Wound Construction in 23-Gauge Surgery

Successful closure rates may be affected by the method of incision construction.

BY KEITH A. WARREN, MD

Since its introduction less than a decade ago, microincision vitreoretinal surgery (MIVS) has been rapidly adopted in the retina community. Sutureless MIVS techniques and technology were created with the goal of providing a less invasive, yet still effective alternative to traditional 20-gauge technology for performing vitrectomy.

The first MIVS systems incorporated 25-gauge instrumentation. However, as surgeons gained experience with the early 25-gauge technology, they reported problems with the flexibility of the instruments and a resultant increased surgical complexity in anterior vitreous dissection. This led to the development of 23-gauge instrumentation,[1-7] representing a compromise in size between 20 and 25 gauge.

With the larger incision size needed to introduce 23-gauge instruments, wound construction becomes an important consideration. Achieving and maintaining adequate wound closure are key factors in the success and the utility of 23-gauge instrumentation.

COMPARATIVE STUDY

To assess the role of incision type on wound stability and construction in 23-gauge vitrectomy, we performed an interventional, comparative, retrospective study of wound performance to evaluate the wound characteristics and stability of a single-step 23-gauge incision (Figure 1) compared with a two-step incision (Figure 2).[8]

In a retrospective review, eyes undergoing 23-gauge vitrectomy with any one of three available platforms for cannula insertion were identified. Exclusion criteria included previous vitreous surgery, a known history of scleritis, or a history of glaucoma surgery or hypotony. Patients in both groups were pretreated with a fourth generation quinolone and prepped with the application of povidone-iodine solution directly to the ocular surface. All patients underwent standard three-port vitrectomy. No additional incision was made to perform a bimanual technique, so all study eyes were limited to only three incisions.

Outcome measures included the need to secure the

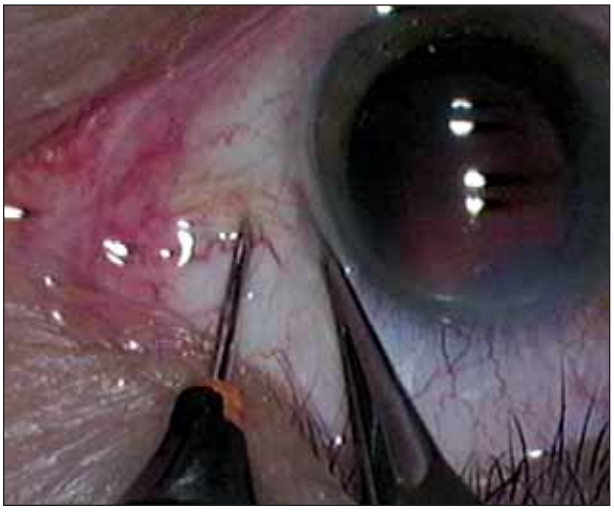

Figure 1. One-step incision.

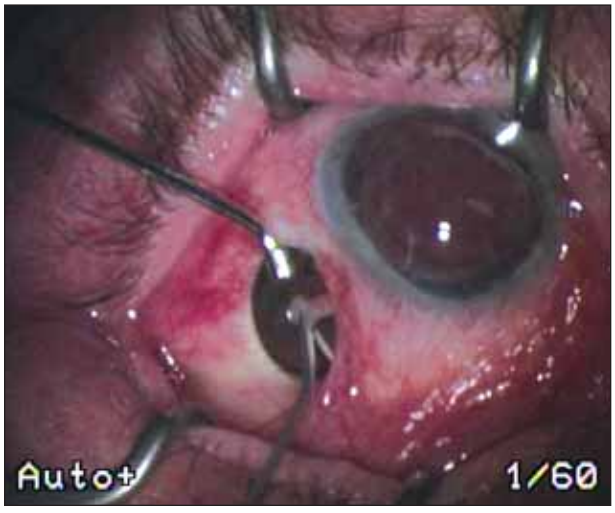

Figure 2. Two-step incision.

TABLE 1. PREOPERATIVE DIAGNOSIS BY INCISION TYPE

	Two-step	Single-step
Primary RD	37 (22.84%)	28 (22.95%)
Diabetic TRD	42 (25.92%)	8 (6.56%)
Vitreous Heme	51 (31.48%)	40 (32.78%)
Macular Hole	20 (12.34%)	23 (18.85%)
Macular Pucker	7 (4.32%)	15 (12.29%)
Diabetic CME	5(3.08%)	8 (6.56%)
Total	162	122

wound postoperatively, postoperative intraocular pressure (IOP), and complications.

CANNULA INSERTION

The conjunctiva was displaced anteriorly before cannula insertion.

With the two-step system (Dutch Ophthalmic USA, Exeter, NH), the cannula was inserted after creation of an incision using an angled, flat microvitreoretinal (MVR) stiletto blade. The angled blade created a reproducible 15° wound, in part because of the angle and sharpness of the blade.

The single-step system (Alcon, Fort Worth, TX) cannula was inserted in a single pass on an angle that varied between 15° and 30°. The variation was due, in part, to the straight blade and cyclotorsion of the globe during insertion.

No difficulty with cannula insertion was noted regardless of which platform was used.

RESULTS

Included in the study were 284 eyes of 271 patients; 162 eyes were treated using the two-step system and 122 patients using the single-step system.

