CASE REPORT

To show the efficacy of compressive sutures alone in the management of acute hydrops in a keratoconus patient

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SUMMARY

A 17-year-old boy presented with sudden loss of vision in the left eye (OS) for 3 days. He was diagnosed with acute hydrops following keratoconic progression in OS. The patient was initially started on topical medical therapy, including steroids and hypertonic eye drops; showing no signs of resolution. Hence, the patient was planned for full-thickness compressive corneal sutures. Four sutures were placed along the central oedematous area covering the area of ruptured Descemet's membrane. Signs of resolution were noticed by 1st week and there was complete resolution of oedema by 3rd post-op week. Sutures were removed by 7th postoperative week/45th day. The patient was doing fine with visual acuity of 6/60 in the last visit with no symptoms of discomfort and no signs of corneal vascularisation. Full-thickness corneal compressive sutures is an effective alternative in cases of acute hydrops if perfluoropropane gas is not available.

obviating the need for intracameral gas/penetrating keratoplasty.

CASE PRESENTATION

A 17-year-old boy presented to us with sudden onset loss of vision and intense photophobia in the left eye (OS) for 5 days. His presenting visual acuity in the right eye (OD) was 6/60 improving to 6/12 and in OS he was able to count fingers at a distance of 1/2 m only. He was the second child of non-consanguineous marriage and his other siblings had normal vision. He underwent optical penetrating keratoplasty in OD 6 months back in the same clinic. On diffuse torch light, the examination of OS showed hazy cornea with no visibility of pupil and anterior segment, and OD showed clear central corneal graft with 16 well-secured sutures. Slit lamp examination of OS showed thickened and oedematous corneal stroma over vertical split of DM; the details of anterior segment were not clearly seen; however, pupillary light reaction was within normal limits. OD showed clear central corneal graft with normal reacting pupil and clear lens. With a diagnosis of acute hydrops post keratoconic progression in OS, the patient was started on 5% sodium chloride drops and fluorometholone drops, but there was significant delay in the resolution of oedema. So, after 7 days, we planned to apply full-thickness compressive corneal sutures as perfluoropropane gas was not available at the centre.

Surgical procedure

Under strict aseptic conditions, initially, pupillary constriction was done intraoperatively by injecting intracameral pilocarpine 1% solution. Next, hydroxyl propyl methyl cellulose viscoelastic was introduced to create the space between cornea and iris plane. 10-0 nylon suture was used to produce full-thickness compression of cornea. Technique of suture introduction is positioning the sharp end of the curved needle perpendicular to the surface of cornea at the margin of edematous cornea and clear cornea, next entering directly to anterior chamber taking care not to damage the iris following which exit of the curved needle from the horizontally opposite end of the junction (figure 1). Similarly, four interrupted full-thickness corneal compressive sutures were placed centrally covering the oedematous part of cornea as shown in figure 1. On the

BACKGROUND

Keratoconus is an ectatic corneal disorder characterised by progressive corneal thinning centrally or paracentrally leading to conical protrusion.¹ Stromal thinning or lysis occurs due to slow destruction of lamellae by the stromal keratocytes.² However, the Descemet's membrane (DM) which is embryologically different in origin is not a part of this disease leading to undue stress on the membrane.³ DM is strongly adherent at the periphery leading to circumferential stretch of the membrane increasing the risk of tear.⁴ When the stretch of the membrane extends beyond the limits of its elasticity, it leads to rupture at the centre with coiling of the membrane, leading to seepage of the aqueous into the stroma causing acute hydrops presenting with sudden diminution of vision. However this is a temporary condition with gradual reduction in fluid inside stroma, detached DM adheres to the stroma, and subsequently cornea becomes clear.⁵ But this process may take long time, which may invite new vessels from the peripheral cornea.⁶ Hence, it is essential to make DM adhere to the stroma surgically using intracameral gas/applying compressive full-thickness sutures.⁷ Penetrating keratoplasty may also lead to visual restoration but risk of graft rejection is high owing to inflammation.⁸ In this case, we report a case of acute hydrops which resolved in 3 weeks using full-thickness compressive sutures

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Figure 1 Acute hydrops and technique of suture introduction involving full thickness of cornea.

first postoperative day, there were persistent stromal oedema and lot of discomfort owing to inflammation. However, from the 7th post-op day, there were signs of resolution and by 28th post-op day, there was complete resolution of corneal oedema leaving a nebular scar with sutures. On the 45th post-op day, corneal sutures were removed under strict aseptic conditions in the operating room. Slit lamp examination showed peripherally clear cornea with central dense scar and suture tracks; there was no evidence of corneal vascularisation.(figure 2).

OUTCOME AND FOLLOW-UP

Visual acuity recorded on the 46th post-op day was 3/60. In the next 3 months, the patient showed marginal improvement of vision to 6/60, which remained stable thereafter. The patient was scheduled for optical keratoplasty after 6 months.

