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"Sclero-DALK": New approach for treatment of superficial corneal leukoma

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ABSTRACT

Purpose: Present a new technique to perform a deep anterior lamellar keratoplasty (DALK) that could be an alternative to the "Big Bubble" or the Melles technique.

Observations: The case concerns a 48 years old man who presents superficial corneal leukoma in the left eye secondary to ocular trauma 14 years ago. Sclero-DALK is performed under general anesthesia obtaining an excellent visual and refractive result.

Conclusions and Importance: Sclero-DALK is a novelty in surgical treatment of corneal surface opacities. It offers the same advantages than conventional DALK since it is also a non-penetrating extraocular technique. Better final visual acuities are expected with this technique in comparision with PK and the conventional DALK because less residual stroma can be remained since we acces directly to the predescemetic space.

1. Introduction

Corneal scarring is a frequent cause of visual loss.[1,2] It can be caused by different factors, such us dystrophies, infections, and ocular trauma.

Traditionally, penetrating keratoplasty (PK) has been the procedure of choice in such cases of severe corneal scarring.[3,4] However, in pathologies where there is no endothelial involvement, deep anterior lamellar keratoplasty (DALK) may be a better alternative.[5,6]

Postoperative complications including rejection and intraocular pressure elevation are more frequent in PK.[7] DALK offers an alternative procedure that may lessen those risks because the recipient Descemet's membrane (DM) and endothelium are preserved.[8] However, intraoperative perforation of the DM is a significant complication. At the same time, DALK carries the potential danger of decreased visual acuity due to possible opacification at the interface layers.[9–11]

We report a new approach for treatment of corneal leukoma which can decrease the risk of DM perforation and may report better postoperative visual acuity, since less residual estroma is remained.

1.1. Case presentation

The case concerns a 48 years old man referred to the Corneal Diseases Department for superficial corneal leukoma in the left eye (LE) secondary to ocular trauma 14 years ago.

The initial clinical findings showed an uncorrected visual acuity (UCVA) of 1 in the right eye (RE) and 0,3 in the LE, with previous refraction of +0.75 (RE) and +2.50–2 x 10° (LE). In the slit lamp evaluation we objectify a central corneal leukoma with anterior stromal opacities and epithelial edema in temporal area, in his LE(Fig. 1). The RE showed no alterations.

Intraocular pressure and fundus were normal in both eyes.

The patient complains of low vision in his LE. A deep anterior lamellar keratoplasty with a scleral approach (Sclero-Dalk) is proposed and he accepted.

Corneal thickness as measured by anterior segment optic coherence tomography (OCT) was 530 μm. Non-contact specular microscopy showed normal endothelial mosaic pattern and a cell density of 2473.4 cells/mm^2

Sclero-DALK is performed under general anesthesia. It consists of the creation of a deep sclerotomy through which we directly approach the predescemetic space. Using a Mermoud spatula, we penetrate this space and introduce a cannula with viscoelastic, achieving dissection of the DM. Subsequently the same process is continued as for the realization of a conventional DALK. As a postoperative treatment, we used dexamethasone and tobramycin drops every 4 hours.

The day after surgery, the corneal graft was transparent with a small air bubble in the anterior chamber; UCVA was 0.2 (Fig. 2).

One week after surgery VA had improved to 0.3. Slit-lamp biomicroscopy showed diffuse edema in the temporal area of the cornea (Fig. 3). The anterior segment OCT revealed a small detachment of DM in the temporal periincisional zone (Fig. 4), so it was decided to introduce an air bubble in the anterior chamber, through a lower temporal paracentesis, obtaining the repositioning of the membrane. The patient was left in absolute rest in supine position for 2 hours and then,

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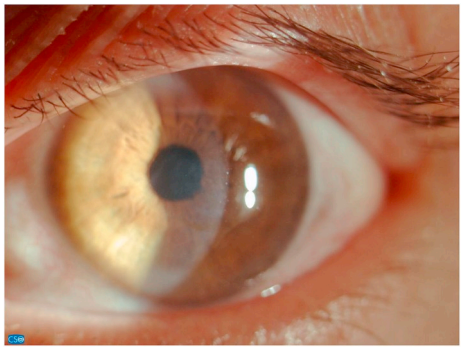

Fig. 1. Slit-lamp biomicroscopy showing superficial corneal leukoma before surgery.

