

Surgery for Macular Hole Repair: A Conversation

Is face-down positioning necessary?

BY NANCY HOLEKAMP, MD; AND PAUL TORNAMBE, MD

Retina Today sat down with two prominent retina surgeons to explore the similarities and differences in their approaches to macular hole surgery. One has been an advocate for abandoning face-down positioning for most patients after macular hole surgery. The other is reluctant to walk away from a successful strategy.

Nancy Holekamp, MD: I ask all of my patients to maintain face-down position after macular hole surgery. If they cannot be face-down for 1 week, then I may use silicone oil. Ninety-five percent of my patients, however, are able to maintain face-down positioning after surgery.

Paul Tornambe, MD: As a group, retina surgeons are quick to adapt to new ideas, but for some reason it seems to be a leap of faith to accept macular hole surgery without face-down positioning. I have found, however, that the buoyancy of a gas bubble has no role in closing a macular hole (Figure 1).¹

I ask none of my patients over age 50 years to position face-down. I think there is no reason to put anybody face down for even 1 minute, and my outcomes without face-down positioning are as good as others report with face-down positioning.

I do, however, have phakic patients younger than 50 years position face-down. I advise patients who are older than 50 years to have their lens removed before surgery because, as Dr. Holekamp has shown,² these patients frequently develop cataracts after vitrectomy. An added advantage of the patient being pseudophakic is that we can put a larger bubble in the eye.

Dr. Holekamp: Do you remove the lens before or at the same time as macular hole surgery?

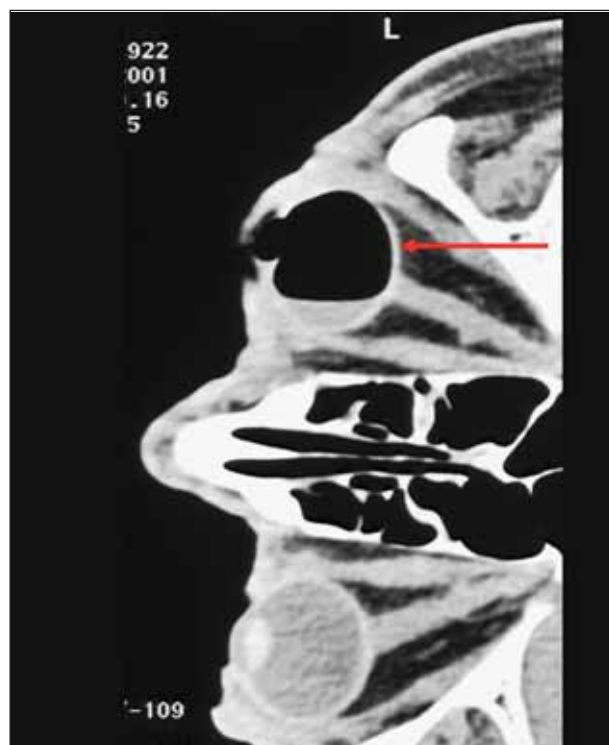


Figure 1. A 75% gas bubble covers the macula with the patient positioned on his or her side and the operated eye uppermost.

Dr. Tornambe: When we wrote the paper in the mid-1990s,¹ we performed lens removal and macular hole surgery simultaneously; a cataract surgeon would come in first, and then we would do our part of the surgery. At the time, it was considered almost blasphemous to perform both procedures together, but this has changed, particularly in Europe where combined cataract and vitrectomy surgery is more common. In the United States,

however, it is politically incorrect for a retina surgeon to remove a lens, and because most cataract surgeons would rather not come to a retina surgery center, we more typically will have the cataract surgeon remove the lens 1 to 2 weeks before macular hole surgery.

Dr. Holekamp: In your study, you stated that without face-down positioning, approximately 79% of holes closed and upon reoperation, 85% closed.

Dr. Tornambe: There are several points to be made about that study. First, approximately 80% of patients in our study had large, more mature holes—stages 3 and 4. Second, in this study published more than a decade ago, we did not peel the internal limiting membrane (ILM). Our rates would almost certainly have been better if we were operating on smaller macular holes and we peeled the ILM.

Dr. Holekamp: Your study also revealed a significant complication rate from performing simultaneous cataract and vitrectomy surgery.

Dr. Tornambe: One of the issues we encountered was that, if there is a 60% fill on the first postoperative day, reinflating the eye results in complications. Iris incarceration through the cataract wound occurred in one patient. Additionally, if the lens is not in the capsular bag, pupil capture can occur with a gas bubble. We avoided pupil capture by using acetylcholine chloride before performing fluid-gas exchange. When the pupil was brought down to smaller than the lens optic, the gas could not push the IOL forward.

