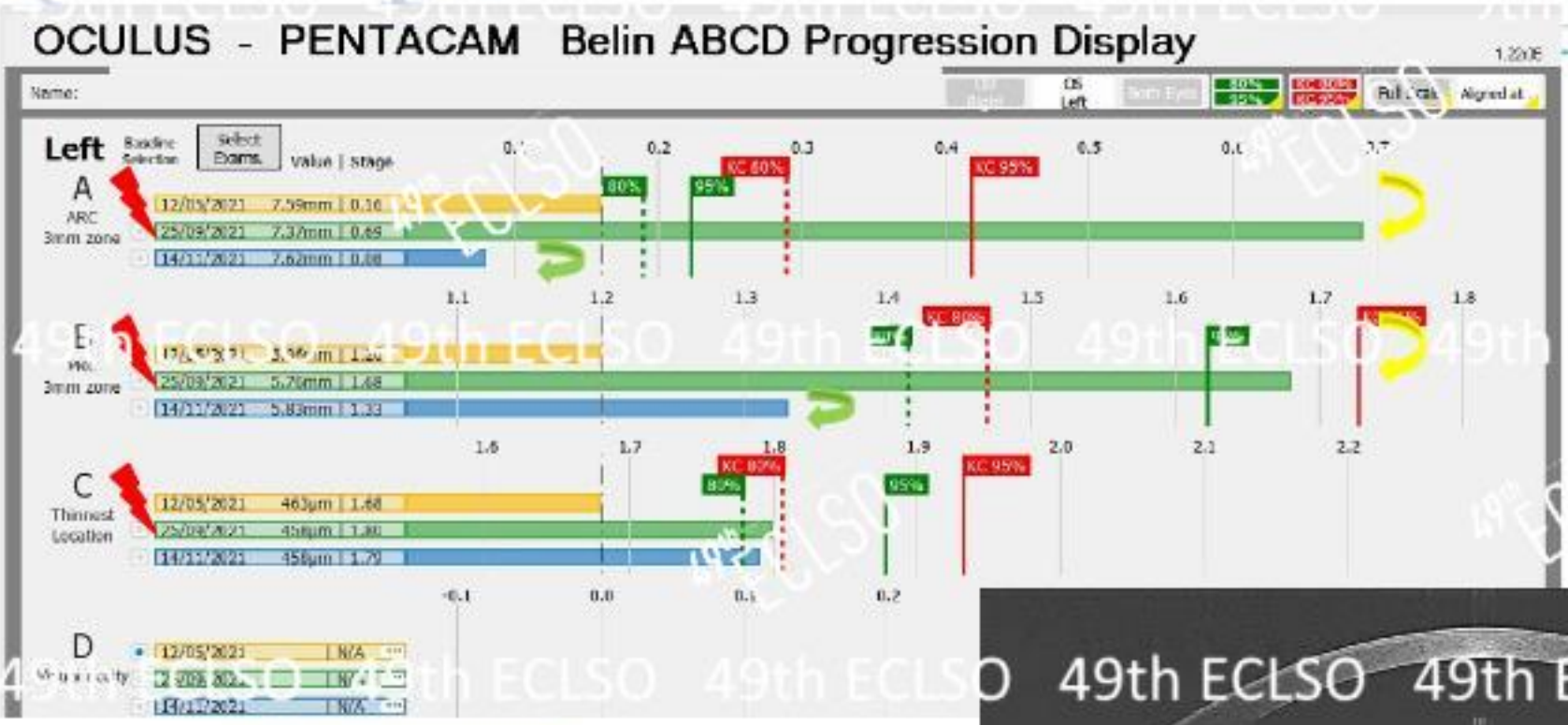


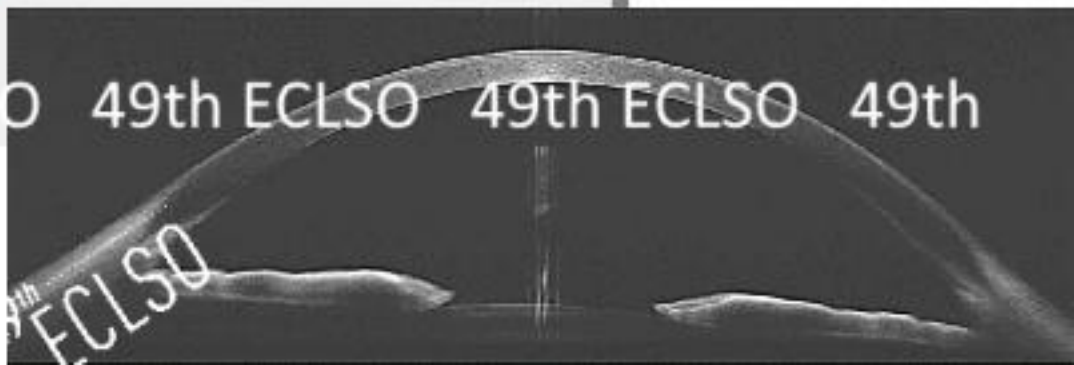


Results

- No pain.
- No epithelium issues.
- No significant haze.
- No ectatic progession except in one case during the follow up
- (17,2 +/- 2,5 months) using ABCD Belin progression display.

Results: Ex 1



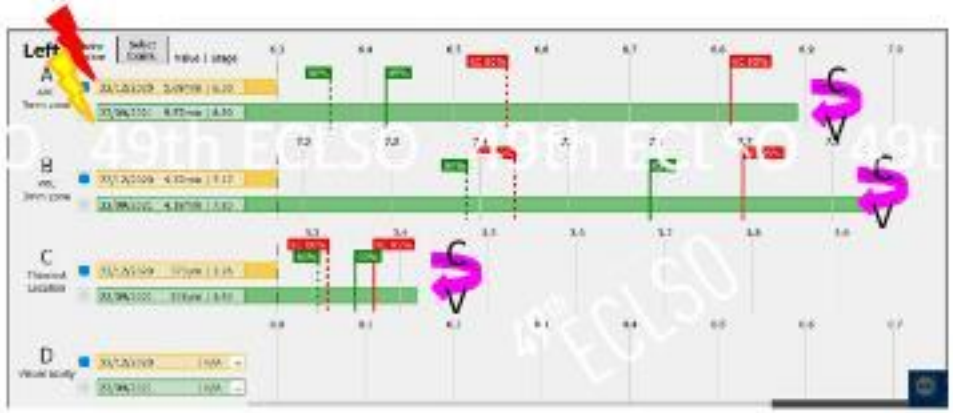


Male, 21 YO: Significant improvement at 1 month of the anterior and posterior curvature after TE-CXL using scleral lens for Riboflavin corneal soaking in a case of documented KK progression but the demarcation line is not visible at 1 month.

Results: Ex 2: « The only failure case »

OD: No progession after TE-CXL assisted with SCL.

OS: Progression after TE-CXL assisted with SCL: another TE-CXL sub 400 done.



Girl 13 YO: Thin cornea 378 µm OD and 373 µm OS

soaking with scleral lens for 30 mn then TE-CXL assisted with soft CL

OD: Stabilisation, but OS: Progression

Another TE-CXL sub 400 protocol OS done.

Discussion

- Soares, R.T., Novo, N.F. and França, W.M. (2017) Evaluation of a Modified Scleral Contact Lens as a Riboflavin Delivery Device for Corneal Collagen Crosslinking. Open Journal of Ophthalmology, 7, 273-280.

