CATARACT & REFRACTIVE

REFRACTIVE SURPRISES
Expect the unexpected when dealing with unusual eyes of cataract surgery patients
by Roibeard O’Haineachain in Vienna

Patients undergoing cataract surgery can have both expected and unexpected refractive surprises, but many can be avoided and most can be fairly easily remedied, said Simonetta Morselli MD, chief of Ophthalmic Department, San Bassiano Hospital, Bassano del Grappa, Italy.

“We expect refractive surprises after corneal refractive surgery. We don’t expect refractive surprises after implantation of a +4 D or -3 D monofocal IOL, but they can occur,” Dr Morselli told attendees at the XXIX Congress of the ESCRs.

Refractive surgery patients represent some of the more difficult cases in terms of IOL calculation, she noted. That first became evident in cataract patients who had undergone radial keratotomy, she noted.

The non-standard curvature of eyes that have undergone RK make standard keratometry readings inaccurate, she said. Furthermore, since the earliest procedures were performed at a time when IOL implantation was nothing like the standard practice it is today, preoperative K readings are never available. Therefore corneal topography is mandatory. In addition, the reduced rigidity of the eye requires the optical measurement of axial length (Figure 1).

A similar situation prevails in regard to eyes that have undergone PRK, where corneal topography is also necessary for IOL calculations, although most types of axial length measurement will suffice, but optical methods are probably better, she said.

In the case of both RK and PRK, getting the hoped for refraction following cataract surgery right the first time is not something surgeons should rely on. Moreover, following radial keratotomy it can take a month after cataract surgery for the eye to reach its final refraction. Eyes that have undergone PRK, however, generally achieve their final refraction more or less immediately after surgery. In either case Dr Morselli said she recommends implanting IOLs that are easily removed and replaced. Hydrophilic acrylics are particularly useful in that regard because they can be removed through 2.2mm incisions (Figure 2).

Cataract patients with phakic IOLs present much less of a problem since the procedure has little impact on keratometry readings, although optical measurement of the axial length is necessary. The IOLMaster includes an option for dealing with such cases, Dr Morselli noted. It is usually clear in the immediate postoperative period whether the patient has achieved the correct refraction, which is true in around 90 per cent of cases, she added.

“If there is a refractive surprise in such cases I will sometimes replace the lens immediately, another possibility is to implant a piggy-back IOL in the sulcus. Implanting a light-adjustable lens to begin with is another option,” she said.

Unexpected refractive surprises
IOL calculation in eyes with unusual anterior chamber depths requires special attention, she noted. In a highly hyperopic eye the flat K can lead to the assumption that the anterior chamber will be shallower and that the implanted IOL closer to the cornea and conversely in a highly myopic eye the steep K can lead to the assumption that the anterior chamber will be deeper and that the IOL will be further from the cornea.

However, in reality, the capsular bags in such eyes are not in the normal position, and therefore the A constant for the IOL used will not be correct because it will not reflect the true effective lens position. The result is an unexpected refractive surprise, Dr Morselli said.

Fortunately, there is a new seven-variable formula, the Holladay 2, created by Jack Holladay MD, which in addition to taking into account the standard axial length and keratometry measurements, also incorporates anterior chamber depth, lens thickness, white-to-white diameter, patient refraction, and age,” she added.

The multivariable formula tends to be more accurate than the two-variable formulae in eyes with extreme refractive errors, she said. It is available as part of the Holladay IOL Consultant/Surgical Outcomes Assessment Program (HIC-SOAP, available at www.hicsoap.com). For surgeons who find themselves dealing with very long or very short eyes, but who don’t have the HIC-SOAP formula ready to hand, calculating for about 1.0 D of myopia may be the best alternative. “This is only my experience, but sometimes it works,” Dr Morselli said.

Refractive surprises can also occur with piggyback IOLs even when using the refractive Vergence formula (Holladay et al J Cataract Refract Surg 1997; 23:1356-1370), which is the standard formula for piggyback IOL power calculation, Dr Morselli noted. She cited as an example a recently reported case in which a myopic patient ended up with a +3 D overcorrection because of an unexpected amount of space between the two IOLs (McCartney, J Cataract Refract Surg. 2011 Jul; 37(7):1372-3)(Figure 3).

Delayed refractive surprises can occur when lenses become dislocated, as has been the case with some of the early lenses designed for implantation through the micro-incisions used in MICS procedures. The early lenses were designed to be highly pliable, but as a result were unable to maintain their position in the bag during capsular contraction and were dislocated either forward or backward. The resulting refractive surprises were particularly pronounced in IOLs with high refractive powers.

“We can control and manage expected and unexpected refractive surprises by paying attention to the preoperative anatomy and the condition and surgical history of the eye,” Dr Morselli concluded.

Figure 1: MICS after RK

Figure 2: Hydrophilic acrylic IOL can be removed easily through 2.2mm incisions

Figure 3: Vergence formula can be removed through 2.2mm incisions

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