Combined Phacoemulsification and Pars Plana Vitrectomy

Combining these procedures benefits both the surgeon and the patient.

BY FRANCESCO BARCA, MD; AND STANISLAO RIZZO, MD

Cataract formation is the most common complication of vitreoretinal surgery. The impact on visual acuity after vitrectomy is thus remarkable and requires, within a short time, removal of the cataract in order not to negate the result obtained with the vitrectomy. In the United States, the most common approach to these cases is to tackle the 2 diseases in 2 distinct phases: first, cataract surgery, and then pars plana vitrectomy, or vice versa. Outside the United States, however, vitreoretinal surgeons often perform these procedures in a single combined surgery to maximize patient recovery and improve early visual rehabilitation.

The reported incidence of cataract after vitrectomy varies considerably among studies, ranging from 17% to 82%,1,2 percentages that increase significantly in patients older than 50 years.3 Several studies have been conducted to compare combined surgery with consecutive surgery, most of which conclude that both procedures are safe and effective.3,4 However, in the case of consecutive surgery, it is not uncommon for a patient who, after experiencing an initial improvement in visual acuity, later complains of impaired visual acuity, raising the question of whether that deterioration is due to cataract or retinal disease.

REASONS FOR COMBINED SURGERY
To better understand why we prefer combined surgery to consecutive surgery, we must consider some intraoperative and postoperative observations. Intraoperatively, it is necessary to consider what it means to perform cataract surgery in vitrectomized eyes and, conversely, what it means to perform vitrectomy in phakic eyes.

Performing cataract extraction and intraocular lens implantation at the time of vitrectomy, even if the cataract is not clinically significant, may be preferable to a second operation.

PHACOEMULSIFICATION IN PREVIOUSLY VITRECTOMIZED EYES
Performing cataract surgery in previously vitrectomized eyes poses additional risks compared with those commonly encountered during phacoemulsification in normal eyes. Intraoperative considerations include abnormal variations in the anterior chamber depth during phacoemulsification, unstable zonules, flaccid posterior capsule during cortical aspiration, and possible damage to the posterior capsule during previous vitrectomy.6 In all of these cases, the risk of complications such as dropped nucleus or lost nuclear fragments is higher. Therefore, gentle nucleus manipulation is necessary to avoid the risk of losing the nucleus posteriorly into the vitreous cavity during phacoemulsification. Indeed, cata-
Retina surgery in previously vitrectomized eyes has been reported to be more challenging than in eyes without previous vitrectomy.

Vitrectomy in Phakic Eyes
Performing vitrectomy in phakic patients can be complicated by the impairment of the surgeon’s operative and postoperative views, restricted access to peripheral vitreoretinal pathology, and unintended damage to the crystalline lens. Furthermore, after vitrectomy, it may be difficult to determine whether a patient’s worsening of vision is caused by the underlying vitreoretinal pathology or by a cataract.

Postoperative Considerations
To evaluate postoperative considerations, we selected 3 articles that discuss the visual recovery of phakic patients undergoing vitrectomy. Thompson evaluated the results of vitrectomy for epiretinal membrane in eyes with good preoperative visual acuities (20/50) and concluded that the procedure was safe and effective for these patients; however, he added that phakic patients require cataract surgery in order to achieve long-term improvement in visual acuity. Otherwise, the improvement obtained with vitrectomy is nullified by the onset of cataract.

Muselier et al compared the visual outcomes of patients with idiopathic macular hole and cataract who underwent combined surgery versus consecutive surgery (cataract extraction performed within the first year after vitrectomy). In the combined surgery group, visual acuity improved significantly during the first 6 months and then proceeded slowly until the first postoperative year, with no significant improvement between 6 and 12 months. In the consecutive group, however, the improvement in visual acuity was significant only after extraction of the cataract. The reason for this difference in outcomes was cataract progression after vitreoretinal surgery in the consecutive group, resulting in better and faster recovery of patients who underwent combined surgery.

Another important consideration is the reopening of previously closed macular holes that can occur after phacoemulsification. Macular hole reopening is a well-known complication with an incidence between 0% and 16%. The reasons for this range in percentages vary but essentially depend on the length of follow-up, whether internal limiting membrane peeling is performed, and subsequent cataract extraction. Bhatnagar et al conducted a retrospective study in which patients with macular hole were divided into 4 groups. Patients in group 1 were pseudophakic at presentation (prior cataract extraction); patients in group 2 underwent cataract extraction as a sequential procedure (vitrectomy followed by cataract surgery); patients in group 3 underwent vitrectomy only (no cataract extraction); and patients in group 4 underwent vitrectomy and cataract extraction as a combined procedure. In this series, the incidence of macular hole reopening was 11%, but the greatest risk of reopening was in group 2 (20% of cases), the consecutive surgery group.