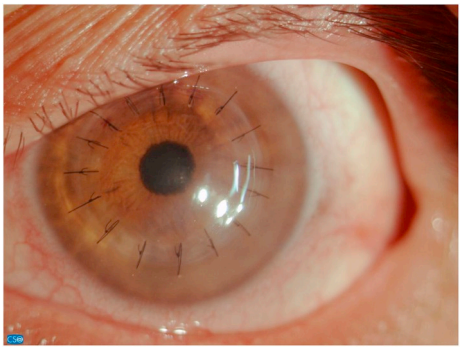

Fig. 3. One week after Sclero-DALK surgery.Slit-lamp biomicroscopy showing diffuse edema in the temporal area of the cornea.

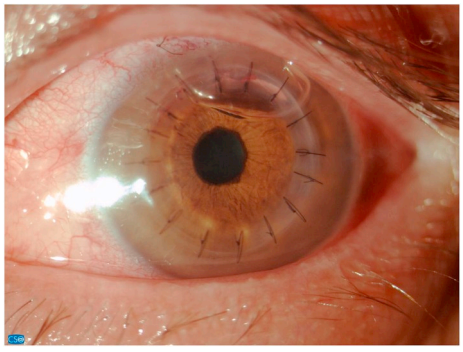

Fig. 2. 24 hours after Sclero-DALK surgery.

half of the air was removed. (Figs. 5 and 6).

At 4 weeks postoperatively, corneal transparency was recovered. (Fig. 7). UCVA was 0.4. The treatment is modified to fluorometolone eye drops every 6 hours.

Three months after surgery, UCVA was 0.5. Keratometry in LE was 48.12/44.37 × 183°. Suture removal was initiated (Fig. 8).

At present, the patient does not refer any symptoms. His best corrected visual acuity (−1.50–4.50 × 50°) is 0.8 and he does not need any treatment. (Fig. 9).

2. Discussion

The Sclero-Dalk technique come up in order to find an alternative to the “Big Bubble” technique for deep lamellar corneal transplants realization. It is performed under general anesthesia. We begin the surgery by performing a limbic peritomy and a 4 × 4mm deep sclerotomy wich allows us to get to the schlemm canal (Fig. 10).

A paracentesis is performed and the aqueous humor of the anterior chamber is evacuated. Once we visualize Schlemm canal, we are certain that we are in predescemetic space level which is further dissected by penetrating into the cornea with the Mermoud spatula. Sodium hyaluronate can be injected through a flat cannula deep into the predescemetic space. Injection of the viscoelastic substance between the deep stroma and Descemet's membrane facilitates the separation of the layers (Figs. 11 and 12).

The anterior corneal surface is cut with a suction trephine set and is completed with Vannas scissors. (Figs. 13 and 14). The stromal lamella is removed and the DM is exposed.

The DM is irrigated until the viscoelastic is completely removed (Fig. 17). A descemet stripped donor corneal button (0.25 mm greater than the size of the corneal receptor trepanation performed) from a fresh cornea, is prepared by the surgeon (Figs. 15 and 16), and subsequently placed at the predescemet's level of the recipient one and sutured to the host cornea by 16-interrupted 10–0 monofilament nylon sutures. (Fig. 18). Sclera and conjunctiva are sutured and cefuroxime intracamerular (0,1ml) is injected at the end of surgery.

The main advantage of this new surgical technique is that it allows us to approach the predescemetic space by direct vision from the Schlemm canal. The conventional DALK or the “Big Bubble” technique use a reflex produced by the air, which is not easily visible and therefore it is more difficult to confirm that there is no residual stromal.

The main disadvantage is that future surgeries of glaucoma may be compromised.

Some experience in glaucoma surgery, especially in the performance of deep non perforating sclerectomy is required. The dissection of DM is not difficult, except in cases with adhesions, as in previous hydrops or deep leukomas.

3. Conclusions

Sclero-DALK is a novelty in surgical treatment of corneal surface opacities. It offers the same advantages than conventional DALK since it is also a non-penetrating extraocular technique. Better final visual acuities are expected with this technique in comparision with PK and the conventional DALK because less residual stroma can be remained since we acces directly to the predescemetic space.

