

Femtosecond laser holds promise for lamellar keratoplasty applications



Methiye Onder Nurozler

Dermot McGrath in Rome

THE IntraLase femtosecond laser keratome appears to offer surgeons a precise and safe means of performing anterior lamellar keratoplasty (ALK) in patients with keratoconus, according to initial results presented during the 9th Winter Refractive Surgery meeting of the ESCRS.

Methiye Onder Nurozler MD, Dunya Eye Hospital, Istanbul, Turkey, said that using a femtosecond laser for anterior lamellar keratoplasty removed one of the more difficult aspects of such procedures – manually dissecting diseased tissue with replacement segments obtained from donor corneas.

The femtosecond laser allows for greater precision by using computer software to match the exact shape of the removed and donated corneal buttons. It also appears to deliver consistently good visual outcomes and faster recovery times, she reported.

“Our small study showed that IntraLase femtosecond-assisted anterior lamellar keratoplasty is a promising alternative approach for managing keratoconus. The laser provides a precise and smooth lamellar cut which seems to lead to a clear improvement in visual results,” she said.

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The study included six eyes of six patients diagnosed with keratoconus who underwent ALK utilising IntraLase for lamellar cuts from both donor and recipient corneas at the Dunya Eye Hospital, Istanbul, Turkey.

Dr Nurozler said that most of the patients were in a young age group and all of them were contact lens intolerant with poor uncorrected and best-corrected visual acuities. All patients had relatively clear corneas with no evidence of cornea scarring.

As in the case of corneal flap creation, tissue cutting is accomplished by scanning the focal spot of a femtosecond laser at a predetermined depth in the cornea of a donor globe, forming an incisional plane of expanding, concentric circles. Stacked, successive circles are then scanned to create cuts to free the donor tissue cap or button. In the recipient cornea, identical cuts are made and the diseased anterior corneal button is lifted from the recipient globe. The donor graft is placed onto the recipient stromal bed and sutured.

Good early postoperative results

Dr Nurozler noted that all grafts were clear without any interface reaction on the first day and week after surgery. All eyes had at least 20/200 uncorrected visual acuity postoperatively and this typically improved over the three-month follow-up period. At the three-month follow-up mark, three eyes showed a two-line improvement in Snellen visual acuity. Slit lamp examinations showed three patients with striation on the posterior surface of the cornea.

Despite the striations, Dr Nurozler said that the procedure results in a central cornea that is clear and compact. The smooth matching surfaces, the perfect donor-recipient fit, and the clean, sharp graft-host interface produced by the femtosecond laser may have contributed to the impressive visual acuity observed in some of these patients within three months.

Dr Nurozler noted that the postoperative topographic maps confirmed an improvement in

corneal shape and a reduction of the prominent cone contours associated with keratoconus.

“Our Orbscan topography results showed prominent flattening and thickening of the

recipient corneas. However, topographic improvement did not correlate with visual results at the same time-frame and visual recovery was typically slower,” she said.

Procedure well tolerated

Another particularly encouraging aspect of the IntraLase-assisted graft, she noted, was that the procedure seemed relatively atraumatic for patients.

“Patients were free of pain and irritation starting from the first day of the actual surgery and sutures were removed after the first month without any complications,” she said.

Dr Nurozler concluded that these preliminary studies show that the femtosecond laser can make non-mechanical cuts for anterior lamellar keratoplasty with relative ease and reliability, thus facilitating the most technically difficult step in this surgery.