Dr. Holekamp: I agree. In a related side note, we recently studied cataract formation in cases of vitrectomy for macular hole and macular pucker. In a prospective study, we found that the presence of a gas bubble did not alter the progression of nuclear sclerotic cataract. We did this using Scheimpflug digital lens photography and quantified the degree of cataract in nuclear density units so that we could run statistics. There was no difference in progression whether you had a bubble or not.

Dr. Tornambe: That is a fish-scale cataract, not the ones that you usually see. I agree with you regarding vitrectomy and nuclear sclerosis.

Dr. Holekamp: Your pilot study of no face-down positioning was published early in the process of perfecting the closure of macular holes. Not many people were peeling the ILM at that time. I do not think ILM peeling

is necessary is stage 2 or small stage 3 holes. It makes a difference in larger stage 3 or 4 holes.

Dr. Tornambe: Before the advent of ILM peeling we saw a 6% to 10% reopening rate of macular holes. Peeling of the ILM was virtually unheard of at that time. Today, with ILM peeling, reopening of the hole is rare, so I peel the ILM in all macular hole cases.

Another phenomenon that I think is interesting but I cannot explain is this: In patients in whom we sequentially take the lens out first and then do the macular hole surgery, not in the same surgical episode, we have not had one case of Irvine-Gass syndrome, ie, pseudophakic cystoid macular edema (CME). In several patients where the cataract has been removed, even years following the macular hole, CME has developed. We have not had a single case of post-macular hole CME in several hundred eyes now when the lens is removed first.

Dr. Holekamp: That is interesting because you would think the cataract surgery might reopen the closed hole and exacerbate the CME. I think the incidence of Irvine-Gass syndrome has decreased because phacoemulsification is so much less traumatic than older cataract surgical techniques. I see less classic pseudophakic CME now than I did 15 years ago.

Dr. Tornambe: In those rare cases in which the retina detaches, the macular hole stays closed, which is also interesting. I have not had much experience with CME that resulted in reopening of the macular hole. Have you seen that?

Dr. Holekamp: Not for a long time. What type of gas tamponade do you use?

Dr. Tornambe: I use 25% SF₆ in all my cases. When I used to use 20% SF₆, even though I am meticulous about closing the sclerotomy wounds to make sure they are not leaking, on the first day I would have about a 90% fill. Some surgeons wait 10 to 15 minutes after they put the gas in for the fluid to accumulate and drain out, but I do not. The 25% SF₆ provides a complete fill on day 1 and a couple more days of bubble-hole apposition. Although 2 or 3 days is probably enough time to permit the hole to seal, the 25% mixture with the patient upright provides about 5 to 7 days of full bubble-to-hole contact.

Dr. Holekamp: I agree, I do not wait 10 or 15 minutes to get the last bit of fluid off the posterior pole; I wait maybe 1 minute.

I also agree that we want the biggest possible bubble. When I review my own case series, if a hole failed to close, the record generally shows that the bubble was not very big. So, regardless of the gas used, I think we need a big bubble in the eye. It is not necessary to use C_3F_8 ; SF_6 is sufficient.

Dr. Tornambe: I think C_3F_8 is overkill.

Dr. Holekamp: I agree. Regarding your comment about holes closing in 2 to 3 days, my impression is that that is probably true. In studies using 3 days of face-down positioning and air, the success rate was fairly good.³

The reason I position patients face-down for 1 week after macular hole surgery is because my success rate with this strategy is about 95%. I cannot tell you why the other 5% do not close, except perhaps the bubble was not big enough. I tell patients that I want to do this operation one time and I want to give them the best chance of successful hole closure.

We know from microplasma studies^{4,5} that macular holes can be closed about 30% of the time without any gas bubble at all. Without face-down positioning we can close 80%. But I tell patients that they have the best chance of having a successful hole closure with one operation if they maintain face-down position for 1 week.

Dr. Tornambe: If I had an 80% closure rate, I would not continue to practice no face-down positioning. I agree with you; I think a failed macular hole carries a poorer prognosis. With reoperation, patients rarely get back to the good vision that they can achieve with a successful single operation. My closure rate is much like yours, 92% to 95%. In my last 40 macular hole cases, using 23-gauge instrumentation and SF_6 gas and performing ILM peeling, there was 100% closure with no face-down positioning (Table 1).

Regarding the belief that we give patients the best chance for success if they are positioned face down, I think sometimes we do things because our gut tells us to, without scientific foundation. Such is true, for example, with pre- or postoperative antibiotics with intravitreal office injections. I believe this faulty reasoning also applies to face-down posturing.