- Natalia Paulina Quiroz-Casian; Omar Santana-Cruz; Alejandro Navas; Arturo J Ramirez-Miranda; Enrique O Graue-Hernandez. Optimizing time in crosslinking: scleral lens based riboflavin impregnation. A pilot study. Investigative Ophthalmology & Visual Science July 2019, Vol.60, 337. doi:

- Dackowski EK, Logroño JB, Rivera C, Taylor N, Lopath PD, Chuck RS. Transepithelial corneal crosslinking using a novel ultraviolet light-emitting contact lens device: A pilot study. Transl Vis Sci Technol. 2021;10(5):5,

Discussion

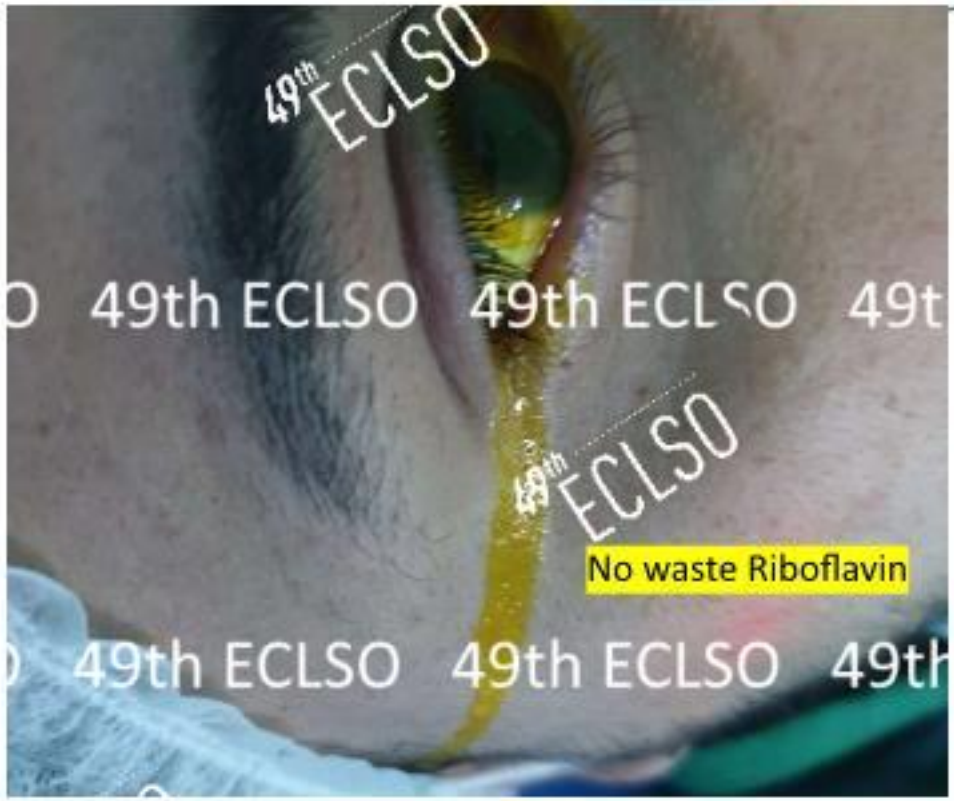
	Soares, & al. 2017	Quiroz-Casian, & al. 2019	Dackowski, & al. 2021	Mekki, & al. 2021
N (eyes)	8	20	10-1=9	70
Mean age	17	24,1	> 18 ?	21.6
Scleral lens Dk	0: disposable	?	?	200: reusable
Mean thinest corneal thikness	>420 µm ?	468 µm	445	444.5 µm
Epithelium	Off	Off	On	On
Soaking duration	30 mn	10 mn	30 mn	20 mn
UV therapy	3 mW/cm2 for 30 mn	30 mW/cm2 for 4 mn	4 mW/cm2 for 30 mn	10 mW/cm^2 for 9 mn
Total procedure time	60 mn	14 mn	60 mn	39 mn
DML depth at 1 month	Not done	203,8 µm	322 µm	299 µm
Mean Follow up	11,6 months	?	6 months	17,2 months

Discussion

We started O2 supplementation since January 2022 to have better DML…?

Conclusion

Using scleral lens to deliver B12 vitamin is a simple, effective, safe, economic, 49th ECLSO 49th ECLSO way to soak continusely the cornea with transepithelial Riboflavin before corneal collagen crosslinking in ectatic cornea.



Thank you !

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