

CASE REPORT

Effectiveness of full-thickness corneal compressive suture in acute hydrops: Two cases

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Aim: The aim of this study was to demonstrate the effectiveness of compressive sutures for rapid resolution of acute hydrops in keratoconus cases.

Case reports: Two young adult patients having keratoconus presented with sudden painful marked dimness of vision associated with watering and photophobia in their left eyes for about 2 weeks. Visual acuity was counting finger-to-hand movement. The examination showed a markedly opaque edematous cornea without any visibility of the pupil, lens, and posterior segment. Patients were diagnosed with acute hydrops. Patients underwent full-thickness corneal compressing sutures under peribulbar anesthesia. Patients were post-operatively treated with topical corticosteroid, antibiotic, cycloplegic, and hypertonic saline. On days 48 and 32, respectively, the total resolution of corneal edema with the central scar was seen in both of the patients. Vision improved to 3/60 and 6/60, respectively, and symptoms decreased. Both patients were advised for penetrating keratoplasty for further improvement of vision.

Conclusion: Full-thickness corneal compressive sutures quickly resolve acute hydrops of keratoconus.

Keywords: acute hydrops of keratoconus, compressive suture, keratoconus

Introduction

Acute hydrops of cornea is a rare but vision-threatening condition in patients with keratoconus. Descemet's membrane remains in a continuous stretching in progressive keratoconus. In advanced cases of keratoconus, aqueous humor enters into the stroma due to a sudden break of Descemet's membrane and develops acute painful hydrops in the cornea (1). The incidence rate of hydrops formation is approximately 3% of keratoconus (2). Males are more affected than females, and the average onset is around 25 years of age (3). Hydrops can occur in pellucid marginal degeneration and keratoglobus with a higher incidence rate of up to 11%, but hydrops cases are more in keratoconus patients as prevalence is more than in other ectatic disorders

of cornea (2). Vigorous rubbing of eyes, especially in vernal keratoconjunctivitis, is mostly associated with the development of acute hydrops (2).

Patients present with severe pain, photophobia, and sudden dimness of vision with loss of corneal transparency due to excessive hydration (3). Natural history of hydrops is a spontaneous resolution with scarring which takes several months (ranging from 5 to 36 weeks) (3). In most cases, prolonged edema of stroma aggravates inflammation, infection, and deep neovascularization, which are high-risk factors for subsequent graft rejection in keratoplasty (2). Usual conservative management includes topical hypertonic saline, corticosteroids, antibiotic, and cycloplegic to reduce symptoms. To hasten the resolution of corneal edema, it is necessary to re-attach the Descemet's membrane

to the stroma with intracameral gas or air injection, pre-Descemet's stromal suturing, full-thickness corneal compressive suturing, incisional drainage of intrastromal fluid, and even mini-DMEK and PKP (4).

Here, we described the effectiveness of the full-thickness corneal compressive suture in acute hydrops for the resolution of stromal edema as well as symptoms.

Research elaboration/case presentation

Case 1

A 16-year-old male adolescent came to our cornea clinic with painful sudden vision deterioration photophobia and watering for 12 days in his left eye with a visual acuity of counting finger in that eye. The left cornea was hazy, and the pupil, lens, and fundus were not visible. The slit-lamp examination revealed a very thick edematous cornea except for some clear portion near the limbus (**Figure 1A**). The patient was diagnosed with left acute corneal hydrops. On diffuse illumination, the right cornea was transparent with regular pupil, clear crystalline lens, and normal fundus,

and old topography showed early keratoconus, visual acuity was 6/12, and K-Max was 51 diopter. The patient was treated with topical ophthalmic preparation of cycloplegic (atropine 1%) drop 8 hourly, dexamethasone 0.1% drop 4 hourly, moxifloxacin 0.5% drop 4 hourly, and hypertonic saline (5% NaCl) 4 hourly daily. The patient was advised for multiple full-thickness corneal compressive sutures in his left eye. Counseling was done about the probable outcome of this procedure, and informed written consent was taken before surgery.

