

Limbus-based Vitrectomy Offers Safe Alternative in Pediatric Cases

Corneal entry site in aphakic eyes avoids risks of more posterior access.

BY VINIT B. MAHAJAN, MD, PhD

Performing vitrectomy in pediatric eyes poses special challenges for the vitreoretinal surgeon.

The infant eye is smaller than the adult eye, and the anatomy is still developing.¹ Before age 8 or 9 months, these eyes lack a pars plana, so the traditional site for surgical entry has been the pars plicata.² In addition, the goals and the potential for complications in pediatric vitreous surgery are often different from those in adult vitrectomy.

There has been a trend in recent years toward use of smaller-gauge instrumentation in pediatric vitreous surgery. Some authors have suggested that use of the smaller-gauge instruments leads to smaller wounds, faster surgical times, faster postoperative recovery, and less patient discomfort in comparison with 20-gauge vitrectomy.^{3,4} Others have argued that larger instrumentation may have advantages because small-gauge instruments can impose limitations in peripheral vitreous removal and watertight closure.⁵

As techniques for vitrectomy in children have improved, the indications for surgery have expanded. Pediatric vitrectomy is now commonly performed for retinopathy of prematurity, retinal detachment, vitreous opacification

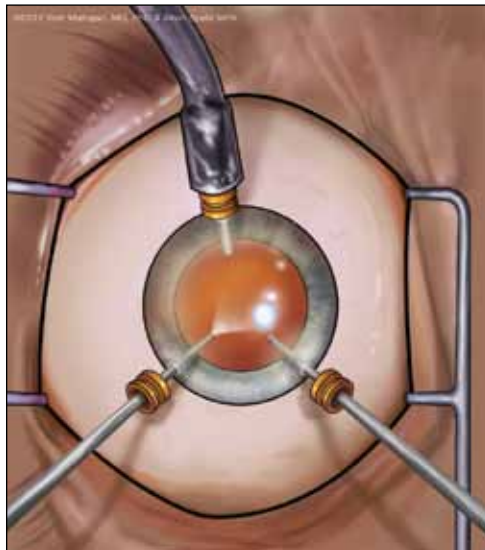


Figure 1. Surgeon's view (temporal approach). One cannula is inserted on the nasal side to accommodate the infusion line. Two more cannulas, for the vitreous cutter and light pipe, are inserted inferotemporally and superotemporally, respectively. All cannulas are extended past the iris margin into the pupillary space.

secondary to uveitis, and vitreous hemorrhage after routine congenital cataract surgery. Vitrectomy should no longer be delayed in eyes with vitreous opacity that threatens to prevent normal visual maturation.

In aphakic pediatric eyes, the possibility of an anterior approach to vitrectomy exists. Entry through the limbus could be an effective alternative to pars plicata approaches, avoiding complications associated with posterior entry.⁶

My colleagues Polly Quiram MD, PhD, Christine Kay, MD, and I recently published our results with limbus-based vitrectomy in 11 eyes of 10 pediatric patients undergoing surgery for a variety of indications.⁷ This article presents a summary of our results and the technique we described for this limbal

approach to vitrectomy in young eyes.

LIMBUS-BASED INSERTION

Our limbus-based approach was designed to avoid disruption of the vitreous base and anterior retina by surgical instruments, especially when the overlying pathology was uncertain in preoperative examination. With 0.12-mm forceps providing countertraction, a 23-gauge trocar/cannula (Alcon Laboratories Inc.) is inserted in a single movement

at approximately a 45° angle at the limbus. The trocar/cannula unit is aimed toward the pupillary space to avoid engaging the iris. The trocar is then retracted, leaving the cannula in the cornea, its distal end protruding at least 1 mm past the corneal endothelium.

The first cannula is inserted inferotemporally or inferonasally to accommodate the infusion line. Two more cannulas, for the vitreous cutter and light pipe (both Alcon), are then inserted superotemporally and superonasally. All cannulas are extended past the iris margin into the pupillary space to avoid tissue damage (Figure 1).

At the end of surgery, the limbal wounds are closed with 10-0 nylon, which is removed during subsequent examination under anesthesia, or with 10-0 polyglactin if such examination is not anticipated.

RESULTS

Our series included 11 eyes of 10 patients (7 males) 2 months to 7 years of age. Indications for vitrectomy included vitreous hemorrhage with retinal detachment (2 eyes), vitreous hemorrhage (1 eye), retinal detachment (2 eyes), opacified vitreous secondary to uveitis (2 eyes), glaucoma requiring vitreous removal prior to shunt placement (1 eye), persistent fetal vasculature (2 eyes), and retained lens material (1 eye). Follow-up was at least 3 (range, 3–6) months for all patients.

Surgical objectives were achieved in all cases. The limbal wounds were not self-sealing, and sutures were required in all cases. No intraoperative or postoperative complications at the wound site, such as wound dehiscence, Descemet membrane tears, or iris incarceration in the wound, were seen. No late wound complications such as epithelial downgrowth or corneal decompensation were seen. No postoperative posterior segment complications, such as hemorrhage, endophthalmitis, or retinal tear or detachment, were seen.

DISCUSSION AND CONCLUSIONS

A limbal approach to vitrectomy may be advantageous for a number of reasons:

- It preserves scleral integrity and avoids conjunctival manipulation, which may be beneficial in eyes that have previously undergone surgery or may require surgery in the future;
- It may limit risks associated with use of posterior sclerotomy to address occult peripheral pathologies.
- It may avoid complications of pars plicata incisions, such as fibrovascular ingrowth, recurrent vitreous hemorrhage, and vitreous traction leading to retinal tears or detachment.⁶

The trocar/cannula system used in this series provided

easy access to the anterior chamber, helped to avoid contact of the instruments with the iris, and minimized the expansion of the limbal wounds. The cannulas easily accommodated the vitrector and light pipe, which were the only instruments required in this series.

Although 23-gauge instrumentation was the preference of the vitreoretinal surgeons who performed these cases, 25-gauge instrumentation could just as easily be used in appropriate cases. Reasons for surgeon preference of the slightly larger 23-gauge instrumentation in these cases included greater instrument rigidity and more efficient fluidics and material removal.

Potential limitations of this approach include the fixed directionality of the instruments in the cannulas, which may lead to corneal distortion and poor visualization, and the fulcrum effect of the cannula, which may restrict instrument movement. These were not significant factors in any of the cases in this series. For cases involving more complex pathology, it may be that a pars plicata approach would be more appropriate.

In pediatric eyes, the distance between pars plicata and limbus is only a few millimeters, but the more anterior entry site may facilitate safer surgery with a shorter recovery time and fewer complications. These are subtle changes, but they can make a big difference in visual recovery in these young eyes and give children the advantages of a shorter rehabilitation and healing period.

Vitreous surgery with 23-gauge limbus-based trocar/cannula placement is a safe alternative to a pars plicata approach in aphakic pediatric eyes. We look forward to continuing to evaluate and potentially expand the indications for this limbus-based surgical approach to vitreous surgery. ■

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