Special surgical considerations in the case of combined surgery for glaucoma tube insertion and Boston type 1 keratoprosthesis implantation

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Purpose: To evaluate the efficacy and the safety of combined vitrectomy and pars plana Ahmed tube placement to control intraocular pressure in patients with poorly controlled glaucoma and pending keratoprosthesis.

Methods: The Boston type 1 Keratoprosthesis is a final option for patients with corneal blindness who have exhausted other options. Many of the patients have pre-existing glaucoma and in many others, glaucoma develops after surgery. One of the main challenges with keratoprosthesis surgery is treating concurrent glaucoma. Glaucoma drainage devices are being advocated as a way to adress this long-term complication. We present a clinical case accompanied by an instructional video: This is a 35-year-old male who arrived complaining of intense discomfort and loss of vision in his only right eye. Goniotomy, trabeculectomy, cataract surgery and 3 penetrating keratoplasties had been performed. We recorded light perception. There was bullous epithelial and diffuse stromal corneal oedema and aphakia. Goldmann tonometry gave a reading of 28 mmHg. The iridocorneal angle had multiple, diffuse, broad peripheral anterior synechiae, and fundoscopy showed a flat retina, with total glaucomatous neuropathy.

Results: A provisional Eckardt keratoprosthesis was performed, combined with a 23 gauge vitrectomy and pars plana Ahmed valve tube placement, and a definitive Boston type 1 keratoprosthesis. Two years after his triple surgery, vision is count fingers and he tolerates a bandage contact lens well. The keratoprosthesis shows no sign of breakdown or endophthalmitis, and the tube appears well-positioned and patent. Digitally-measured IOP is between 15 and 20 mmHg.

Conclusions: The Boston type 1 Keratoprosthesis has been successfully used in eyes with a poor prognosis for a conventional penetrating keratoplasty. However, glaucoma has significantly limited visual potential in patients with otherwise successful transplants. Given a crowded anterior chamber, scarring, and/or inability to visualize the anterior segment, combined keratoprosthesis, vitrectomy and pars plana tube insertion is frequently necessary for intraocular pressure control. In addition, the need for an optimal bandage lens fitting after surgery necessitates a modified glaucoma surgical technique to improve bandage lens stabilization and to achieve optimal visual rehabilitation. Chosing the site of tube insertion depends on the status of the lens, iris, and vitreous. Pars plana approach
offers several advantages: Placing glaucoma tube hard-ware further back from the limbus, minimizing the risk of tube exposure caused by contact between the tube and backplate, reducing the risk of tube exposure induced by the edge of the bandage lens, and decreasing likelihood of tube obstruction caused by crowding within the anterior chamber. We also recommend leaving the tube long, radial in orientation, and in a plane parallel to the iris so that the tube and its tip can be easily seen.