Intrastromal Halo® Inlay Implantation for Corneal Melt and Perforation – 3 Cases
Real Life experience

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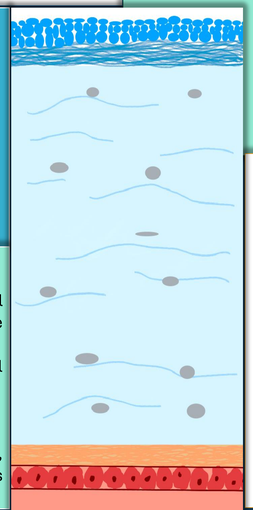
Introduction:

During corneal melt (keratolysis) there is progressive stromal degradation which can lead to corneal thinning and perforation. This can have a disastrous outcomes for patients and needs to be managed promptly to preserve corneal integrity and maintain vision.
The management of corneal perforations requires an individualised approach, based on the size, location and aetiology.[1,2] In cases of smaller perforations the use of cyanoacrylate adhesive or amniotic membrane transplantation may be preferred.[1]
For larger perforations tectonic overlay-based techniques have traditionally been favoured with penetrating keratoplasty being considered the gold standard.[1,3] However, this presents the risk of rejection and infection.[3] Additionally, it can be difficult to acquire tissue in the current global shortage.[4]
Halo® inlays are a form of sterile cornea providing a viable alternative. They provide sterility and a long shelf life of around two years and can be stored at room temperature.
It is interesting to also note that implantation into the intrastromal space is not new and is currently used for refractive purposes to manage presbyopia.[5]

Here we describe three cases using a novel technique of intrastromal implantation of Halo® Inlay to treat corneal melt and perforation.

Methods:

- Retrospective review of cases performed at Colchester Hospital between July and November 2024.
- Inlay made to size based on the size of the defect.
- Stromal pocket created and inlay inserted
- Secured using 10.0 nylon



Case 1:

A 65-year-old female presented with neurotrophic corneal melt, with a history of diabetic eye disease and multiple previous retinal detachment surgeries.

- Eye was phthisical, hypotonus and lacked visual potential.
- Around 90% of the corneal thickness had been lost.

➢ Intrastromal insertion of Halo inlay

✓ One month follow up: corneal integrity was preserved, anterior chamber stable and no further surgery was required.

Case 2:

A 58-year-old male with a history of recurrent herpes simplex keratitis presented with neurotrophic corneal melt. This is despite being on long term antiviral prophylaxis with acyclovir 400mg, oral, twice daily.

- Snellen VA -> hand movements
- Low digital pressure
- 90% loss in corneal thickness (see Figure 1, top)

➢ Halo® inlay was inserted intrastromally on the same day as presentation under local anaesthetic.

✓ At three months follow up the integrity of the cornea was excellent with no leak or secondary viral reactivation. (Please see figure 1, bottom). No additional surgery has been performed to date.

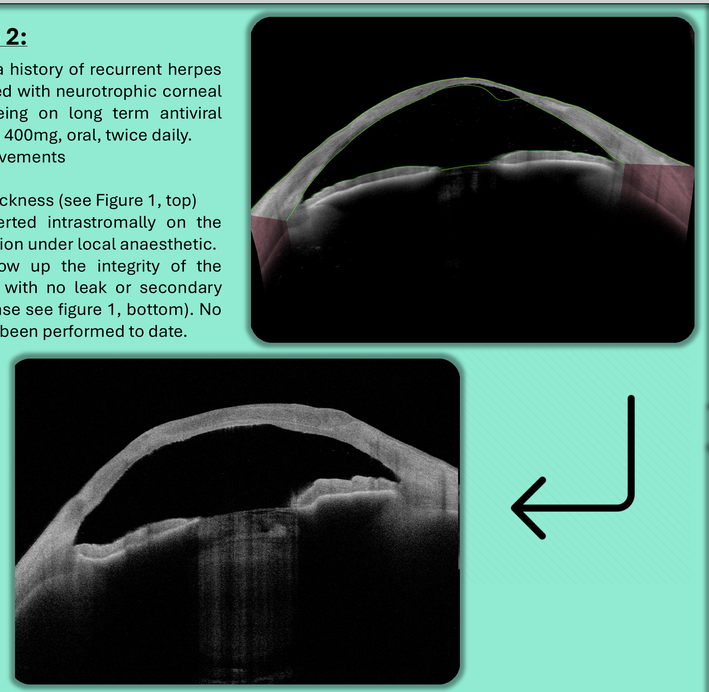


Figure 1: Anterior OCT images. Top shows pre-procedure. Bottom shows post-procedure following intrastromal implantation.

Case 3:

A 58-year-old male presented with a corneal melt in the left and only eye. This gentleman had a complex history including ANCA positive vasculitis, further complicated by cocaine abuse. The fellow right eye had already been lost due to endogenous endophthalmitis many years ago.

- Significant bone resorption was present with soft tissue loss of face.
- Complete loss of medial orbital wall on left side with distorted nasal anatomy
- Lower lid entropion was also present.
- Snellen VA -> counting fingers
- Intraocular pressure of 9mmHg. Corneal thinning and presence of bacterial infection at presentation Over 6 months the patient has multiple corneal perforation and corneal melts gradually extending to involve 60% of the corneal diameter.

➢ To date around 20 ophthalmic surgical procedures have been performed. These include but are not limited to those listed on the right. (please see right for continuation of Case 3)

Case 3 Continued...

➢ Amniotic membrane transplants
➢ Use of Halo® inlay intrastromally and as overlay
➢ Descemet stripping endothelial keratoplasty (DSAEK)
➢ Tectonic penetrating keratoplasty
➢ Cataract surgery
➢ Intravitreal and intrastromal Amphotericin B and voriconazole
➢ Cross-linking

Follow up:

- Further interventions were required
- Complications due to underlying vasculitis and poor host tissue
- Each intrastromal inlay maintained corneal integrity for 6-8 weeks
- Cataract procedure has been performed recently which was complicated by fungal fungal endophthalmitis.

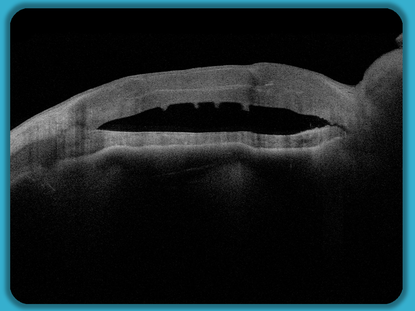


Figure 2: Anterior OCT after successful intrastromal implantation of Halo® inlay.

Discussion:

Advantages:

- **Smaller graft size**
- **Facilitates faster epithelial healing than overlay techniques**
- **Reduced risk of chronic epithelial defects compared to overlay**
- **Simplified suture techniques reduces suture related complications**
- **Potential for reduced inflammatory responses and potential improved visual prognosis**
- **Tissue readily available with two-year shelf life.**

Limitations:

- **Intrastromal insertion of the inlay requires further investigation and prospective trials**
- **Long term viability has not been assessed and further studies are required to do so**
- **In circumstances of extreme clinical complexity such as case three there may be the requirement for further surgery even after successful intrastromal implantation.**

Conclusions:

The intrastromal implantation of Halo® corneal graft tissues represents an effective and more minimally invasive solution to conventional treatments for corneal perforations secondary to corneal melts. However, we require larger prospective trials with extended follow up periods to fully elucidate the use case of the technique in the management of corneal melt/perforations. Comparative studies against more conventional procedures would be welcomed.

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The authors have no financial interests to declare