

Miniaturized Instruments in Vitreoretinal Surgery: The Future?

The time advantage gained by the use of the sutureless technique could imaginably be lost by the need for a longer vitrectomy time.

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The 20-gauge system has been the gold standard in vitreous and retinal surgery since the introduction by O'Malley in 1974.¹ During the past 30 years, this technique has been successfully developed further. In 2002, a 25-gauge system for closed pars plana vitrectomy was developed and made commercially available.^{2,3}

First reports have emphasized several advantages to be expected by the use of the new 25-gauge sutureless transconjunctival system for vitrectomy. These advantages are a shorter surgery time, no need to open and close sclera and conjunctiva, as well as no need for conjunctival and scleral blood coagulation. This subsequently minimizes surgically induced trauma and foreign-body perception. This is supposed to reduce the length of the convalescence period and postoperative inflammatory response. The microcannulas of the system are believed to permit interchangeability of instruments between entry sites and to protect the vitreous base from damage.

SUCTION AND FLOW RATES

On the other hand, suction and flow rates are significantly lower than the comparable parameters in the established 20-gauge technique, due to the smaller diameter of the 25-gauge system.⁴ This could eventually cause difficulties in removing tighter vitreous, epiretinal membranes or denser hemorrhages or clots. Membranes that are too thick or too big to be cut

We designed a clinical trial to compare the functional and clinical differences and advantages between the standard and 25-gauge system for pars plana vitrectomy.

inside the eye could be a reason for sclerotomy enlargement. The time advantage gained by using the sutureless technique could imaginably be lost by the need for a longer vitrectomy time or retinal manipulation time to remove the same amount of vitreous through the smaller caliber of the instrument.

This, however, has never been evaluated in a prospective randomized clinical trial.

IS SMALLER REALLY BETTER?

We designed a randomized, prospective, controlled clinical trial to compare the functional and clinical differences and advantages between a standard operating system and this newly developed 25-gauge system for pars plana vitrectomy. We used the two systems for pars plana vitrectomy in a group of diseases requiring uncomplicated vitreoretinal surgery. Cases requiring silicone oil or previtrectomized or retinally preoperated patients were excluded. Two randomized surgeons performed surgery on 60 patients divided into two

randomized groups, 30 for the 20-gauge system and 30 for the 25-gauge system (Figure 1).

OBJECTIVE FINDINGS

Regarding our main outcome parameter — the surgery time — the following observations could be made: The 25-gauge group showed a statistically significant shorter opening time ($P<.001$) as well as closing time ($P<.001$) compared with the 20-gauge group. In contrast, vitrectomy time was significantly longer in the 25-gauge group versus the 20-gauge group ($P<.001$). There was no significant difference between the two groups regarding the retinal manipulation time. Finally, the total operating time did not show a significant difference between the two groups ($P=.67$).

Conjunctival injection as well as subjective postoperative pain showed significantly lower irritation in the 25-gauge group ($P<.001$) compared with the 20-gauge group.

RESEARCH MUST CONTINUE

From the patient's point of view, the new sutureless transconjunctival 25-gauge system for pars plana vitrectomy offers significantly improved postoperative comfort during the first postoperative week. The smaller surgical openings facilitate wound healing and minimize pain and discomfort.

On the other hand, we finally conclude, that the time advantage gained by the use of the sutureless technique has been lost by longer vitrectomy times to remove the same amount of vitreous through the smaller diameter of the instruments. Based on these results, we already started a study with 23-gauge instruments, hoping to finally combine the positive qualities of the different vitrectomy systems. After 30 years of 20-gauge vitrectomy, new technologies are needed, and further research and development is necessary. ■

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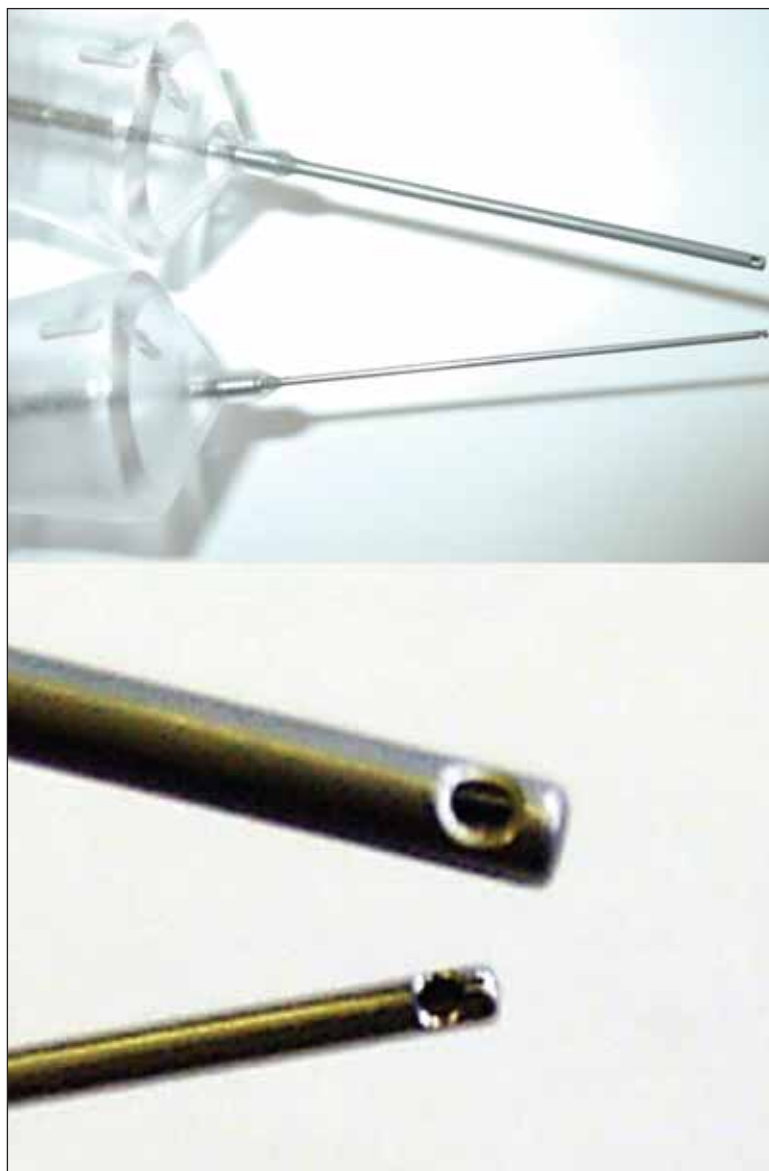


Figure 1. A magnified look at the difference between the 25-gauge instruments and the 20-gauge instruments.

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