

Options to treat keratoconus expand

by **Matt Young EyeWorld Senior Staff Writer**

Ferrara Ring approved in Europe

If surgeons are interested in treating keratoconus with a surgical implant, Intacs (Addition Technology Inc., Des Plaines, Ill.) is not necessarily the only option.

The Ferrara Ring (Ferrara Ophthalmics, Brazil) is another option that has been approved in Europe.

The Ferrara Ring is a PMMA medical device that can be implanted in the corneal stroma. Its purpose is to regulate corneal deformities caused by tissue pathologies, and it corrects or reduces associated refraction errors. In particular, it has been studied to treat keratoconus with good results.

"In 1996, as an experience, we implanted a PMMA intracorneal ring to correct keratoconus in a patient recommended for cornea transplant," said Paulo Ferrara, M.D., Ph.D., president of Ferrara Ophthalmics. "The surgical result was extremely favorable."

Since then, studies also have confirmed the benefit of the Ferrara Ring for keratoconus. Dr. Ferrara co-authored a study in the November/December 2003 issue of the *Journal of Refractive Surgery*, where he concluded, "Ferrara intrastromal ring segments appear to be an alternative for the treatment of severe keratoconus."

Ring success

In Dr. Ferrara's study, the Ferrara Ring segments were inserted in 36 eyes of 35 patients with severe keratoconus. Patients were analyzed after a 12-month follow-up period.

"All patients had highly disabling visual acuity, contact lens intolerance, and a previous indication for penetrating keratoplasty," Dr. Ferrara wrote in his study.

The results were favorable, the researchers said.

Uncorrected visual acuity improved in 28 eyes (77.78%) and best spectacle-corrected visual acuity improved in 29 eyes (80.56%). Spherical equivalent refraction decreased from -7.29 ± 3.12 D to -4.80 ± 3.04 D by month 12 post-op. In addition, no patient lost any visual acuity, researchers said.

"Corneal topography and ultrasound biomicroscopy showed corneal flattening, demonstrated by thinning of the central cornea and a reduction in anterior chamber depth," Dr. Ferrara said in the study.

However, the surgeries weren't all without complications.

Segment decentration occurred in one eye (2.7%). A symmetric positioning of the segments occurred in two eyes (5%). Inadequate depth occurred in

Indications of the Ferrara Ring

- Patients with keratoconus who are contact-lens intolerant;
- Patients with a keratoconus in evolution;
- Corneal warpage;
- Astigmatism after penetrating keratoplasty;
- Corneal ectasia iatrogenic after refractive surgeries (e.g., PRK and LASIK);
- Irregular astigmatism after RK;
- Pellucid marginal degeneration.

Contraindications of the Ferrara Ring

- Advanced keratoconus with keratometry bigger than 75.0 D ;
- Keratoconus with severe corneal opacity;
- Hydrops;
- After penetrating keratoplasty, when the donation bottom is decentralized;
- Severe atopic disease;
- Any local or systemic active infective process;
- Autoimmune or immunologic disease;
- Recurrent corneal erosion syndrome;
- Corneal dystrophy.

Source: Ferrara Ophthalmics, Brazil

two eyes. Segment migration occurred in two eyes. And segment extrusion was necessary in five eyes (13.8%). One eye also suffered from conjunctivitis, while another did so from bacterial keratitis. Overall, after a surgeon gets over the learning curve of using the ring, he or she can expect a 3% complication rate, according to the company. Complications also are related to patient habits, company officials said, such as excessive eye rubbing, which could cause the ring to come out of position. Generally, however, the complications are reversible, which makes the procedure safe, officials said.

When it doesn't work, and other uses

Advanced keratoconus with K readings greater than 75 D is a contraindication for the Ferrara Ring, as is keratoconus with severe corneal opacity. Recurrent corneal erosions and corneal dystrophy also are contraindications. But the Ferrara Ring also can be useful for other problems than keratoconus as well.

For instance, the Ring is indicated for astigmatism after penetrating keratoplasty and irregular astigmatism after RK.

However, Yaron Rabinowitz, M.D., director of ophthalmology research, Cedars-Sinai Medical Hospital, Los Angeles, and a well-known researcher of Intacs (Addition Technology Inc., Des Plaines, Ill.), said that with the Ferrara Ring, the optical zone is much smaller, which means patients tend to have more glare.

"The Intacs was designed in such a way that the inner diameter is about 6.8 mm, so the whole idea is to reduce the amount of glare," Dr. Rabinowitz said. One argument that sometimes is made is patients with keratoconus have glare anyway, "but I don't think that's necessarily a valid argument for this treatment option," Dr. Rabinowitz said.

Editors' note: Dr. Rabinowitz has no financial interests related to his comments. Dr. Ferrara is the president of Ferrara Ophthalmics.

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