MINI REVIEW

Anterior segment surgery

This is a review of the most recent events in anterior segment surgery. Improvements are still being seen resulting from the general use of microsurgical instrumentation, viscoelastic agents, and finer suturing in the refinement of old and the introduction of new operative techniques. These, however, are well established, so although fundamental to many advances they will not be mentioned further.

Cataract surgery
There is much active interest, even turmoil, in cataract surgery, with a plethora of new intraocular lens designs aiming at still greater advantage (and market edge). These include surface modification to reduce endothelial hazard, the use of soft materials to permit the insertion through a small incision, and multifocal lenses to increase the already remarkable number of patients who enjoy good close vision without an additional reading correction after lens implant surgery.

A method of accurate anterior capsulotomy (capsulorhexis) is being used to prevent accidental equatorial tears. This reduces the risk of decentration of the lenticulus, important in the use of multifocal and small diameter lenses.

Although there is discussion on the relative advantages of interrupted or continuous sutures, security of wound closure is now so well established that more attention can be given to the ultimate refractive error. There is much interest in small incision cataract surgery to reduce healing time and induced refractive errors. It may be thought that emmetropia would be desirable, but in fact a small myopic astigmatism has great advantages for patients after intraocular surgery.

It is profoundly disturbing to hear reports that intraocular lenses already withdrawn in the United States are being promoted in the Third World, with resulting high incidence of endothelial dystrophy.

Corneal surgery
Surgery for refractive errors continues to excite much interest, not only within the profession but also in the media and among the general public. There is a general understanding that ophthalmic surgery is more secure and successful than in the recent past. Thus, a patient who has to wear an awkward optical correction after surgery may consider the result something of a failure. Surgeons continually strive to improve the results of their surgery, and more and more are inclined to undertake refractive surgery to achieve this end.

In the knowledge that most patients obtain good visual acuity with spectacles or contact lenses, great care must be taken in the evaluation and practice of refractive surgery.

There are more new instruments for the measurement of corneal topography by keratometry, keratophotography, and computer graphics. Much of this equipment is very expensive, but accurate surgical planning and execution are very necessary if there is to be progress towards more satisfactory and reliable results.

Methods
Methods of refractive surgery still include all the earlier concepts of treating visual defects by planned corneal surgery. They include keratomileusis (corneal sculpturing), keratoplasty (intralamellar insertion of a lenticle of cornea or substitute material), wedge resection, radial keratotomy and other relaxing incisions, compression sutures, lamellar and penetrating corneal grafts, thermokeratoplasty, and, more recently epikeratoplasty ("the living contact lens"). None of the methods are free of complication, and many involve cutting the normal cornea or removing a wedge from it. Such operations have irrevocable effects, and if the outcome is unsatisfactory they cannot be reversed. No surgical methods to alter refraction are fully predictable; they all have inaccuracies.

The predominant interest in the use of relaxing incisions has been for correction of myopic refractive errors. The quality of preoperative assessment and surgical technique is high, with great respect for the corneal endothelium. While long-term follow-up shows 75% of radial keratotomy results to be stable, 25% show increasing hyperopia. A similar proportion have fluctuating visual acuity.

The current indications for donor epikeratoplasty are restricted, and there is research into a cheaper artificial material which will encourage early epithelial cover.

Astigmatism
Although most refractive surgery has been performed for small or moderate degrees of myopia, it is patients suffering from high refractive errors who have the greatest clinical need for surgical relief. Seiler and others correctly state that the primary corneal locus of astigmatism suggests that surgical intervention for astigmatism has a more pressing indication than other refractive errors, especially given the limited ability of spectacle or contact lens technology to compensate for large astigmatic errors. The increased interest in this subject is illustrated by the publication of one whole issue of a current journal devoted to articles on astigmatism only.

Despite the efforts to close wounds accurately some patients end up with gross astigmatism in an otherwise good eye, and this usually proves to be due to inaccurate surgery. There are now many papers on the correction of graft astigmatism but very few on other surgically induced and traumatic astigmatism. It is carelessly suggested that such astigmatism can be reduced by removing all sutures, but this is not predictable, and often it can be made worse. A wound revision is often necessary.

At present the accuracy of prediction is not good enough to justify surgery for less than 6 dioptres of astigmatism, unless the symptoms are pressing. If the other eye has a similar astigmatism, but with an axis at right-angles the combined effect is used in assessment. The significant variability of effect is illustrated by the following examples.

Transverse (T)- cuts give an average correction of 6 dioptres of astigmatism, but with a standard deviation of 5-7 dioptres. Markedly distorted mires have been reported after wedge resection for high postkeratoplasty astigmatism. One of 11 patients had increased astigmatism. Methods of correcting astigmatism are still not consistent or predictable; results show a range from 3 to 23 dioptres of correction.
The Future: laser refractive surgery?

It is expected that the excimer laser will have enormous potential in making more precise corneal incisions. If this results in less postoperative astigmatism after penetrating keratoplasty, more satisfactory visual results will be obtained. Similarly great value could come from the accuracy of wound preparation in the whole range of anterior segment surgery. For example, glaucoma filtration could be established by taking an incision just deep enough to permit controlled aqueous escape without entering and decompressing the anterior chamber.

As mentioned above very recent developments with the excimer laser suggest that there are exciting developments on the horizon. Corneal laser surgery seems to be a highly precise procedure. The controlled and uniform depth of the excision leads to improved predictability of the refractive result. Various incision shapes can be programmed which may be more suitable for modifying the corneal topography than the linear and arc incisions currently used. If an area of Bowman’s membrane is destroyed, a subepithelial stromal response is troublesome, and another development being investigated is laser ablation of the stroma under a flap, so that Bowman’s membrane remains intact.

We can be sure that, from all these areas of development, the prospects in anterior segment surgery will continue to be exciting during this decade.

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