Facedown Positioning is Not Necessary in Idiopathic Macular Hole Repair

Change from current standard of care reduces morbidity and improves patient experience.

BY RAYMOND IEZZI, MD, MS

Facedown positioning for 3 days to 1 week after surgery for idiopathic macular hole repair remains the traditional standard of care. This is a significant source of morbidity for patients, however, as it is difficult and uncomfortable. Some surgeons use silicone oil in those who cannot position, requiring an additional procedure to remove the oil, which carries its own risks.

A recently published retrospective consecutive case series of patients from our practice (68 eyes in 65 patients) shows that macular hole surgery can be performed without facedown positioning with results equivalent to surgery in patients who practice facedown positioning.[1] In our case series, the single-procedure macular hole closure rate was 100% (95% CI, 95%–100%) and there were no reported complications. The postoperative visual acuities were equivalent to those previously reported in the literature with facedown positioning.

Subsequently, this technique has allowed several patients in our practice with macular holes of 16 to 20 years duration to undergo successful macular hole surgery that had been deferred due to unwillingness or inability to position facedown.

We have found clear benefits with regard to safety, comfort, and patient satisfaction. For example, facedown positioning has the potential to cause mesenteric venous obstructions. Additionally, patients who are hypercoagulable can develop deep vein thrombosis or pulmonary embolism. There are also patients who are physically incapable of maintaining facedown positioning due to musculoskeletal disorders or age. Patients who have researched macular hole surgery on the Internet often arrive in our office with a significant fear of facedown positioning. Eliminating facedown positioning removes these obstacles.

CHANGES IN APPROACH

Previous studies using full, limited, or no facedown positioning for macular hole closure have reported varying degrees of success. Our study, which reviewed patient records from March 2009 to December 2012, demonstrated noninferiority of no facedown positioning compared with prior published reports with facedown positioning. Although many studies excluded patients who had recurrent, myopic, or traumatic holes, we had no exclusions in our series.

Seventy-one percent of surgeries in our series were performed in women (n=48) and 29% were performed in men (n=20). Sixty-five percent of cases were phakic (n=44) and 35% were pseudophakic (n=24). Thirty-one percent of cases were stage 2 (n=21), 40% were stage 3 (n=27), and 29% were stage 4 holes (n=20). Fourteen percent of cases were referred to us with recurrent macular holes (n=9). Mean hole basal diameter was 610 µm ±226 µm. Mean minimum linear dimension was 285 µm ±136 µm. Five holes had a basal diameter of larger than 1000 µm.

Our study found that phacoemulsification with intraocular lens insertion is not a crucial step in the process of repairing macular holes, as a significant proportion of the cases in our series were phakic at the time of surgery. Although it is technically easier to perform pars plana vitrectomy with shaving of the entire anterior-to-posterior vitreous base in a patient who is pseudophakic, we have found that it is within our capability, by having a surgical assistant depress the sclera, to shave the vitreous base in patients who are phakic.

SURGICAL METHOD

Pars plana vitrectomy. All cases were performed via 3-port 23- or 25-gauge pars plana vitrectomy. We separated the posterior hyaloid face from the retina, anterior to the posterior insertion of the vitreous base. The vitreous skirt was shaved 360º, followed by shaving of the vitreous base under scleral indentation. Care was taken to shave the vitreous base over the entire posterior-to-anterior extent to approximately 500 µm to 750 µm from the retinal surface (one-third to one-half disc diameter).

Light management. During surgery, we employed continuous active light management. Using this technique, the endoillumination light intensity is constantly adjusted to the minimum amount of light required to permit adequate visualization for each step of the procedure. The lighting requirement for vitreous base shaving is different from that for internal limiting membrane (ILM) peeling. Typically, when working over the macula, lower endoillumination intensities are used. Active light management also includes lowering the light intensity of the operating microscope and preventing this light from entering the pupil, unless one is assessing the red reflex or the anterior segment. In addition, when injecting ICG, widefield visualization is used at the lowest endoillumination setting.

ILM peeling. Restoring the retina to a more mechanically compliant state is important when repairing macular holes. Mechanical compliance is defined as the amount of deformation that occurs per unit force applied to the retina. By removing taut epiretinal membranes or ILM, retinal compliance is increased, allowing the macular hole to close. Consequently, we uniformly peeled all membranes. We used a broad ILM peeling technique in our study. Using a pinch-and-peel method with end-grasping forceps, we peeled the ILM to a diameter of approximately 8000 µm. Superiorly and inferiorly, peeling was performed to the vascular arcades and nasally to the temporal margin of the optic nerve head. Temporally, the ILM was peeled for a distance equal to the nasal ILM peel radius.