More cases are required in order to standardize the technique and clearly establish its indications and limitations, since there are no publications on this new surgical approach.

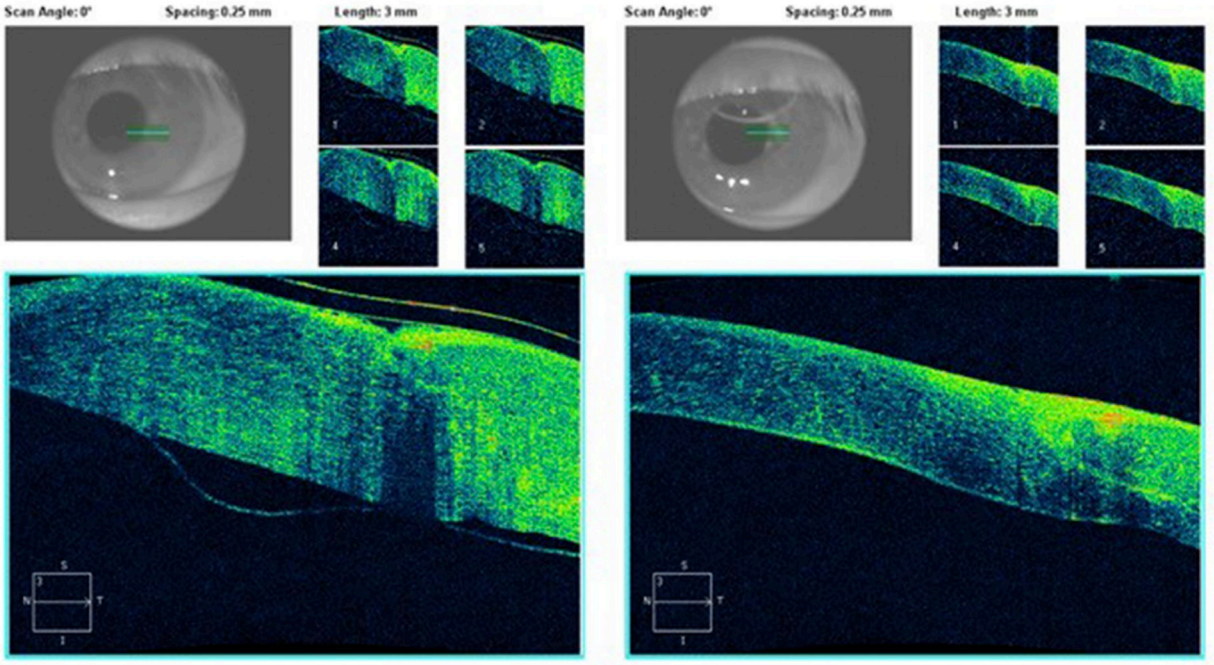

Fig. 4. Anterior segment OCT of the left cornea. Descemet membrane detachment in the periincisional zone (left image) and Descemet membrane reposition after air injection (right image).

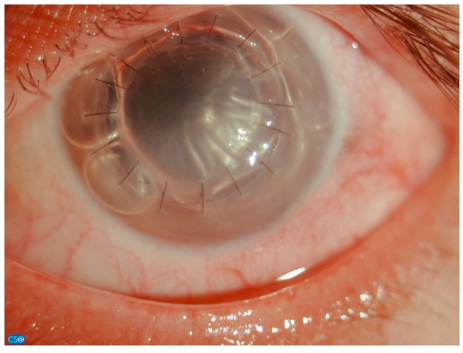

Fig. 5. Immediately after air injection.

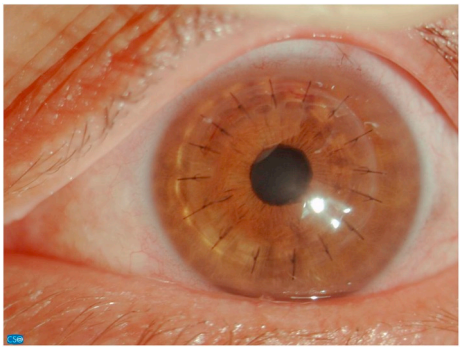

Fig. 7. Transparent corneal graft, one month after surgery.

