THE CLINICAL OUTCOMES OF BOSTON KERATORPROSTHESIS TYPE 1 IN ALEXANDRIA, EGYPT

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Introduction

There are nearly 36 million individuals who are blind worldwide, and corneal disease is the fifth most common cause of blindness following cataract, uncorrected refractive error, glaucoma and age-related macular degeneration. According to the 2018 EBAA (Eye Bank Association of America), the most common indication for any corneal transplantation in the United States is endothelial dysfunction while keratoconus and corneal infections are the most common indications in other regions. Although corneal graft survival rates are high in these conditions, the survival rates in eyes with high risk of graft failure are significantly lower and, in some cases, so poor that traditional keratoplasty is not indicated. Professor Claes Dohlman developed the Boston Kerato-prosthesis type 1 at the Massachusetts Eye and Ear Infirmary in the 1970s. Since the FDA approved the Boston Kerato-prosthesis type 1 in 1992, its use has increased tremendously for the last two decades not only in the United States but also in other countries. The most common indication for the Boston Keratoprosthesis in many long-term studies is multiple graft failure with 50–65% of eyes reaching a visual acuity of 20/200 or better at 3 years follow-up and a device retention rate of 80–87.8%.

Aim of the work

The aim of this work is to determine the clinical outcomes of the Boston keratoprosthesis type 1 in a cohort of Egyptian patients.

Patients and Methods

Patient selection and data collection

This is a retrospective study in which data of 25 patients who had received the Boston keratoprosthesis type 1 device at least one year before the commencement of the study were collected. Patients were considered for implantation if they are at high risk of failure with standard keratoplasty procedures. These included patients with severe corneal scarring and vascularization caused by chemical burns, repeated failed corneal grafts, and autoimmune diseases that do poorly following penetrating keratoplasty. The data extracted from the files include the demographic data of the patients, indications for implanting the device, preoperative and postoperative BCVA in logMAR, operative data including graft size, type of graft fixation to the K-pro, additional surgeries done before or simultaneously such as implantation of Ahmed glaucoma valve (AGV), crystalline lens extraction, anterior vitrectomy, and IOL explantation. The data include also the postoperative complications recorded during the follow-up period such as graft melts, glaucoma, retro-prosthetic membranes, fungal keratitis, fungal endophthalmitis, hypotony, retinal detachment, and others.

Surgical procedure and postoperative management

The diameter of the donor corneal was 8.5 mm in all cases. Additional surgeries were done according to each individual patient's clinical presentation. Immediately after the surgery a soft contact lens was placed and replaced every 6 months. Postoperatively, topical moxifloxacin eye drops were administered 5 times daily and maintained for at least 1 month. Topical antifungal eye drops (voriconazole or fluconazole) were administered for all cases 4 times daily for 1 week every 3 months. Topical steroid eye drops may be dosed as frequently as one drop every hour for 1 week, then reduced to four times daily for 1 week, then tapered over the next 1-3 months. Patients should remain on a maintenance dose of topical steroids for life. IOP measurement using standard methods is difficult, so the IOP is assessed digitally and tension lowering eye drops were administered according to everyone's intraocular pressure. OCT of the optic nerve fiber layer thickness was performed every 4 months for cases with suspected elevation of IOP.

Results

Figures 1 and table 1 summarize the pre-operative and post-operative visual acuity, showing statistically significant ($p \leq 0.05$) improvement in BCVA between the preoperative and the first week postoperative BCVA. However, this difference lost statistical significance on comparing the first week postoperative BCVA with the last visit postoperative BCVA because of the occurrence of visually significant complications.

Table (1):Comparison between the three studied periods according to BCVA in logMAR

	Preoperative (n = 25)	week Postoperative (n = 25)	Last visit (n = 25)	Fr	p
BCVA					
Min. – Max.	1.0 – 2.30	0.30 – 2.30	0.10 – 2.90		
Mean ± SD.	2.14 ± 0.28	1.42 ± 0.73	1.72 ± 0.96	9.525*	0.009*
Median (IQR)	2.30 (2.0 – 2.30)	2.0 (0.70 – 2.0)	2.0 (1.0 – 2.30)		
Sig.bet. periods	p_1=0.006*, p_2=0.138 p_3=0.203				

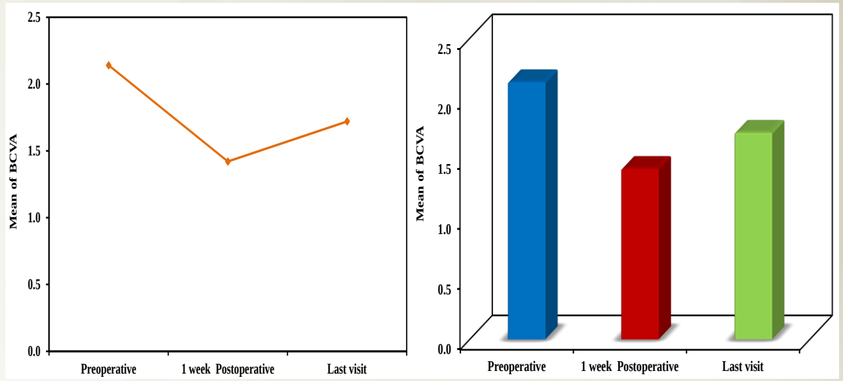

Figure (1): Comparison between the three studied periods according to BCVA in logMAR

Table (2): Distribution of the studied cases according to the complications (n = 25)

	No.	%
Melting	9	36.0
Choroidal detachment	6	24.0
Retro-prosthetic membrane	5	20.0
Retinal detachment	4	16.0
Atrophia	4	16.0
Extrusion of the K-pro	4	16.0
Glaucoma	3	12.0
Hypotony	3	12.0
Fungal endophthalmitis	3	12.0
Vitritis	3	12.0
Fungal Keratitis	3	12.0
Others	5	20.0

Conclusion

Our experience with the Boston type 1 keratoprosthesis is that it's a viable option in high-risk patients whom a routine keratoplasty offers little chance of visual recovery. However, the keratoprosthesis offers improvement in visual acuity for a short term only attributed to the high rates of complications with a trend of a decline of vision with time.