Outcomes of Type 1 Boston Keratoprosthesis at the University of Toronto Health Network

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The authors have no conflicts of interest and no financial interest in the article's subject matter or methods mentioned.

### Purpose:

- Advances in corneal transplantation have lead to improved visual outcomes in patients suffering with corneal blindness. However, there exists a subset of patients with repeat graft failure, severe corneal opacities, and cicatrizing diseases that often are not amendable to standard penetrating keratoplasty (PK).
- In instances were PK carries a poor prognosis, the Boston Keratoprothesis (KPro) serves as a viable alternative.
- The aim of this retrospective study is to report the effectiveness of the Boston Type 1 Keratoprosthesis in the management of repeat corneal graft failure and ocular stem cell disease at the University Health Network in Toronto, Canada.

#### Methods:

Retrospective analysis of patients' data was performed.

Data regarding the preoperative characteristics and intra/postoperative course of each patient was analysed.

#### **Results:**

#### Thirty patients (31 eyes) were included in this study

Preoperative Diagnosis	Eyes, n (%)
Failed Corneal Transplantation	21 (68)
Herpetic Keratitis, Trauma	4 each (13 each)
Chemical Burn, Corneal Ulcer, Corneal Dystrophy, Idiopathic	2 each (7 each)
Disease	
Aniridia, ICE, GVHD, pseudophakic edema	1 each (3 each)
No Prior Corneal Transplantation	10 (32)
Chemical Burn	4 (13 each)
LSCD	2 (7 each)
Herpetic Keratitis, Trauma, SJS, Bacterial Keratitis	1 each (3 each)

**Table 1:** Preoperative diagnosis of eyes implanted with a Boston Type 1 Keratoprosthesis

# Preoperative Visual Acuity



**Preoperative Visual Acuity** 

**Figure 1:** Preoperative Visual Acuity of both the operated and contralateral eye of patients undergoing KPRO surgery. (CF, counting fingers; HM, hand motion; LP, light perception; NLP, no light perception)

# Concomitant procedures

<b>Concomitant Procedure</b>	Eyes, n
Intraocular Lens Removal	16
Anterior Vitrectomy	10
Goniosynechialysis	5
Posterior Vitrectomy	3
Extracapsular Lens Extraction	1
Iridectomy	1

 Table 2: Concomitant procedures performed during keratoprosthesis

 surgery

# Visual Acuity pre- and postoperatively



**Figure 2:** Visual Acuity of eyes preoperatively and postoperatively (CF, counting fingers; HM, hand motion; LP, light perception; NLP, no light perception)

## Visual acuity over time after surgery



**Figure 3:** The Mean VA (logMAR) over time after surgery. The data indicates significant visual improvement compared with BCVA preoperatively

# Post operative complications

Post-Op Complication	Patients (%)
Retroprosthetic Membrane	15 (48)
Elevated IOP	10 (32)
Epithelial Defect, Hypotony	7 each (23 each)
Prolonged Conjunctival Inflammation,	6 each (19 each)
Posterior Capsule Opacification	
Stromal Melt	4 (13)
Corneal Infiltrate, Vitreous Hemorrhage,	3 each (10 each)
Retinal Detachment, Glaucoma	
Progression	
Uveitis, endophthalmitis, sterile vitritis,	1 each (3 each)
prolonged intraocular inflammation	

**Table 3:** Summary of all post-operative complications experienced by keratoprosthesis patients.

# Post operative procedures

Post-Op Procedure	Patients (%)
Nd:YAG membranectomy	9 (29)
Nd:YAG capsulotomy	7 (22)
Tarsorrhaphy	6 (19)
Pars Plana Vitrectomy*	5 (16)
Surgical membranectomy, Glaucoma Surgery, Repair of Retinal Detachment* Lamellar Corneal Graft, Oral Buccal Mucous Membrane Allograft, Amniotic Membrane Grafting	3 each (10 each) 2 each (6 each)
Drainage of Choroidal Hemorrhage	1 (3)

Table 4: Summary of all post-operative procedures completed on keratoprosthetic patients.

### Conclusions

Boston KPro retention rates were excellent and visual acuity improved in a majority of cases.

Our study demonstrates that the Boston Type 1 Keratoprosthesis is a viable option after multiple failed grafts or in situations where there is a poor prognosis for traditional penetrating keratoplasty.