MANAGEMENT OF DESCemet’s MEMBRANE RUPTURE BY INTRACAMERAL INJECTION OF SF\textsubscript{6} IN ACUTE HYDROPS

TRATAMIENTO DE LA ROTURA DE LA MEMBRANA DE DESCemet MEDIANTE SF\textsubscript{6} INTRACAMERULAR EN HYDROPS AGUDO

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ABSTRACT

Case report: Hydrops occurring in the eye secondary to keratoconus, grade 4. It was managed by sulfur hexafluoride (SF\textsubscript{6}) gas injected into the anterior chamber, with an early resolution of corneal edema obtained.

Discussion: Intervention with intracameral SF\textsubscript{6} injection has proven to be a safe and effective therapy for early reduction of corneal edema in an eye with Descemet’s membrane detachment and acute hydrops (Arch Soc Esp Oftalmol 2009; 84: 533-536).

Key words: Hydrops, keratoconus, corneal edema, sulfur hexafluoride, SF\textsubscript{6}, intracameral injection, Descemet’s detachment.

INTRODUCTION

Corneal hydrops is an acute pathology which occurs when Descemet’s membrane breaks damaging the endothelial cells. In this process, the cornea begins to produce edema due to the entry of aqueous humor towards the stroma, causing loss of transparency and therefore of vision, feeling of foggyness and photophobia. In a large majority of cases, it is a self-limited process which tends to resolve itself in a few weeks, leaving scar areas or leukoma as sequela. The healthy endothelial cells adjacent to the altered area change their shape (polymorphism) and size (polymegatism) in an attempt to occupy the space previously taken by the damaged cells and in this way cover the defect and...
facilitate regeneration of Descemet’s membrane. When the rupture disappears, the aqueous balance of the cornea is reestablished and the edema gradually disappears.

In the acute phase, treatment would be basically symptomatic with instillation of cycloplegic miotics, topical steroids, hypertonic solutions and compressive bandages.

Multiple treatments have been proposed to accelerate said recovery process, such as carbonic anhydrase inhibitors, anterior chamber paracentesis, puncture of bubbles, tarsoraphia and application of heat to cause a contraction of the deep layer collagen fibers to bring closer the rupture edges of Descemet’s membrane. Other treatments which have been applied include intra-chamber injections of air (1) or perfluoropropane 14% (C3F8) (2-4). The period of permanence of air in the anterior chamber is lower than that of gases. In turn, perfluoropropane exhibits a cataratogenic action greater than sulphur hexafluoride (3), and for this reason we report a case based on the intra-chamber injection of sulphur hexafluoride (SF6).

**CLINICAL CASE**

A 33-year old female patient visits our centre referring visual acuity reduction in the left eye (LE) since two days earlier, together with pain and photophobia. Her personal history includes Graves-Basedow disease treated with radioactive iodine and bilateral keratocone. With correction, her VA is of 0.7 in the right eye (RE) and finger counting at 20 cm in the LE. Intra-ocular pressure (IOP) is 8 mmHg in both eyes (BE). Biomicroscopy reveals a grade 3 keratocone (Bennet classification) in the RE and a moderate central corneal opacity in the left one, coinciding with a grade 4 cone (fig. 1). An Optical Coherence Tomography (Visante-OCT) showed rupture of Descemet’s membrane and secondary tear, corneal edema and a cone-shaped form of the involved cornea (figs. 2 and 3). Symptomatic treatment is established with sodium chloride 5% and ocular hypotensors (Elebloc, 2%, 1 drop every 12 hours).

One week later, observing the insignificant evolution of the process, it was decided to inject SF$_6$ into the patient’s chamber.
Technique

In our centre we have SF$_6$ in single doses in non-expansive concentration at 20%. Prior to the injection, the patient must follow an ofloxacine treatment at 30-minute intervals starting 90 minutes before the intervention, and pilocarpin 2%, likewise instilled at 30-minute intervals 90 minutes before the operation. The preparation of SF$_6$ is made with a 1cc and 40 UI insulin syringe, taking 0.2 ml through a Millex-GS® 0.1 µm microfilter. Subsequently, paracentesis is performed with a 15º steel blade to empty the anterior chamber and the gas is injected through a 27G cannula into the anterior chamber to form a bubble leaving a free area in the periphery (360º) of about 1 mm, which is usually the equivalent of injecting a volume of 0.2 cc. (fig. 4). The permanence time of the gas in the anterior chamber is usually of 4-5 days (fig. 5).

The day after the gas treatment, the patient referred improvement of symptoms and absence of pain. The biomicroscope revealed a gas bubble in the upper area, the remainder being without alterations. Treatment was maintained with ofloxacin at 4-hour intervals and the intra-ocular pressure reducing drug (Elebloc, 2%) every 12 hours, with dexametason being added every 4 hours. Three days later, the patient’s improvement was highly visible, without gas detected in the pupil area, which disappeared completely at day 6. The patient achieves a VA of 0.05 with refraction and the corneal edema was circumscribed to the inferior temporal side. Treatment continues with eye drops and anti-edema cream with the initial schedule. Two months after the intervention, the reduction of the edema was considerable, maintaining sodium chloride 5% as the only treatment. Five months after the treatment, the patient improvement remains stably, with the sole treatment being anti-edema cream at night. At the lens level, we did not observe any changes or variations in the transparency degree. With a refraction of -10.00 sphere, the patient reaches a VA of 0.2. The patient rejected penetrating keratoplasty for the time being.

DISCUSSION

In many cases corneal hydrops is considered to be a self-limited process which tends to resolve itself in a few weeks, leaving corneal scar areas as sequela. The healthy endothelial cells adjacent to the altered area elongate to cover the defect and allow regeneration of Descemet’s membrane. The treatment we propose aims at achieving a repositioning of said membrane against the stroma up to its regeneration and relocation of the endothelial cells which prevent the passage of aqueous humor.

In 2002, Miyata et al (1) demonstrated the efficiency and safety of intra-chamber air injections for treating acute hydrops. However, it has a drawback which is the short time of permanence of air in the anterior chamber. On the contrary, the permanence time of C3F8 is long, increasing the probability of developing secondary glaucoma, among others.
Our choice was SF6 because it is 5 times heavier than air, colorless and odorless. It has a minimum cataratogenic action (3.5) and exhibits little risk at the endothelial level. SF6 is expandable at concentrations exceeding 20% and it increases its volume 150% when injected undiluted. The volumetric changes of the gas bubble injected in the anterior chamber have the main limitation of being in a chamber which is isolated.

Miyata et al (1) reported a mean resolution of corneal edema of 20.1 ± 9.0 days with air injections, while Kaushal (2) referred a significant clarification of the cornea two weeks after following treatment with C3F8. In turn, Rajaraman et al (5) demonstrated a resolution of edema in 8.87 ± 4.98 days, with C3F8 associated with compressive sutures.

In the reported clinical case, the acute conditions diminished, with a lower evolution time vis-à-vis that described in the literature. In addition, the IOP did not increase, a factor which must be checked in all visits. Therefore, it can be said that this was a simple, safe and efficient technique for the instant case, which has served to reduce the acute condition and diminished the evolution time. Accordingly, the corneal sequelae such as leukoma or scarring were also diminished.

REFERENCES