
Zigzag incision using femtosecond laser effective for penetrating keratoplasty

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in Las Vegas

THE use of the femtosecond laser to cut a zigzag incision in both the donor and host cornea is an effective way to perform penetrating keratoplasty, according to a recent study.

“The zigzag incision is biomechanically stable and secure, and surgically straightforward,” said Roger Steinert MD, director of refractive, cornea and cataract surgery at the University of California, Irvine,

speaking at the AAO annual meeting.

The study included 16 eyes undergoing penetrating keratoplasty, many with simultaneous macular disease. The first six cases were performed at the University of California at Irvine using tissue from the Northwest Lions Eye Bank. Dr Steinert and his fellows used the IntraLase femtosecond laser for all the procedures.

The procedure involves cutting a zigzag pattern incision that is the exact opposite in donor and host, creating a “lock and key” match. The posterior incision begins in the

anterior chamber or deep stroma, angling from centre to periphery at 45 degrees. Then a lamellar ring, 0.5mm in width at 320 microns of depth, runs from periphery to centre at a constant depth such as 320 microns. Finally, an anterior side-cut angled at 45 degrees extends from the central lamellar incision to the periphery. The result is a zigzag-shaped incision. The transplant is closed with a 24-bite 10-0 nylon running suture.

Three months after the procedure, follow-up was available for eight eyes (the other

eight had not yet reached the 90-day point). Topography revealed that the average simulated keratometry reading was 3.5 D with a range of 0.4 to 8.4 D. Six of the eight eyes had a reading of less than 3.5 D.

The researchers also found that BSCVA was 20/80 or better in four out of five eyes three months after the procedure, despite the fact that most patients had macular disease. Dr Steinert said this was especially significant because functional vision usually

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takes six months to return with conventional penetrating keratoplasty and three months to return with Descemet's Stripping Endothelial Keratoplasty (DSEK).

"The femtosecond laser PKP procedure appears to have a rate of recovery of vision that may be competitive with DSEK," he said.

In showing a slide of an eye that had undergone the procedure, Dr Steinert drew the audience's attention to the smoothness of the contour at the incision, with excellent alignment of both the anterior and posterior curvatures. He also pointed to a shadow that he explained was the suture.

"The suture is mid-depth; it didn't go to

the apex of the tissue," he said. "Despite that the suture was mid-depth, the posterior tissue is in perfect alignment and perfect apposition. This demonstrates that the zigzag incision is biomechanically favourable and stable."

Why a zigzag is best

Dr Steinert explained that the femtosecond laser makes a wide variety of cut patterns possible, including the standard, top hat, mushroom, Christmas tree, zigzag, and zig square. He said that he quickly settled on the zigzag shape because it provides a hermetic wound seal, and because the angled edge provides a smooth transition between the host and donor tissue.

He said that using the femtosecond laser provides better-quality vision, with less astigmatism and fewer aberrations, compared with transplants using a conventional trephine.

"The laser does a better job from an optical standpoint, and there's faster recovery of vision," he said.

Dr Steinert concluded that femtosecond laser corneal transplant is technically feasible and produces better results than those seen with conventional transplant. The zigzag configuration is only possible with laser incisions, he emphasised. He said that the next step in research would be to compare conventional corneal transplantation with that using the femtosecond laser.

"We're taking a tool from primary refractive surgery, and giving it to the transplant surgeon," he said.

"We need the astigmatism reduced when we perform corneal surgery," said Amar Agarwal MD of Dr Agarwal's Eye Hospital in Chennai, India, in an interview with *EuroTimes*. He said that use of the femtosecond laser was a good way to reduce the amount of astigmatism.

"The zigzag technique of Roger Steinert is a very good technique. It helps the normal healing much better. Using the IntraLase one can easily do it. It also won the film festival award at ASCRS 2007," Dr Agarwal added.

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