Performing intrastromal arcuate keratotomy with an Intralase femtosecond laser (IFS, AMO) is a safe and effective means of treating moderate amounts of astigmatism, reports Wolfgang Riha MD, for the research team which includes Theresa Rückl MD and Prof Günther Grabner MD, University Eye Clinic, Paracelsus Medical University, Salzburg.

“The IFS-laser allows the creation of precise, purely intrastromal incision patterns that are not readily achievable by standard diamond blade techniques. Our preliminary outcomes indicate an excellent safety profile, the possibility of highly precise pattern placement, very rapid recovery and stability of vision,” Dr Riha said at the 16th ESCRS Winter Meeting.

In a study involving 21 eyes of 21 patients, intrastromal arcuate keratotomy with the Intralase femtosecond laser (IFS, AMO) reduced corneal astigmatism by 0.25 D to 2.5 D in a manner highly dependent on the cut angle. In addition the cylinder reduction remained stable over the first six months of follow-up, Dr Riha noted.

Arcuate cuts

The study included 17 patients with naturally occurring astigmatism ranging from 0.75 D to 3.5 D and four patients with 1.25 D to 1.5 D of residual astigmatism following cataract surgery, he said. All underwent the creation of arcuate cuts placed completely within the corneal stroma on the steep axis using the femtosecond laser.

Immediately preceding the laser treatment, the steep axis using the Keratron scout (Optikon), an intraoperative videokeratoscope was marked by the surgeon (GG) and an ultrasound-pachymetry centrally and in four quadrants was performed. Depending on the amount of astigmatism present in each eye, one of four different treatment patterns was selected, which varied in the zone diameter, side-cut angle and incision width, based on pachymetry. At a follow-up which extended a minimum of six months, keratometric changes with the Pentacam® HR (Oculus) and the Keratron Scout were measured and wavefront aberrometry was collected with the WASCA Wavefront Analyser (Carl Zeiss Meditec).

Following surgery, all patients had a reduction of their astigmatism, which remained extremely stable throughout follow-up. At six months the mean manifest refraction cylinder of 16 patients having had treatment with the same incision pattern was 0.33 D and their topographic cylinder was 0.63 D.

Dr Riha said that they were able to place all incisions in their planned locations and no perforations occurred. Furthermore, the incisions were barely visible by slit-lamp examination from the first postoperative day, but were detectable by OCT (Visante®, Carl Zeiss Meditec). Endothelial cell count was unchanged from preoperative values, he added.

Encouraging safety results

Complications occurred in two patients, Dr Riha said. In one case there was a slight decentration, but the patient nonetheless achieved an uncorrected visual acuity of 20/20 in that eye. In another case there was a loss of suction, requiring a repeat treatment. At six months the patient had an uncorrected visual acuity of 20/50, which was better than the baseline value prior to planned phacoemulsification.

“The take-home message is that we have encouraging safety results. The intrastromal incisions probably have less of an anti-astigmatic effect than standard arcuate incisions, but we think that it may be more stable in the long-term. In addition, we seem to have less sicca syndrome with this technique because it doesn’t harm the corneal nerves as much. The patient satisfaction was also very high, because of the short treatment time and low rate of complications,” Dr Riha summarised.