Combined Surgery: Phaco Plus Vitrectomy
Performing cataract extraction and intraocular lens implantation at the time of vitrectomy, even if the cataract is not clinically significant, may be preferable to a second operation owing to the high rate of cataract progression after vitrectomy surgery. There are several advantages of combined surgery, including the reduced surgical risk of a single operation, shorter postoperative visual rehabilitation, faster recovery, and increased patient satisfaction. Further, better visualization of the posterior pole and the peripheral retina during vitrectomy can be achieved because lens removal allows a complete vitrectomy with vitreous base shaving and thus better gas and oil fill-in.

Surgical Technique
In considering which surgical technique to adopt, there is still an ongoing debate about 2 aspects: (1) Is it better to insert microcannulas before or after cataract extraction?, and (2) is it better implant the IOL before or after vitrectomy?

Based on our initial experience using first-generation trocars, because of the needle-like design of the trocar...
and the stepped-up diameter at the transitional area from the trocar to the cannula, relatively high force is required for insertion. Therefore, 3 microcannulas should be set up before making the corneal incision and performing cataract procedures, as this step could increase IOP, leading to possible dehiscence of the prior corneal wound and collapse of the anterior chamber (Figure 1). The current second-generation trocars are sharper and easier to introduce, but puncturing an eye immediately after phacoemulsification with relatively low IOP may be difficult in any case, and, in addition, a previously positioned infusion line can permit a safer anterior vitrectomy if a rupture of the posterior capsule occurs.

In determining when to place the IOL, it is better to insert the lens before vitrectomy (Figure 2) for 3 main reasons: First, the IOL opens and maintains the capsular bag opening. Second, if the implantation of the lens is postponed until the end of vitrectomy, it can be easy to damage the capsular bag during the maneuvers of vitreous shaving, making it difficult if not impossible to insert the IOL. Third, in our opinion, it is not true that the presence of the IOL hinders the surgeon’s view of the fundus.

For a video demonstration of a combined procedure, visit eyetube.net/?v=kupen.

**SYSTEMS FOR COMBINED SURGERY**

A suitable machine for combined surgery must have a good phacoemulsification system and the ability to have 2 infusion lines, 1 for the anterior chamber and 1 for the posterior segment; it should be possible to activate these infusion lines at the same time, simultaneously and independently providing infusion for the vitreous cavity and irrigation for the anterior chamber.

Until a few years ago, combined surgery was performed using 2 different machines, the first for phacoemulsification and the second for vitrectomy. Thus, after phacoemulsification, the surgeon was forced to wait for the operating room staff to relocate the 2 machines, remove the phaco, and approach the vitrector before proceeding to the posterior segment. Those movements were often obsolete and unnecessary and increased surgical time. The alternatives were combined machines that did not guarantee effective phacoemulsification.

Today, having an instrument that effectively combines the 2 technologies makes the entire procedure more homogeneous and orderly.

**CONCLUSIONS**

Vitrectomy in phakic patients can be complicated by impairment of the surgeon’s operative and postoperative views, restricted access to peripheral vitreoretinal pathology, and unintended damage to the crystalline lens. Phacoemulsification following vitrectomy carries increased risks of posterior capsular tears, zonular dialysis, and loss of lens particles posteriorly.

Combined surgery has many advantages for both the patient and the surgeon. The patient does not have to return to the operating room for an additional surgical procedure, and the surgeon does not have to perform a potentially technically difficult second operation. Combining phacoemulsification with vitrectomy can potentially hasten visual rehabilitation and prevent the increased physical risks and medical costs associated with a second procedure in select patients.

Francesco Barca, MD, is a vitreoretinal surgery fellow at the Academic Medical Centre, University of Amsterdam, Netherlands.

Stanislao Rizzo, MD, is Director of U.O. Chirurgia Oftalmica, Ospedale Cisanello, Azienda Ospedaliero Universitaria Pisana in Pisa, Italy. Dr. Rizzo is a member of the Retina Today Editorial Board. He can be reached via email at stanislao.rizzo@gmail.com.