

## Delayed Macular Hole Closure

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### Key Words

Macular hole · Vitrectomy · Gas tamponade

### Abstract

**Purpose:** The presented case raises questions regarding the favorable scheduling of planned postoperative care and the ideal observation interval to decide for reoperations in macular hole surgery. Furthermore a discussion about the use of short- and long-acting gas tamponades in macular hole surgery is encouraged. **Methods:** We present an interventional case report and a short review of the pertinent literature. **Results:** We report a case of spontaneous delayed macular hole closure after vitreoretinal surgery had been performed initially without the expected success. A 73-year-old male Caucasian patient presented at our clinic with a stage 2 macular hole in his left eye. He underwent 23-gauge pars plana vitrectomy and internal limiting membrane peeling with a 20% C<sub>2</sub>F<sub>6</sub>-gas tamponade. Sixteen days after the procedure, an OCT scan revealed a persistent stage 2 macular hole, and the patient was scheduled for reoperation. Surprisingly, at the date of planned surgery, which was another 11 days later, the macular hole had resolved spontaneously without any further intervention. **Conclusions:** So far no common opinion exists regarding the use of short- or long-acting gas in macular hole surgery. Our case of delayed macular hole closure after complete resorption of the gas tamponade raises questions about the need and duration of strict prone positioning after surgery. Furthermore short-acting gas might be as efficient as long-acting gas. We suggest to wait with a second intervention at least 4 weeks after the initial surgery, since a delayed macular hole closure is possible.

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### Introduction

The most widely accepted hypothesis concerning idiopathic macular hole pathogenesis is an abnormal anteroposterior vitreous traction. Furthermore fibrocellular proliferation at the top of the inner retinal surface is proposed to support the formation of macular holes.

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Fibrocellular proliferation is also suspected to be responsible for the reopening of the macular hole or the persistence of the hole in spite of surgery [1]. Vitrectomy – the removal of the vitreous cortex and gas tamponade – is supplemented by internal limiting membrane (ILM) peeling, different tamponade options (gas or silicone oil) and different dyes for ILM visualization (brilliant blue or indocyanine green). A postoperative prognosis depends on the preoperative visual acuity, hole size and duration of symptoms. The incidence rate of persistent macular holes after surgery is between 4 and 13% [1–3]. In cases of persistent macular holes, reoperation has a reduced prognosis compared to that of the initial surgery. However, the visual acuity increases after reoperation [4].

### Case Presentation

A 73-year-old Caucasian male presented with a 6-month history of decreased visual acuity in his left eye. In 2002 the patient had undergone combined phacoemulsification and pars plana vitrectomy in his right eye to treat cataract and a stage 2 macular hole.

Clinical examination showed a best-corrected visual acuity (BCVA) in the right eye of 0.1 logMAR and in the left eye of 0.7 logMAR, with a positive Amsler test in the left eye. Intraocular pressure was 13 mm Hg for both eyes. We diagnosed cataract and a stage 2 macular hole in the left eye. Optical coherence tomography (OCT) examination confirmed a stage 2 macular hole.

One month later surgery was performed on the left eye. Phacoemulsification and implantation of a capsular tension ring and a posterior chamber intraocular lens were combined with 23-gauge pars plana vitrectomy, endolaser coagulation to treat equatorial degenerations of the retina, ILM peeling after staining with brilliant blue and 20% C<sub>2</sub>F<sub>6</sub>-gas tamponade. The patient was asked to keep a prone position for 5 days. A combination of antibiotic and steroid eye drops was applied 6 times per day, carbonic anhydrase inhibitor eye drops were given 3 times per day.

Sixteen days after surgery, a clinical examination revealed a persistent macular hole, confirmed by an OCT scan (fig. 1). BCVA was 1.0 logMAR, and the C<sub>2</sub>F<sub>6</sub>-gas tamponade within the vitreous cavity was resorbed completely. Due to the persistence of the macular hole, we scheduled the patient's reoperation for 11 days later. On the day of admission to our clinic, BCVA in the left eye had improved to 0.4 logMAR and the macular hole was anatomically closed as confirmed by another OCT scan (fig. 2). The operation was cancelled, and a further follow-up visit 2 months later showed a still closed macular hole and a BCVA of 0.2 logMAR. Further interventions were not needed.