Dr. Holekamp: All of these patients in your recent series were pseudophakic?

Dr. Tornambe: Yes, all of them with no face-down positioning, which is about 99% of patients. I do not see macular holes in many people younger than 50 years. That group would include high myopes, frequently Asian patients; those eyes were excluded from this series. The

no-face-down-positioning strategy is used for run-of-the-mill, virgin idiopathic macular holes with no preexisting retinal detachment, no uveitis, etc.

Dr. Holekamp: Do you peel ILM on stage 2 holes?

Dr. Tornambe: I do it on all macular holes. I have reviewed the literature, and I think you probably do not have to do ILM peeling with stage 2 holes. They will close, but then there is a higher risk of reopening. As you said, I want to try to get this done with one operation, and I think peeling the ILM gives a little extra edge. It improves the success rate perhaps 7% or 8% overall.

Does this mean we are unnecessarily peeling ILM in some cases? Surely we are. We had a 78% closure rate without any ILM peeling in the mid-1990s with no face-down positioning, including larger holes. So surely it is not necessary in every case—but I do not know which cases those are. And I think we can peel ILM fairly atraumatically.

I hope that brilliant blue dye becomes available for retinal use in the near future because I think that will be the best dye to use for this surgery. I currently use indocyanine green (ICG) at a concentration of 1 mg/mL. I put a couple of drops in the fluid-filled eye and take it out immediately. That helps me to see the edge of the ILM. I cannot do it without dye. I have tried triamcinolone acetonide. In one case, a triamcinolone crystal stayed in the hole, so I stopped using it.

Dr. Holekamp: I have heard other prominent vitreoretinal surgeons say that they tried triamcinolone and abandoned it because they felt that crystals kept the hole open.

Dr. Tornambe: I don't think it necessarily keeps the hole open, but I do not like the idea of using a steroid in this situation. We are trying to get a little fibrin plug in that hole to waterproof the inner retina again. By inhibiting wound healing, I think steroids might be counterproductive.

Dr. Holekamp: That may be, but I have been using triamcinolone exclusively for the past 5 years, and it works great in my hands. I see no reason to abandon triamcinolone.

Dr. Tornambe: I probably would not either except that I had bad experiences in my first two cases with it. One did not close, probably because I did not get the ILM. In the second, the crystal lodged beneath the macular hole. After those two cases, I decided not to use it anymore.

Dr. Holekamp: On the other hand, at the Macula Society meeting 2 years ago, I presented a case in which

I was convinced that ICG dye had gained access to the retinal pigment epithelium (RPE) through the macular hole and limited visual recovery.

Dr. Tornambe: I agree that can occur. That is why I try to use as low a concentration of dye as possible. Do you recall if you used 20, 23, or 25 gauge on that case?

Dr. Holekamp: It was 23 gauge.

Dr. Tornambe: With smaller gauge instrumentation, I think the incidence of light toxicity is lower. I have not seen it since I began using smaller gauge.

Dr. Holekamp: The downside to smaller gauge instrumentation is that the infusion force is greater through the smaller cannulas. We are almost forcing the ICG right at the retina, and if it is misdirected it can go right to the hole.

Dr. Tornambe: I have my assistant blow “smoke rings.” Just a little puff that hits the retina and bounces off. I do not have a stream actually hitting the retina.

Dr. Holekamp: I agree with that. You need a good assistant though. My problem occurred when an assistant used too much pressure.

Dr. Tornambe: Fernando Arevalo, MD, presented a case similar to yours. ICG dye struck the retina with such force, it created a hole and drove the ICG beneath the retina. I also had a case where I did not aim the cannula toward the hole, it was above or below the nerve. It caused a tear in the retina, and the ICG went under the retina. I have the same concern that you do, but I think this is an avoidable complication. If I have a new tech injecting I will initially aim the cannula away from the hole and use the light pipe to prevent a forceful ICG stream from damaging the retina.

Dr. Holekamp: These patients are left with a scotoma in that area because the ICG is toxic to the RPE. I agree with you that brilliant blue might be safer and better. But again, it is hard to justify changing if you have a good success rate.

Dr. Tornambe: Have you ever had a patient say “I just can’t position face down”?

Dr. Holekamp: Yes. For those patients I use silicone oil.

Dr. Tornambe: Goldbaum, McCuen, and colleagues⁶ published a series of patients in whom silicone oil was used because they could not perform face-down positioning, and their visual results were poor.

Dr. Holekamp: Yes, I am aware of that paper from the late 1990s. I do not understand their poor visual results because I have not noticed that in my own practice.