Immediately before peeling the ILM overlying the macular hole, a 1 to 2 disc-diameter ILM edge parallel to the vascular arcade was created at a distance midway between the center of the hole and the superior or inferior arcade to mobilize a large flap of ILM on the hole. This large flap allowed the nasal and temporal ILM surrounding the macular hole to be peeled simultaneously in a single maneuver. This assured that in every case, no residual ILM was left behind at the macular hole edge. In some cases, a dense elastic membrane was encountered that could not be peeled from the foveolar edge without avulsing the foveolar tissue. In these cases, the ILM was peeled radially 360º, toward the macular hole center. Horizontal manual scissors were used to carefully amputate the membrane close to the retinal surface.

Inspecting the peripheral retina at the end of the case. ILM peeling was followed by a meticulous 360º inspection of the peripheral retina to assure no peripheral retinal breaks were untreated. If a suspected peripheral lesion was identified, it was circumscribed with endolaser of a single spot of light cryo.

Intraocular gas endotamponade. Fluid-air exchange was performed twice, 5 minutes apart, in all patients. This facilitated a uniformly good postoperative gas fill (95%) in all patients regardless of lens status. The sclerotomies were sealed by repeatedly applying focal pressure on them or via suture. An air-SF_6 exchange was performed using a 50-mL syringe filled with nonexpansile 20% SF_6 gas-air mixture. This was injected via a 30-gauge needle inserted through the pars plana. Venting was achieved using an open tuberculin syringe on a 27-gauge needle inserted through the pars plana.

FOLLOWING THE SURGERY

We recommend that patients read or do other activities in the reading position for 3 to 5 days, while awake. This has a number of merits, not the least of which is reducing intraocular convection by constraining the body's physical activity. Patients can take walks, keeping the head at a 45º angle to the ground, during the first 5 days after surgery. It is important to limit the capacity of the bubble to push the lens-iris diaphragm forward, as this could raise intraocular pressure. Patients are happier knowing they can read or work on their tablet or laptop, rather than needing to rent a special chair to be face down for days.

Patients should wear a shield when they sleep, and should not sleep on their back.

DISCUSSION

The importance of vitrectomy. The key to successful macular hole surgery is a meticulous, complete vitrectomy. A limited vitrectomy may result in a limited, possibly

inadequate, intraocular gas tamponade. Whatever fluid volume is present within the eye will displace gas from providing a complete fill to an unknown extent, because fluids are incompressible and it is not possible to know the volume of the remaining vitreous. Using a standardized method for removing the vitreous and shaving the vitreous base as described above reduces variability in the postoperative gas fill and may obviate the need for an expansile gas or facedown positioning to compensate for a gas underfill.

The role of peeling and endotamponade. The purpose of the hyaloid separation and ILM peeling is to return the retina to its natural malleable and highly compliant state. If there is a taut membrane on the inner aspect of the retina, it is no longer in a high-compliance state. The application of external forces by these membranes may not allow the retina to relax into its natural hole-closed position. Gas endotamponade seals the inner aspect of the macular hole. Under this seal the macular hole closes as the RPE pump evacuates all fluid within the hole, drawing the edges of the hole to apposition with each other. Prolonged endotamponade assures that the macular hole remains closed while it heals.

A useful technique for achieving a good gas fill is to perform at least 2 fluid-air exchanges, separated by 5 minutes, to get as much of the fluid out of the eye as possible. In rare cases, a third fluid-air exchange, delayed by 5 minutes, can be applied if a significant amount of fluid remains in the macular region after the first fluid-air exchange.

CONCLUSION

The results of our case series show that, using the surgical techniques described here, facedown positioning is not necessary after surgery for idiopathic macular hole closure.

Adoption of any new surgical method involves a learning curve, and the decision to eliminate facedown positioning from the postoperative regimen after macular hole surgery should be guided by a surgeon's confidence in his or her ability to safely shave the vitreous base to within 500 µm to 750 µm of the retinal surface from its posterior insertion to the ora serrata. Ultimately, such a near-complete vitrectomy increases the extent of gas fill and, combined with membrane and ILM peeling, ensures success in hole closure. ■

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