Surgical technique

The patient was given peribulbar anesthesia with an equal mixture of 2% lidocaine without adrenalin and 0.5% bupivacaine and 50 unit hyaluronidase with a 25 G needle. The patient was draped aseptically. Multiple sutures (4 × 4) were given from full thickness from clear to clear cornea through the anterior chamber with a 10/0 prolene suture with a curved needle carefully not to injure the iris and crystalline lens (**Figure 1B**). Sutures were tied and buried. A pad and bandage were given. The patient was given an analgesic. Post-operative day showed all sutures were intact and in position. The patient reported some foreign body sensations and watering. The patient was treated

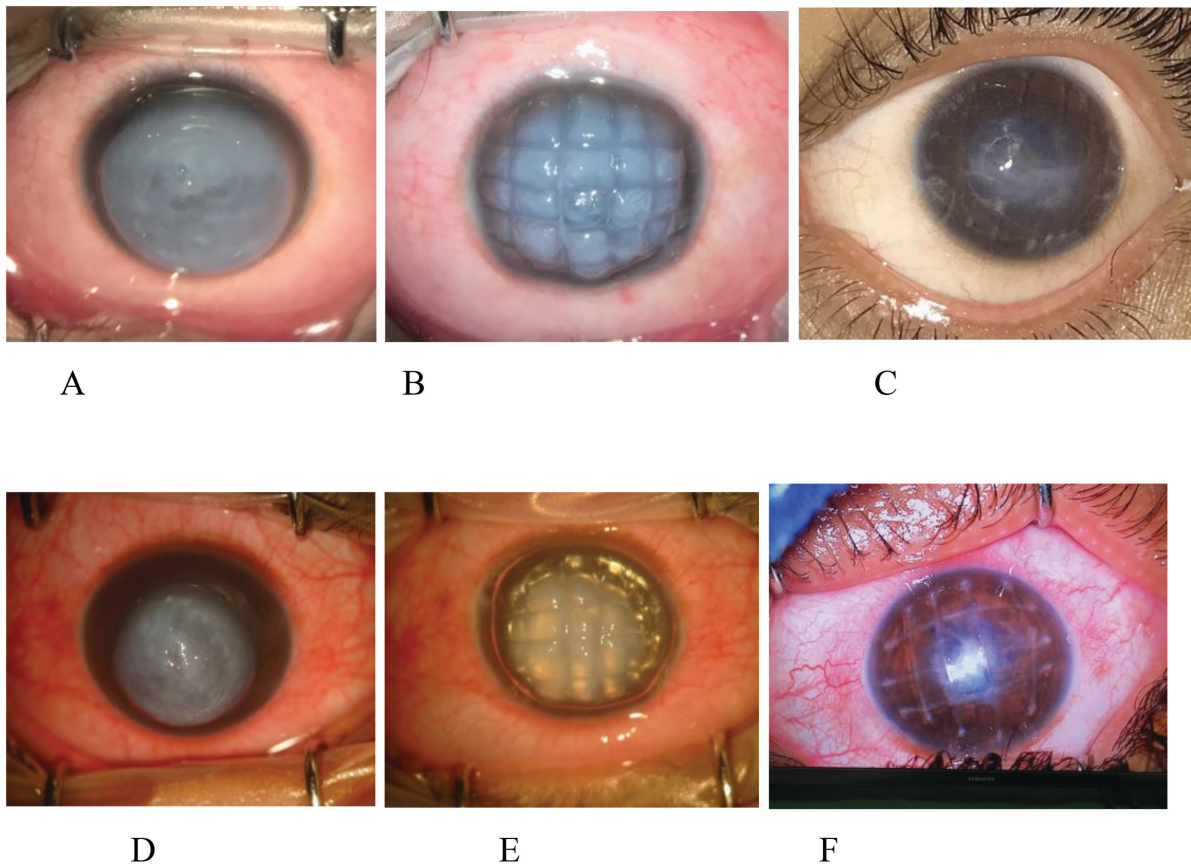


FIGURE 1 | (A) Acute hydrops—Case 1. **(B)** Compressive sutures—Case 1. **(C)** Corneal scar after resolution of acute hydrops and removal of sutures—Case 1. **(D)** Acute hydrops—Case 2. **(E)** Compressive sutures—Case 2. **(F)** Corneal scar after resolution of acute hydrops and removal of sutures—Case 2.

with topical ophthalmic preparation of cycloplegic (atropine 1%) drop 8 hourly, dexamethasone 0.1% drop 4 hourly, moxifloxacin 0.5% drop 4 hourly, and hypertonic saline (5% NaCl) 4 hourly daily. Two weeks later, the patient felt better and the atropine eye drop and hypertonic saline were discontinued, the dexamethasone eye drop was tapered, and the antibiotic eye drop was continued. On day 48, post-operatively, the cornea showed scar and clear peripheral cornea, and all sutures were removed. Suture marks were seen, and there was no corneal vascularization (**Figure 1C**). Visual acuity improved from counting finger to 6/60. The patient was advised for penetrating keratoplasty (PKP) for further improvement of vision.