I use silicone oil once or twice a year. People who say they cannot perform face-down positioning usually can. We provide equipment and resources that help them to maintain face-down positioning.

Dr. Tornambe: The next patient who says they can’t be face-down, if they are pseudophakic, peel the ILM and put in a 25% gas bubble. I will buy you a Mercedes if it doesn’t work.

Dr. Holekamp: If they are pseudophakic, I will consider that.

Retina Today: Dr. Holekamp, what would convince you to abandon face-down positioning?

Dr. Holekamp: A challenge from Paul to try it and if it doesn’t work he’ll buy me a Mercedes [laughs].

Paul has always been on the frontier in this regard. When I practice medicine, I truly want to give my patients the best chance at a successful surgery. It is hard to argue for changing a winning game. If the hole does not close after the first surgery, the patient needs another operation. If they could not be face-down the first time and they need a second operation, then they have to have oil, and that means two more operations, one to put the oil in and another to take it out.

I have really engineered my practice around having the very highest possible first-time success rate. I believe, however, that the macular hole probably closes within 2 or 3 days and that 7 days face-down is too much. I also believe that C₃F₈ gas is too much. I think we can probably close most holes most of the time with 3 to 5 days of face-down positioning. But Paul is saying no face-down positioning. It would really help if there were a group of people using Paul’s technique. Paul, have other people abandoned face-down positioning as you have?

Dr. Tornambe: Yes, there are quite a few. There are at least seven publications in peer review over the past 6 or 7 years.⁶⁻¹² After we published the initial paper there was about a 10-year hiatus when no one tried it, but more recently there has been renewed interest. I know Charles Gremillion, MD, in Englewood, FL, exclusively uses no face-down positioning now. He reported success in more than 100 eyes at the 2010 Masters meeting.

I am in private practice just as you are, and if my techniques do not work I know I will not get referrals. I am a reflection of the referring doctor, and if my work is not good

TABLE 1. ANATOMIC SUCCESS HIGHEST WITH BOTH 23-GAUGE INSTRUMENTS AND ICG-ASSISTED ILM PEELING

Review period	Face Down Anatomic Success (%)	No Face Down Anatomic Success (%)
Pre-ICG	8/10 (80)	47/54 (87)
ICG/ILM	17/18 (94)	78/85 (92)
ICG/ILM/23-gauge	1 (100)	37/37 (100)
ICG = indocyanine green ILM = internal limiting membrane ICG/ILM = ICG-assisted ILM peeling		

it reflects back on him or her. I have the same feeling you do, that a failed first surgery is bad and patients do not get as good vision. To me, face-down positioning is sort of like using pre- and postoperative antibiotics. They are probably not necessary, but when you have been using them for all these years without an infection, it is hard to change.

In my practice, I just don't use face-down positioning. I believe it absolutely is not necessary if the eye is pseudophakic, if you fill it totally with 25% SF₆, and if the patient does not lie flat on his back and let the bubble move away from the hole. He can lie on either side or face-down or sit up. My success rate is as good as anyone else's. The patients love not having to do the face-down positioning. The Internet is driving many patients to doctors who have abandoned face-down posturing.

Dr. Holekamp: I am familiar with some of the reports in the literature within the past 10 years. When I reviewed them, they seemed to be small retrospective case series, level 3 or 4 evidence.⁷⁻¹³ Are there any larger prospective or randomized studies by multiple surgeons?

Dr. Tornambe: We did that with the pneumatic retinopexy trial, multiple sites with multiple surgeons. That has not been done with no face-down positioning.

I reported on my 15 years' experience with no face-down positioning at last year's American Society of Retina Specialists meeting [See *Retina Today*, September 2010]. That series included about 100 eyes with run-of-the-mill idiopathic macular hole operated with ICG dye and ILM peeling. Patients younger than 50 years positioned face-down and patients older than 50 had their lens removed and did no face-down positioning. This was before I started using smaller gauge instrumentation. Of 103 eyes operated with this technique, 18 were positioned face-down and 85 were not face-down. The single-operation success rate was

92% in the no-face-down group, 94% in the face-down group. In the most recent 40 patients, with 23-gauge vitrectomy, the single-operation success rate with no face-down positioning has been 100%. One patient was positioned face-down, the other 39 were not. I have yet to publish this data.

Nancy, if you want that Mercedes, I think you are going to have to do 100 cases to find one where it does not work.

Dr. Holekamp: Paul, I have great respect for your work and your experience. It is just very hard to change a winning game and take the risk that my patient may not have his or her very best chance at hole closure. However, the field has to move forward, and you may be on the right track. ■

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