Corneal Hydrops: New Treatment Allows Rapid Visual Improvement

Nonexpansile retinal gas can rapidly resolve corneal edema in patients with acute corneal hydrops.

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Acute corneal hydrops is a condition in which there is a rapid development of corneal edema secondary to a break in Descemet membrane. Because the conventional treatment has been observation,[1] acute corneal hydrops is a frustrating occurrence for clinicians and patients alike.

The condition occurs in patients with a history of ectatic corneal conditions—keratoconus, keratoglobus, and pellucid marginal corneal degeneration—and is due to a break in Descemet membrane that allows fluid to enter the cornea.[2-4] Patients present to the eye care specialist with a sudden reduction in vision associated with a focal area of corneal swelling, which can be small or large. The location and size of the swollen area is related to where the linear break in Descemet occurred. Previous treatment for hydrops consisted of conservative approaches such as the use of hypertonic saline solution with topical antibiotics and cycloplegic agents. Patients are advised to avoid wearing contact lenses until the condition has resolved, which may take anywhere from 5 to 36 weeks with a conservative approach.[5]

INTRACAMERAL GAS

Intracameral gas injections are conventionally used to repair detachments of Descemet membrane and as a method for securing the donor's disc in Descemet stripping endothelial keratoplasty procedures. In 2002, the first investigation was published on the use of air for the rapid treatment of acute corneal hydrops.[6] Additional studies have evaluated the effectiveness of two retinal gases: sulfur hexafluoride (SF_6) and perfluoropropane (C_3F_8).[7-10] Both SF_6 and C_3F_8 gas used in nonexpansile concentration have produced earlier resolution of edema with fewer repeat injections compared with conventional treatment.

ACUTE CORNEAL HYDROPS TREATMENT

1. Pilocarpine drops are given.
2. Inferior peripheral iridotomies are performed with the laser after the pupil has constricted.
3. Dilating drops, including longer-acting dilating drops to help keep the pupil enlarged, are instilled (these may include homatropine or hyoscine).
4. A nonexpansile concentration of retinal gas (either SF_6 or C_3F_8) is placed into the anterior chamber of the eye with a 30-gauge needle at the slit lamp with the goal of a 40% to 50% fill.
5. The patient is instructed to lie flat on his or her back, facing the ceiling, so that the retinal gas will tamponade the break in Descement membrane.

Nonexpansile C_3F_8 is able to remain in the anterior chamber longer than SF_6, making the need for repeat injections less likely. The gas physically blocks the entry of aqueous into the corneal stroma. It also allows the torn ends of Descemet membrane to heal by acting as a tamponade.

OUR EXPERIENCE

Based on the research, we have treated five patients at our center with either C_3F_8 or SF_6. In all of the cases, the corneal edema resolved in less than 2 weeks. However, as mentioned in the published literature and in our experience, the procedure and postoperative course are not risk free. The biggest challenge is avoiding pupillary block, which will result in a rapid increase in IOP. This complication occurred in three of our five patients and was related to the pupil's not remaining dilated beyond the lower edge of the intracameral gas level. Other risks include infection or anterior

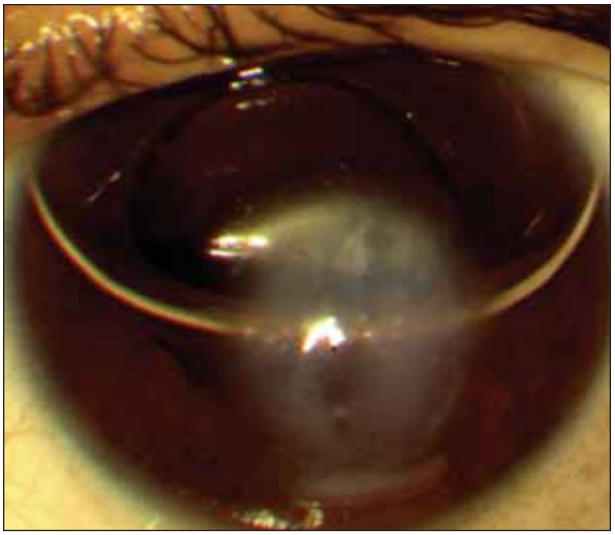

Figure 1. Injection of SF_6 in a patient with acute corneal hydrops.

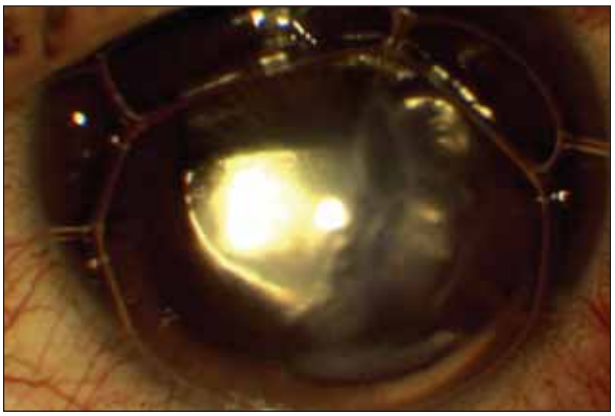

Figure 2. Excessive intracameral gas, leading to pupillary block and elevated IOP. One can avoid this by ensuring that a nonexpansile concentration of retinal gas is placed.

capsular cataract formation, the latter's occurring in one of our patients following pupillary block and an elevated IOP.

TREATMENT METHOD

Based on our experience of a high rate of pupillary blocks, we now place an inferior peripheral iridotomy before injecting the retinal gas to help reduce the risk of elevated IOP. Our current treatment method for patients who present with acute corneal hydrops can be seen in the sidebar, *Acute Corneal Hydrops Treatment*.

CONCLUSION

In our experience, the placement of nonexpansile retinal gas for the treatment of acute corneal hydrops has been extremely effective for rapidly resolving corneal edema (Figures 1-4). Obviously, patients need to be cooperative and agree to lie supine with their heads facing the ceiling to allow the gas to block the entrance of fluid through the break in Descement membrane. The other major challenge is to avoid pupillary block from the gas, with steps such as the placement of inferior peripheral iridotomies and the use of dilating eye drops. Overall, the development of this treatment has allowed patients to recover and return to contact lens wear in a matter of a week or 2 versus having to wait 1 to 8 months for the condition to resolve on its own. ■

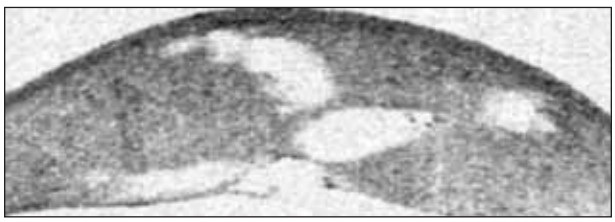

Figure 3. Optical coherence tomographic image of acute hydrops, demonstrating the break in Descemet membrane and fluid pockets in the corneal stroma. This is the same patient as in Figure 1.

Figure 4. Optical coherence tomographic image of same patient, demonstrating significant improvement of acute corneal hydrops following retinal gas injection.

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