Case 2

A 15-year-old male adolescent came to the cornea clinic with severe painful vision loss, photophobia, and watering for 5 days in his right eye. His presenting vision was 3/60. The patient underwent left deep anterior lamellar keratoplasty 6 years back due to keratoconus. On slit-lamp examination, his left eye maintained a clear healthy graft with a visual acuity of 6/18 and his right eye revealed a very thick edematous cornea centrally (**Figure 1D**). The patient was treated with acute corneal hydrops with topical cycloplegic (atropine 1%) drop 8 hourly, dexamethasone 0.1% drop 4 hourly, moxifloxacin 0.5% drop 4 hourly, and hypertonic saline (5% NaCl) 4 hourly daily. The patient was advised for multiple full-thickness corneal compressive sutures in his left eye. Counseling was done about the probable outcome of this procedure, and informed written consent was taken before surgery.

The patient was given peribulbar anesthesia with an equal mixture of 2% lidocaine without adrenalin and 0.5% bupivacaine and 50 unit hyaluronidase with a 25 G needle. The patient was draped aseptically. Side port entry was done with a 15 knife, and the air was introduced into the anterior chamber. Multiple sutures (4 × 4) were given from full thickness from clear to clear cornea through the anterior chamber with a 10/0 prolene suture with a curved needle carefully not to injure the iris and crystalline lens (**Figure 1E**). Sutures were tied and buried. A pad and bandage were given. The patient was given an analgesic. Post-operative day showed all sutures were intact and in position. The patient was treated with topical cycloplegic, steroid, antibiotic, and hypertonic saline like Case 1 in the same protocol. Two weeks later, the atropine eye drop and hypertonic saline were discontinued, the dexamethasone eye drop was tapered, and the antibiotic eye drop was continued. On day 32, post-operatively, the cornea showed scar, and all sutures were removed. Suture marks were seen, and there was no corneal vascularization (**Figure 1F**). Visual acuity improved from 3/60 to 6/60. The patient was advised for PKP for further improvement of vision.

Discussion

Keratoconus associated with vernal keratoconjunctivitis, Down syndrome, and vigorous rubbing of the eye may develop acute corneal hydrops (5). Acute hydrops is specified by the occurrence of gross stromal edema as the entry of aqueous humor due to the sudden breaking of Descemet's membrane. The patient reports sudden painful loss of vision as the cornea loses its transparency. Medical treatment with topical cycloplegic, hypertonic saline, and corticosteroid shows variable outcomes (6). Medical treatment takes 3–4 months even more up to 36 weeks for the resolution of hydrops with the formation of corneal scar (2, 3). Feder et al. (7) showed that corneal neovascularization may develop if keratoplasty is done in the future. Surgical treatment including intracameral gas or air injection, full-thickness or partial-thickness stromal compressive suture with or without gas or air, and incisional drainage of intrastromal fluid quickly resolves hydrops (4). Compressive suture probably apposes the edge of tear Descemet's membrane by bringing Descemet's membrane and stroma close together; thus, the endothelium easily covers the ruptured area (8). Expanding gas bubbles in the anterior chamber may enter into the stromal cleft, resulting in a delayed resolution of stromal edema (9). Thus, full-thickness compressive suture with or without intracameral gas injection is a better surgical option for the resolution of hydrops by decreasing the migration of gas bubbles into the stroma (10).

In both these cases, we found early resolution of hydrops with full-thickness corneal compressive suture with or without intracameral air injection.

Conclusion

Corneal compressive suture is a simple technique and very effective in the quick resolution of acute corneal hydrops as well as vision, preventing corneal stromal neovascularization.

Author contributions

SB: concept, design, and manuscript preparation. AA: literature search and manuscript editing. SR: manuscript review and grammatical correction. NA: literature review. AB: literature review. All authors contributed to the article and approved the submitted version.

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