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Cornea (December 2008) 27(10):1219–1220.

Therapeutic Keratoplasty for Corneal Perforation

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Reply:

The letter regarding our article “Therapeutic Keratoplasty for Corneal Perforation: Clinical Results and Complication” from Professor Anita Panda et al., is very interesting and we appreciate the comments. There are 10 points that should be emphasized.

1. First, to describe our strategy for treating severe corneal inflammation, reducing and eliminating infection or inflammation are the most important points when treating a diseased cornea. Despite careful medical treatment, some cases are refractory and progress to corneal perforation. If possible, a corneal transplantation will be performed before severe complications occur. We have had 20 cases progress to perforation despite the approach described in the study under discussion. Some cases have been referred to our hospital with a longstanding perforation. Therapeutic keratoplasty performed for corneal perforation is rare at our institution. We have seen an estimated 180 cases of keratoplasty in this 3-year period, and therapeutic keratoplasty accounted for 20 (11%) of them. Because of this, we believe it is valuable to report our experience. Table 1 shows the various causes of perforation. Seven eyes (35%) had infectious keratitis and five eyes (25%) herpetic necrotizing keratitis. Active bacterial or fungal ulcers accounted for only two eyes in this report, and 10 eyes had noninfectious keratopathy.
2. The size of the perforation may determine the choice of treatment. In 20 eyes, four eyes had a perforation smaller than 2 mm, six eyes 2 to 3 mm, and 10 eyes a perforation exceeding 3 mm. Perforation always surrounded a large ulceration or a diseased stroma. Removing the perforated area with the surrounding tissue effectively controls wound healing. Curing the disease not only requires that the leaking is stopped but also that the perforated area is filled with stroma and covered with epithelial tissue. A corneal graft or amniotic membrane is suitable material to fill the thinned stromal layer.<sup>1</sup> Surgical adhesive glue can

maintain a small perforation, but the effect is not permanent. Normal corneal epithelialization and stromal wound healing are difficult in the presence of cyanoacrylate filling.

3. We had two cases of perforation caused by acute bacterial or fungal infectious keratitis. Both cases underwent a previous penetrating keratoplasty (PK) and developed a severe persistent epithelial defect. A soft contact lens may be suitable and necessary to protect the epithelium with careful observation in these cases. It is difficult to discuss infections caused by misuse of soft contact lenses.
4. We reported all of the perforations in our institution over the past 3 years. Ulceration and perforation had various etiologies and various sizes and locations in this series, and suitable surgical techniques should be performed. We know PK and peripheral lamellar keratoplasty (LK) are entirely different procedures and mentioned that in “Surgical Technique and Intraoperative Complications” and Table 3. We added the visual prognosis, i.e., the best-corrected visual acuity was unchanged in three eyes and decreased in one eye in the group that underwent LK.
5. We added details about peripheral LK grafting. All peripheral LK cases were treated with fresh donor tissue.
6. Perforation caused by keratoconus is also rare in our institution. Some articles have reported on perforations in the presence of keratoconus.<sup>2, 3</sup> It is extremely rare, but it is essential to know that perforations can develop in these patients.
7. Cataract surgery with therapeutic keratoplasty for an acutely infected eye carries the risk of endophthalmitis because of spreading bacteria or fungi. In the study under discussion, four infected eyes underwent therapeutic keratoplasty with cataract excision. Three eyes had perforated herpetic necrotizing keratitis with a dense cataract, which

could be an indication for optical treatment. One eye with active bacterial keratitis had had severe melting of the lens capsule and required cataract surgery. Surgeons should be alert to the disease conditions and select a suitable surgery on a case-by-case basis.

8. Removal of the diseased area with surrounding normal tissue may prevent recurrence of bacterial or fungal keratitis. The recurrence of herpetic keratitis cannot be prevented by simply removing the area of diseased cornea. Oral or topical use of acyclovir might be effective in this case. Neurotrophic ulcers need careful ocular surface treatment to protect the epithelium. Rheumatoid arthritis and autoimmune disease needs corticosteroids, immunosuppressive agents, or both. We have reported the need for additional postoperative treatment in Surgical Technique and Intraoperative Complications and Disease Cure.
9. We also believe that cataract development is not an acute problem. There have been several debates about the optimal time to perform secondary cataract surgery. We had five cases of keratoplasty with cataract removal and five cases of secondary cataract surgery after keratoplasty.
10. We understand based on a reference search that there are differences among authors.<sup>4-6</sup> In our report, only a few patients had short-term follow-up, but the patients were all treated consistently during that time. We think that surgeons should report the results of constant treatment in the short term, although it is also important that a larger number of patients be studied in the long term.

Different results are expected to be reported in the future with advances in treatment, such as more effective antimicrobial, the advancement of immunosuppressant, or improved surgical techniques.

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