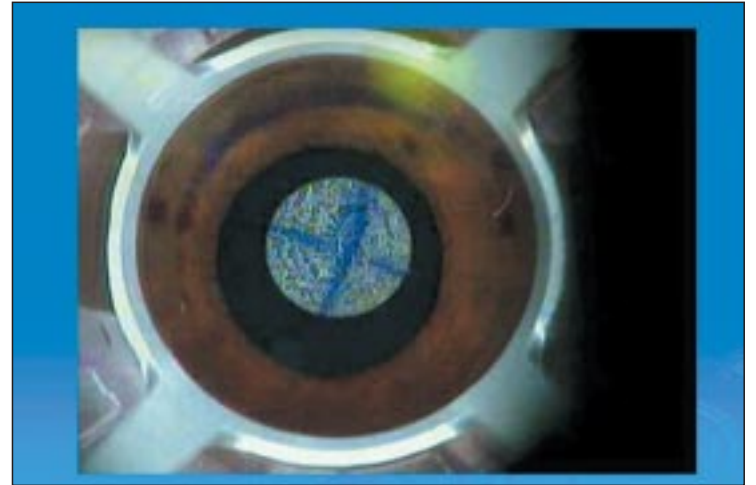
Although femtosecond lasers are primarily considered as an alternative to mechanical microkeratomes for creating the flap in LASIK procedures, manufacturers such as IntraLase and 20/10 Perfect Vision are keen to expand the technology into other ophthalmic applications such as lamellar keratoplasty and creating channels for Intacs insertion.

These companies believe that early results show that astigmatism, especially irregular astigmatism, can be reduced using femtosecond laser technology, representing a potentially important advance in transplant surgery. They further stress the ease and safety with which this procedure can be performed, which may shift current surgical practice away from penetrating keratoplasties that are easier to perform but carry a higher risk of complications.

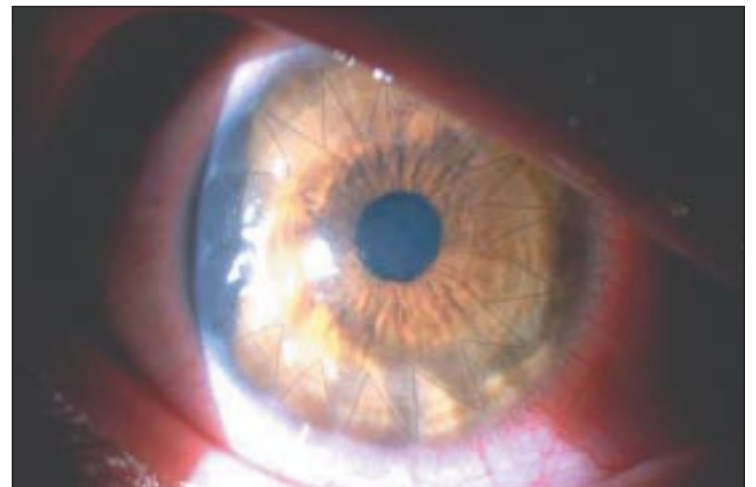
To help spread the message, a global team of corneal surgeons, expert in the field of therapeutic lamellar keratoplasty, recently formed the IntraLase Lamellar Study Group specifically chartered to advance the use of the IntraLase laser for therapeutic procedures.

New guidelines issued by the group are designed to assist ophthalmic surgeons performing anterior lamellar keratoplasties.

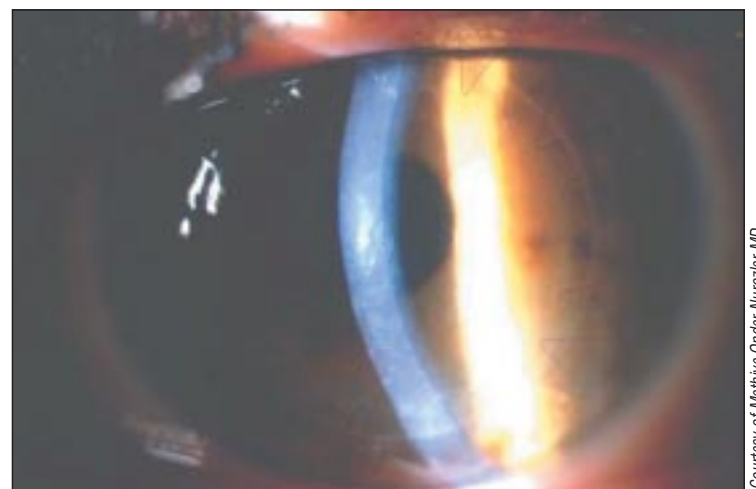
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Creation of corneal button with IntraLase.



In the early postoperative period the eyes show a quiet and clear graft-recipient bed compliance.



Slit section of the interface: note the wrinkles of the posterior surface which is the most possible cause of delay in visual improvement.