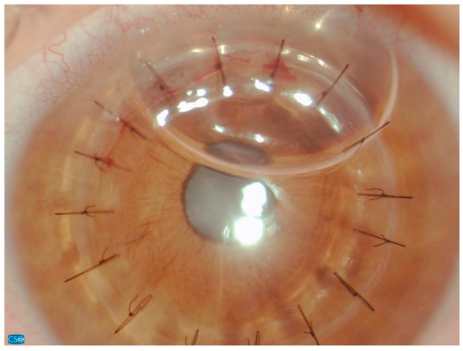

Fig. 6. Two hours after air injection.

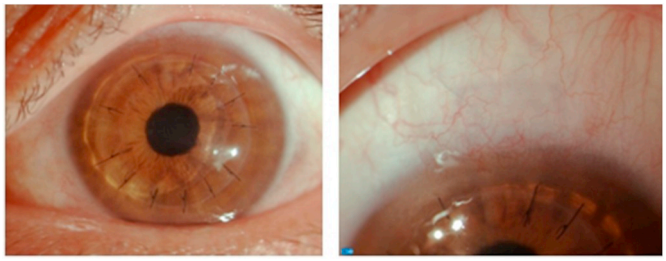

Fig. 8. Transparent corneal graft, 3 months after Sclero-DALK surgery. The image on the right shows the scleral approach area.

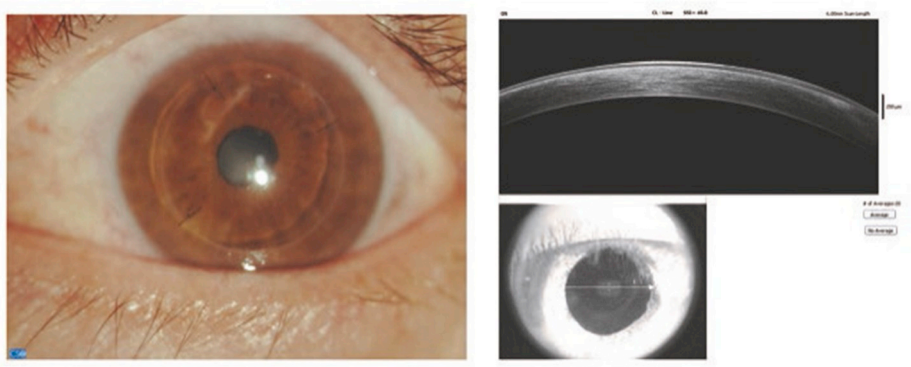

Fig. 9. Slit lamp biomicroscopy and anterior segment OCT at 8 months after Sclero-DALK surgery).

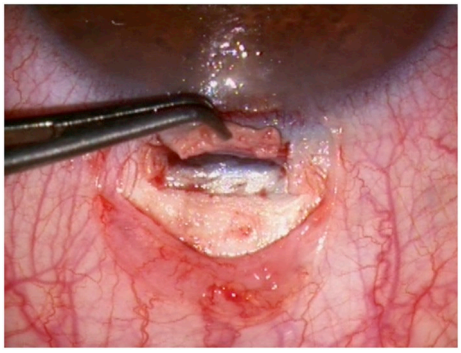

Fig. 10. Creation of the deep sclerotomy.

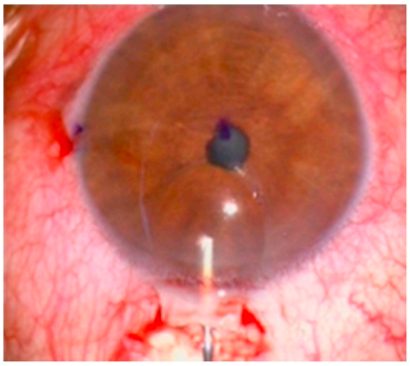

Fig. 11. Viscodissection through the sclerotomy approach.