DISCUSSION

Acute hydrops is a well-recognised complication of keratoconus characterised by sudden onset gross corneal oedema owing to rupture of DM leading to loss of vision. Conventional medical management of acute hydrops is non-specific and there is no proper protocol mentioned in the literature. Topical steroids, hypertonic eye drops and cycloplegics have been mentioned in the literature with variable results.⁹ However, non-surgical management takes 3–4 months for the hydrops to reduce and subsequently scar formation.¹⁰ Due to long-standing corneal oedema, there is high risk for corneal neovascularisation shown

Figure 2 Central corneal scar with suture tracks under microscope and slit lamp examination.

by Feder *et al*¹¹ in his study, which may increase the risk of graft rejection after penetrating keratoplasty. Hence, surgical intervention is important to hasten the recovery of hydrops. Intracameral gas injection alone has been mentioned in the literature showing faster resolution of corneal oedema,¹² but it may lead to seepage of gas bubbles into the stroma leading to delay in resolution of corneal oedema.¹³ Combination of full-thickness sutures with intracameral gas injection is a very good option vitiating the need for repeat injection and reducing the risk of intrastromal gas seepage.¹⁴ However, full-thickness compressive sutures alone without the use of intracameral gas have not been reported earlier. Here, we report a case of acute hydrops showing early signs of resolution with full-thickness compressive suture alone as an alternative to intracameral gas injection.

Learning points

- ▶ Progressive keratoconus may lead to rupture of Descemet's membrane producing acute hydrops.
- ▶ Early intervention helps in faster resolution of corneal oedema, which, in turn, prevents the development of corneal vascularisation.
- ▶ Full-thickness corneal compressive sutures can be considered as an effective alternative to intracameral expansible gas in the management of acute hydrops providing equivalent result.

Contributors PS: conceptualisation, design, acquisition of data and writing of manuscript. ZK: proofreading of manuscript. NRS: writing and analysis of manuscript. SS: proofreading and coordination.

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REFERENCES

- 1 Rabinowitz YS. Keratoconus. *Surv Ophthalmol* 1998;42:297–319.
- 2 Ionescu C, Corbu CG, Tanase C, *et al*. Inflammatory biomarkers Profile as Microenvironmental expression in Keratoconus. *Dis Markers* 2016;2016:1–8.
- 3 Eghrari AO, Riazuddin SA, Gottsch JD. Overview of the cornea: structure, function, and development. *Prog Mol Biol Transl Sci* 2015;134:7–23.
- 4 Binder PS, Rock ME, Schmidt KC, *et al*. High-voltage Electron microscopy of normal human cornea. *Invest Ophthalmol Vis Sci* 1991;32:2234–43. Erratum in: *Invest Ophthalmol Vis Sci* 1991 Dec;32(13):3313.
- 5 Barsam A, Brennan N, Petrushkin H, *et al*. Case-control study of risk factors for acute corneal hydrops in keratoconus. *Br J Ophthalmol* 2017;101:499–502.
- 6 Tuft SJ, Gregory WM, Buckley RJ. Acute corneal Hydrops in keratoconus. *Ophthalmology* 1994;101:1738–44.
- 7 Yahia Chérif H, Gueudry J, Afriat M, *et al*. Efficacy and safety of pre-Descemet's membrane sutures for the management of acute corneal hydrops in keratoconus. *Br J Ophthalmol* 2015;99:773–7.
- 8 Meyer JJ, Gokul A, Crawford AZ, *et al*. Penetrating keratoplasty for keratoconus with and without resolved corneal hydrops: long-term results. *Am J Ophthalmol* 2016;169:282–9.
- 9 Barsam A, Petrushkin H, Brennan N, *et al*. Acute corneal hydrops in keratoconus: a national prospective study of incidence and management. *Eye* 2015;29:469–74.
- 10 Grewal S, Laibson PR, Cohen EJ, *et al*. Acute hydrops in the corneal ectasias: associated factors and outcomes. *Trans Am Ophthalmol Soc* 1999;97:187–98.
- 11 Feder RS, Wilhelmus KR, Vold SD, *et al*. Intrastromal clefts in keratoconus patients with hydrops. *Am J Ophthalmol* 1998;126:9–16.
- 12 Basu S, Vaddavalli PK, Ramappa M, *et al*. Intracameral perfluoropropane gas in the treatment of acute corneal Hydrops. *Ophthalmology* 2011;118:934–9.
- 13 Sharma N, Mannan R, Titiyal JS. Nonresolution of acute hydrops because of intrastromal migration of perfluoropropane gas. *Cornea* 2010;29:944–6.
- 14 Rajaraman R, Singh S, Raghavan A, *et al*. Efficacy and safety of intracameral perfluoropropane (C3F8) tamponade and compression sutures for the management of acute corneal hydrops. *Cornea* 2009;28:317–20.

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