The underlying retinal pathologies for both treatment groups were similar (Table 1). The most common diagnoses were vitreous hemorrhage, retinal detachment, and macular hole, with numbers about equal in each group. Mean follow-up was 6.8 months. Mean age of the patients was 68.3 years, and there were slightly more women than men (51.8% vs 48.2%).

Twenty-nine (23.8%) eyes in the single-step group vs six (3.7%) eyes in the two-step group required a suture to secure the wound at the end of surgery (*P*=.002). Of the eyes requiring a suture, two in the two-step group and 13 in the single-step group needed multiple wounds sutured.

Chemosis on postoperative day 1 was present in nine eyes in the single-step group and four eyes in the two-step group that did not require sutures.

Complications occurred in 10 patients (6.17%) in the two-step group and seven patients (5.73%) in the single-step group. This difference was not statistically significant. The most frequent complication, vitreous hemorrhage, occurred more often in the two-step group (Figure 3 [graph, slide 10]). One eye in the single-step group developed endophthalmitis.

Mean preoperative IOP was 17.8 mm Hg. Of the patients not requiring a secondary intervention, eyes in the single-step group had a mean IOP of 15.1 mm Hg at 1 day postop, compared with a mean IOP of 16.9 mm Hg in eyes in the two-step group. This difference was not statistically significant. Hypotony, defined as IOP of 5 mm Hg or less, occurred in 11 eyes in the single-step group and two eyes in the two-step group. Patients requiring wound closure had a mean postop IOP of 17.1 mm Hg.

DISCUSSION

The MVR blade used in the two-step technique creates a flat, linear, self-sealing incision that appears to be stable despite surgical manipulation. Little leakage at the entry site is noted after manipulation of the cannula. By contrast, the one-step incision after manipulation forms

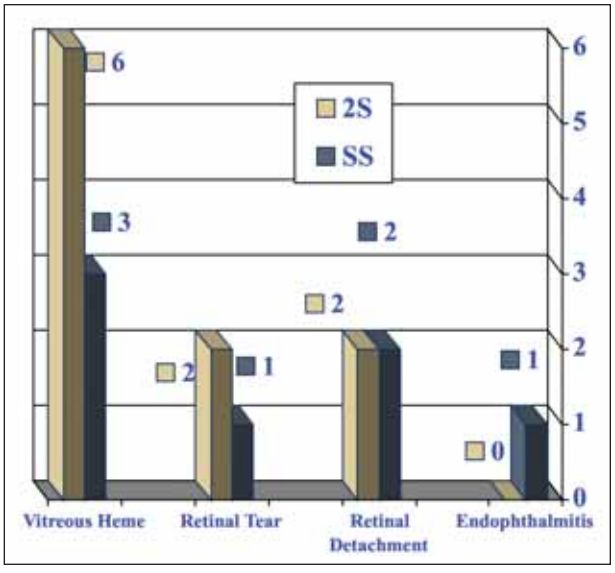

Figure 3. The most frequent complication, vitreous hemorrhage, occurred more commonly in the two-step (2S) incision group. One patient in the single-step (SS) group developed endophthalmitis.

a chevron-type incision that appears to be more prone to wound gape and leakage from the wound. These incisions appear to have less stability with surgical manipulation and to require stabilization postoperatively.

Eyes in the single-step group required suture closure more frequently than those in the two-step group, and this difference was statistically significant (*P*=.002).

The overall complication rate (5.98%) was low for all patients, and there was no statistical difference in the complication rates between the groups. The most frequent postop complication was vitreous hemorrhage. One eye in this series developed endophthalmitis.

Both types of 23-gauge system allow the performance of safe, easy, and efficient retinal surgery. In this series, the two-step system required suture closure significantly less often than the single-step system.

The difference in rates of inadequate wound closure between the two cannula systems may be related to wound construction and blade design. The stiletto-type design of the MVR blade seems to create a sharper and more controlled incision. In addition, the use of the angled blade with the two-step cannula system may offer the advantage of reproducibility when compared with a single-step system with which the angle of entry may vary.

While in this series the complication rates were similar in the two groups, surgeons must be vigilant of potential complications, in particular hemorrhage and infection, associated with inadequate wound closure in MIVS. ■

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than mild, and 90% reported less than moderate pain. Again there were no significant differences between anesthetic groups (Figure 3). Analysis of pooled data on burning and stinging revealed that 84% of total patients reported mild or less than mild pain, 92% less than moderate pain, and again there were no differences between the anesthetic groups (Figure 4).

Overall satisfaction scores were very high, with 95% of study participants grading the procedure as either excellent or very good. Again, there were no differences between the individual anesthetic groups.

SUMMARY AND DISCUSSION

The purpose of this study was to assess the effectiveness of several topical anesthesia techniques that we felt were particularly efficient. We found no significant differences in pain scores or overall satisfaction scores among the three anesthetic groups. Additionally, there was no significant difference in pain scores between 30 gauge and 31 gauge needles, regardless of anesthetic group.

Although this study found no significant differences in pain or satisfaction scores between the groups, the cost of the 3.5% lidocaine gel technique is greater than the other techniques utilizing proparacaine and liquid lidocaine.

Based on these findings, we conclude that the use of topical 0.5% proparacaine drops alone provides very good or excellent anesthesia during office-based intravitreal injections. This anesthetic technique is both efficient and cost-effective, features worthy of attention in this era of rising health care costs. ■

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