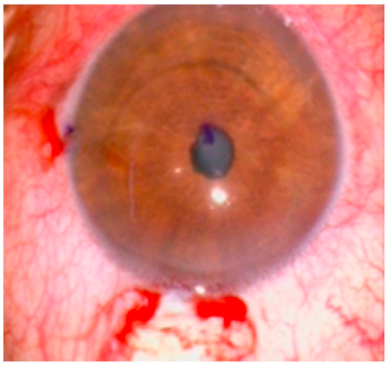

Fig. 12. Viscodissection through the sclerotomy approach.

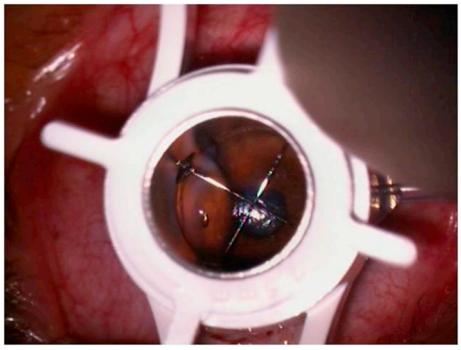

Fig. 13. Cutting the anterior corneal surface.

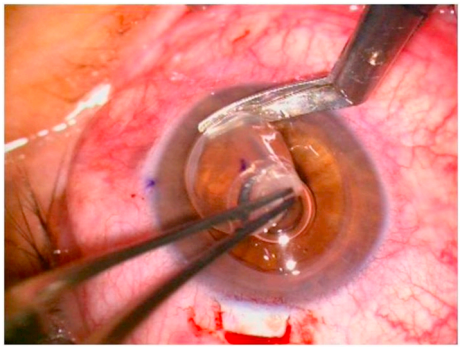

Fig. 14. Cutting the anterior corneal surface.

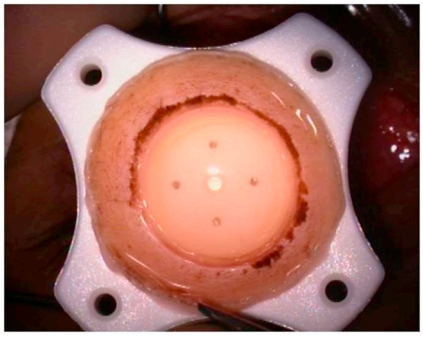

Fig. 15. Donor scleral corneal ring on the Hessburg-Barron Punch block (left image).

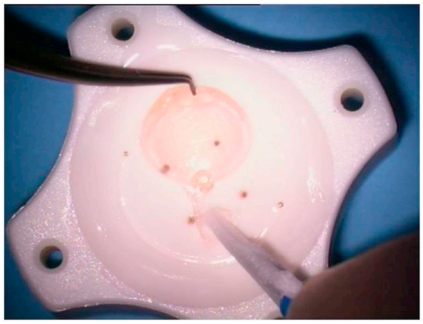

Fig. 16. Endothelium is removed with its Descemet Membrane by tweezers (right image).

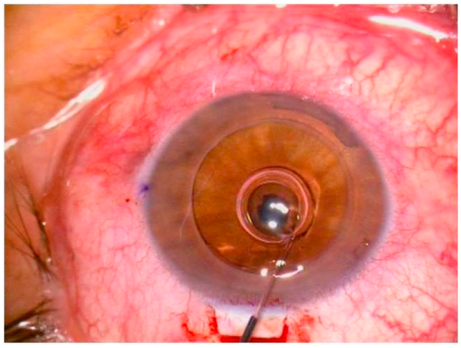

Fig. 17. Irrigation to remove viscoelastic.

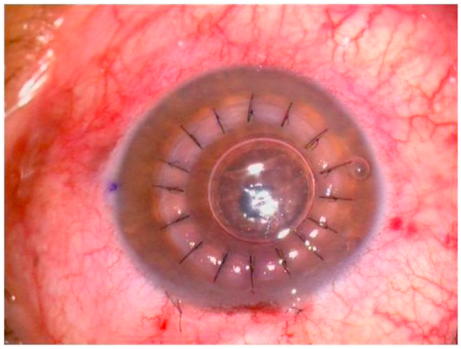

Fig. 18. End of the surgery

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Patient consent

Written consent to publish this case has not been obtained. This report does not contain any personal identifying information.

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Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

Declaration of competing interest

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