

Single-stitch surgery can increase ATR astigmatism

by Noel Alpines, MD
Special to Ocular Surgery News

The major drawback to single-stitch and no-stitch surgery can be the inducement of a significant amount of against-the-rule (ATR) astigmatism.

Most patients with preoperative 0 D to 0.75 D of ATR astigmatism are more likely to require spectacle correction following single-stitch or no-stitch surgery, as eventual wound slippage leads to increased ATR astigmatism. This slippage is only advantageous to patients with preexisting with-the-rule (WTR) astigmatism. Patients with 1 D or more ATR preop astigmatism should undergo tangential astigmatic keratotomy to effect WTR change.

Single-stitch and no-stitch surgery certainly have advantages for the surgeon; wound closure time is reduced, and if no sutures are used the cost of consumables decreases. Patients enjoy faster recovery of vision with the reduction of early WTR astigmatism that is inherent in radial suture techniques, as well as from the need for improvement in wound architecture, which cannot be disregarded for single-stitch and no-stitch techniques.

Disappointing change

However, soon after changing from continuous-cross-stitch to single-stitch surgery 18 months ago, I noticed that some patients' initial excitement at the rapid recovery of vision turned to disappointment two months after surgery, when visual acuity deteriorated with increased ATR astigmatism. There is no reason to believe that no-stitch surgery would induce less ATR drift than single-stitch surgery with the same wound configuration.

An attempt was made to counter this problem by introducing a radial component into the tangential suture technique, calling it the horizontal single-stitch. In this technique a 5.1-mm scleral pocket incision is made to a depth of 375 µm, 2 mm behind the surgical limbus, and a suture is inserted in the posterior



Noel Alpines

edge of the floor of the pocket using 10-0 nylon and a Solitaire SU3 needle (Alcon).

Every surgeon different

When making such a change, the question arises: How does the surgeon best analyze the results of different suture techniques? Each surgeon's incision is like his or her own personal surgical signature on the eye. Just as surgeons have their personalized A-constants for each lens type, so does each surgeon's individual incision and closure technique induce different amounts of ATR astigmatism, which must be taken into account when allowing for preexisting corneal astigmatism. The aim is to maintain corneal sphericity, or keep induced ATR shift within the 0 D to 0.75 D range.

The only way for the surgeon to know the level of astigmatism he or she induces for any incision configuration is to analyze his or her own data. Reliance on the subjective reactions of patients and on single postoperative assessments, including keratometry, to determine surgical results on an ad-hoc, case-by-case basis won't give the surgeon the full picture. In my experience, the best way to analyze these data is with a software program I have developed, which employs vector analysis using Naeser's formula for polar values.

It is beyond the scope of this article to describe the mathematics involved. The approach, however, in my opinion has advantages over the Jaffe method of vector analysis.

Self-analysis

An analysis of a series of 77 patients has enabled me to assess my own induced-astigmatism levels. Accompanying photos show the incisions used.

Patients were evenly distributed among the continuous-cross-stitch, conventional single-stitch and horizontal-single-stitch incision techniques. On average, females outnumbered males 2-to-1; males on average were six years younger.

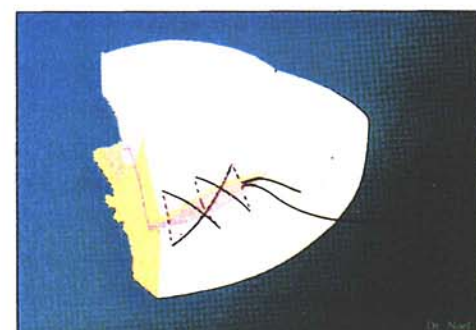
Clinical impressions had indicated horizontal single stitch to be the superior technique for countering induced ATR astigmatism. Indeed, analysis of the series showed that employing radial forces in the tangential incision does initially avoid the ATR drift of conventional single stitch. However, vector analysis of the series showed that the horizontal single-stitch technique is unable to sustain this effect in the long term.

By six months, results for single stitch and horizontal single stitch were equivalent. Indeed, the results suggest that there may well be cause

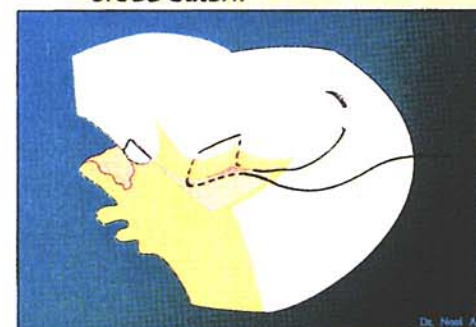
to retain the continuous-cross-stitch technique for the 0 D to 0.75 D range of preoperative ATR astigmatism. At six months the continuous-cross-stitch method was shown to induce less ATR drift than both single stitch and horizontal single stitch. Statistical comparison showed the differences to be significant.

Vector analysis using the Jaffe formula reveals no apparent difference in the calculated results for the suture types because the Jaffe formula measures only total astigmatism induced; it does not account for astigmatism in an ATR-versus-WTR sense. The Naeser formula appropriately addresses changes in the astigmatism by converting such changes to their polar values.