### Discussion

We present an unexpected delayed closure of a stage 2 macular hole following vitreoretinal surgery with gas tamponade. The full thickness of the macular hole in our patient persisted for at least 16 days postoperatively. Because the OCT scan showed a fulminant macular hole with elevated margins at the first follow-up visit, we decided to reoperate early on. Surprisingly, however, within the following 11 days the macular hole closed spontaneously without the presence of a gas tamponade and without prone positioning of the head. Our observation raises 3 questions: (1) how long do we have to wait to decide for reoperation?; (2) how long do we have to keep the patient in a prone position?, and (3) is gas necessary for macular hole closure? Schumann et al. [1] suggest to wait for 6 weeks before

considering reoperation. Our case demonstrates that 2½ weeks are too short and that we should wait at least 4 weeks, even if the macular hole persists. In our hospital we generally try to reoperate early on in the case of persistent macular hole to avoid further retinal damage. Considering the duration of prone positioning and long- or short-acting gases after pars plana vitrectomy for macular hole surgery, the discussion is controversial. In 1991 Kelly and Wendel [5] suggested prone positioning for 1 week. Haritoglou et al. [2] suggested a C<sub>2</sub>F<sub>6</sub>-gas-air mixture and a prone position for at least 5 days. Xirou et al. [6] compared SF<sub>6</sub> and C<sub>3</sub>F<sub>8</sub> gas; they kept their patients for 2 days in a prone position. Their results showed a high success rate for the short-acting gas [6]. In our case a C<sub>2</sub>F<sub>6</sub>-gas-air mixture, a medium-long-acting gas, was used and the patient was asked to keep a prone position for 5 days. The gas was resorbed after 15 days, and the macular hole was persistent in full size for at least 16 days after surgery. It finally sealed between postoperative day 17 and 26.

Apparently initial vitreoretinal surgery with ILM peeling and compressive forces of C<sub>2</sub>F<sub>6</sub> gas in prone positioning of the head might stimulate healing processes that are still ongoing 2 weeks after the procedure and even after the gas is resorbed completely.

In general, patients complain about visual impairment due to long-acting gas and prone positioning. Our patient demonstrates that short-acting gas and possibly no prolonged prone positioning can be sufficient for macular hole closure. However, we learn that a reoperation for macular hole closure should be considered at the earliest 4 weeks after the initial intervention.

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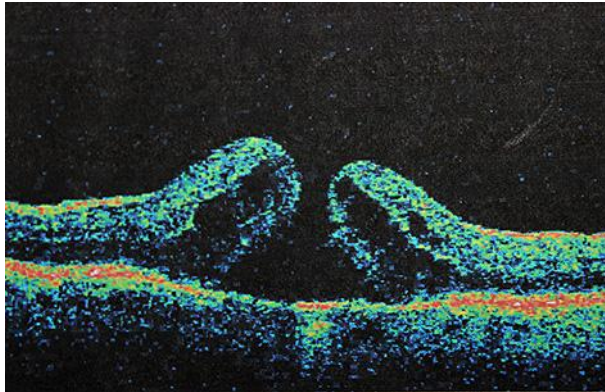
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### Disclosure Statement

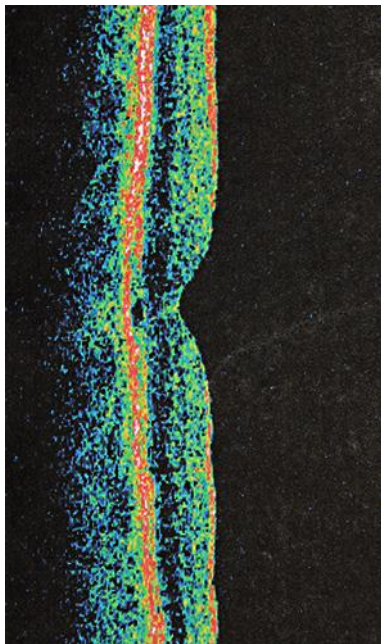
The authors have no conflicts of interest to disclose.

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**Fig. 1.** OCT scan of the persistent macular hole 16 days after surgery. The gas tamponade was already resorbed and a second intervention was scheduled. BVCA 1.0 logMAR.



**Fig. 2.** Without further treatment the macular hole had closed 11 days later. The scan shows a regular foveal depression with a minimal residual edema. BVCA 0.4 logMAR.