A Nearsighted Perspective of Radial Keratotomy

One of the major concerns in radial keratotomy (RK) surgery is that there may potentially be severe, long-term complications of the cornea. This idea has been debated and discussed since RK was introduced to the United States in 1978. The concern, of course, evolves from the changes in the endothelium that eventually led to bullos keratopathy in Sato's patients. While long-term complications certainly may occur in the future, there is no data to substantiate this at the present time. I think it is wise, however, to be concerned about longterm complications and to maintain a "farsighted" view of radial keratotomy. My personal concern lies with the complications that are occurring now. I think our attention should be focused on the present status of radial keratotomy, and for that reason, I coin the phrase "the nearsighted perspective of radial keratotomy."

I am disturbed by the increased number of RK patients with complications that I am seeing in my office who have been referred or who have independently sought a second opinion because of poor results following RK. They generally fall into two categories: that of over- or undercorrections; or secondly, the loss of best visual acuity.

In the first category, undercorrections are generally the least worry, assuming that there has been no loss of best visual acuity. These cases, even if they have had a reoperation, can be managed with other optical devices and are encouraged to refrain from seeking further surgical corrections. They are also told to avoid the use of prolonged wear contact lenses, which have a high incidence of corneal neovascularization and keratitis following RK.

The overcorrections, on the other hand, are visually disabling for the presbyopic patient. While there is a tendency for refractive surgeons to want to "do something" to help these patients, our attempts frequently can result in worsening the condition. I have seen incisions that have been reopened or resewn resulting in epithelial stromal ingrowth, cyst formation, and increasing glare and photophobia without significant reduction in hyperopia.

The next category of complications, and probably the most devastating, is that of reduction in best visual acuity. This is most commonly the result of an excess number of incisions. I have seen several cases that have had 40 or more incisions performed, in some cases at the initial procedure, resulting in excessive scarring, occasionally with involvement of the visual axis. I have also observed several cases of irregular astigmatism following RK, particularly when transverse incisions were placed too close to the visual axis in an attempt to correct astigmatism. Several of these cases have required homolastic myopic or hyperopic keratomileusis, or even penetrating keratoplasty.

It is the responsibility of ophthalmic surgeons to perform to the best of their ability, and I have no doubt that the vast majority adhere to this course in their daily practice of medicine. The question is, why is there an increasing number of complications occurring? The answer lies not necessarily in negligence, but rather in failure to follow reasonable guidelines for radial keratotomy. This is not surprising, since many RK courses actually teach techniques that I believe are dangerous in the hands of the novice radial keratotomy surgeon.

Radial keratotomy is a deceptively simple surgical procedure that can result in permanent and frequently irreparable changes to the corneal curvature. I would urge the inexperienced radial keratotomy surgeon to follow specific, conservative guidelines until a definitive conclusion has been drawn on this subject. These suggested guidelines are as follows:

1. Utilize the fewest possible incisions. Perform only four or eight incisions on your initial surgery. Do not exceed more than 16 total radial incisions.
2. Realize that RK rarely corrects more than six diopters of myopia.
3. Avoid astigmatism surgery in your initial cases.
4. In cases of astigmatism, leave the steeper axis of the cornea untouched so that potential incisions can subsequently be added.
5. Avoid redeepening and penetrating into the anterior chamber.
6. Limit your optic zone to 3 mm or greater.
7. Do not cross a radial incision with another radial or transverse incision.
8. Do not reopen previous radial incisions.
9. Avoid the prolonged use of topical steroids.
10. Tend toward small undercorrections.
11. Avoid continuous wear soft contact lenses in order to avoid keratitis and vascularization.
12. Avoid reoperations until one can repeatedly perform deep incisions. Sixteen shallow incisions eliminate the possibility of future correction.

In conclusion, although it is wise to maintain a "farsighted" view of RK with concern about potential longterm complications, these complications may be greatly minimized by adopting a "nearsighted" perspective to this deceptively simple procedure. Ophthalmic surgeons must adhere to reasonable, conservative surgical guidelines in a prudent attempt to eliminate the avoidable complications that are currently being encountered. By maintaining a cautious approach to RK, we will continue to establish and confirm the future of radial keratotomy as a stable and reliable refractive surgical technique.

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INDICATIONS
For steroid responsive inflammation of the palpebral and bulbar conjunctiva, cornea and anterior segment of the globe.

CONTRAINDICATIONS
Acute untreated purulent ocular infections, acute superficial herpes simplex (dendritic keratitis, vaccinia, varicella and most other viral diseases of the cornea and conjunctiva, ocular tuberculosis and fungal diseases of the eye, and sensitivity to any components of the formulation.

WARNINGS
1. In those diseases causing thinning of the cornea, perforation has been reported with the use of topical steroids.
2. Since PRED FORTE contains no antimicrobial, if infection is present appropriate measures must be taken to counteract the organisms involved.
3. Acute purulent infections of the eye may be masked or enhanced by the use of topical steroids.
4. Use of steroid medication in the presence of stromal herpes simplex requires caution and should be followed by frequent mandatory slit-lamp microscopy.
5. As fungal infections of the cornea have been reported coincidentally with long-term local steroid applications, fungal invasion may be suspected in any persistent corneal ulceration where a steroid has been used, or is in use.
6. Use of topical corticosteroids may cause increased intracocular pressure in certain individuals. This may result in damage to the optic nerve with defects in the visual fields. It is advisable that the intracocular pressure be checked frequently.
7. Use in Pregnancy—Safety of intensive or protracted use of topical steroids during pregnancy has not been substantiated.

PRECAUTIONS
Posterior subcapsular cataract formation has been reported after heavy or protracted use of topical ophthalmic corticosteroids.

Patients with histories of herpes simplex keratitis should be treated with caution.

ADVERSE REACTIONS
Increased intracocular pressure with optic nerve damage, defects in the visual fields. Also posterior subcapsular cataract formation, secondary ocular infections from fungal or viruses liberate from ocular tissues, and perforation of the globe when used in conditions where there is thinning of the cornea or sclera. Systemic side effects may occur with extensive use of steroids.

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