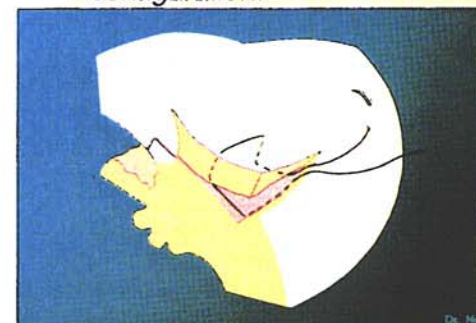
The surgeon should take into account the preoperative status of each eye's astigmatism before deciding on suture technique and whether any astigmatic keratotomy incisions will be required. A vector-analysis program of this type is well-suited to assist the surgeon in discerning how his or her own incision affects the eye so that either corneal sphericity may be maintained, or any preexisting astigmatism may be reduced, or at least not increased.



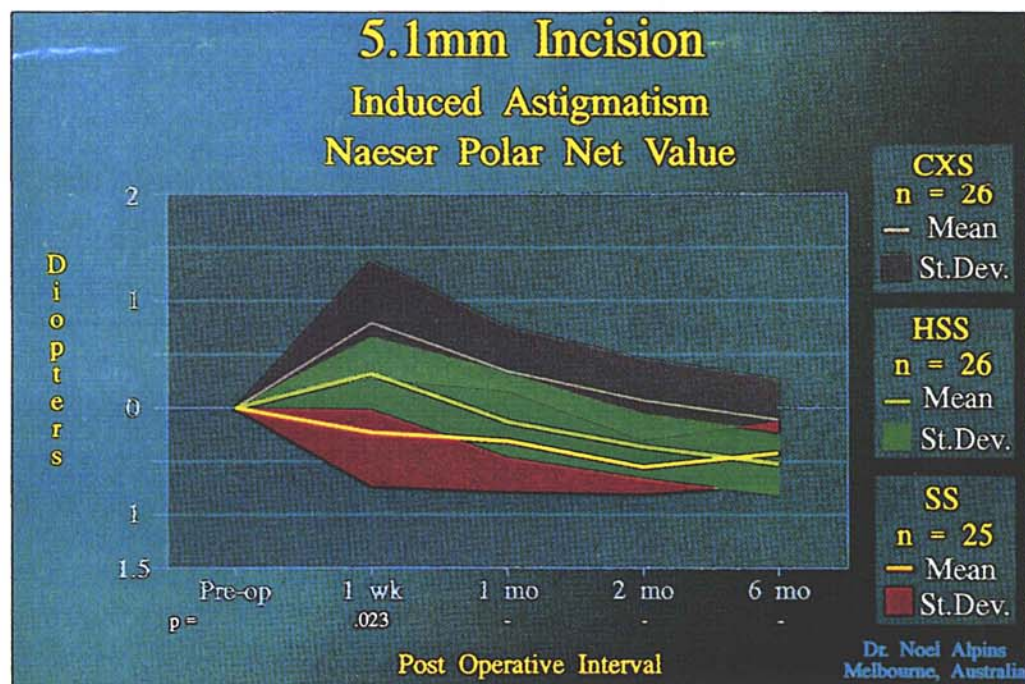
Conventional continuous cross stitch.



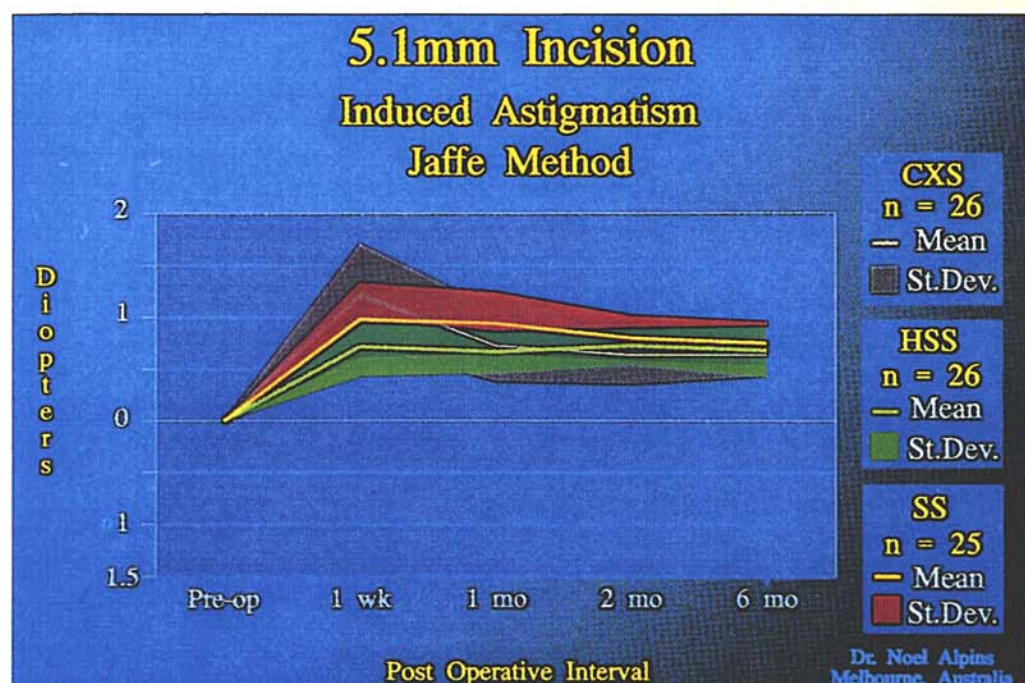
Tangential single-stitch configuration.



Horizontal single stitch has radial component.



Three techniques compared: At six months the continuous-cross-stitch method was shown to induce less ATR drift than both single-stitch and horizontal single-stitch sutures.



No polar values: Jaffe formula measures only the total astigmatism induced.

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