Torsional phacoemulsification with the OZil handpiece represents a revolutionary new means of removing nucleus material much more efficiently and safely than traditional longitudinal ultrasound, according to leading surgeons familiar with the technology.

“While it is clearly an evolution in phacoemulsification technology, I think that the impact of OZil is almost a revolution,” said David Allen, FRCS, FRCOphth, who has operated on several hundred patients using torsional phacoemulsification.

“Once they have had access to OZil, all surgeons I know have found it to be a significant advance in technology. There is simply no repulsion of material from the tip during active phaco, and the whole procedure of nucleus removal is much more quick and efficient,” he said.

**Attraction not repulsion**

Even with dense nuclei, the low energy released into the eye enables the surgeon to maintain minimal turbulence in the anterior chamber, said Dr Packard.

“Because there is no repulsion and because the pieces come towards you at all times, rather than going away from you, you will not see pieces of nucleus bouncing up towards the endothelium or down towards the posterior capsule. And it is quite uncanny that because these fragments come towards you, you feel very much more in control during the procedure and you do not need to use such high aspiration flow rates in order to achieve the same result,” he said.

Taking all of these features together, it is clear that torsional phaco is superior to longitudinal phaco, concluded Dr Packard. “The argument is clear cut. First of all there is no, or minimal, cavitation, and we have lower heat production and lower energy usage with OZil. This translates into a more efficient use of phaco power, less turbulence due to reduced flow rates with the same effect on tissue removal, and better followability. But also most importantly, we now have attraction rather than repulsion of nuclear material.”

**WHY OZIL SPELLS THE END OF THE LINE FOR TRADITIONAL PHACO**

### Why OZil has the edge

As a new cataract removal modality on the INFINITI Vision System, the OZil torsional uses ultrasonic oscillations of an angulated or curved tip, and dramatically alters both the energy profile and the reaction of the lens material contacted by the tip.

Unlike traditional ultrasound, there is no forward and backward movement of the tip with torsional ultrasound. In the torsional mode, the handpiece oscillates from side to side at 32,000 times per second. Because the tip of the instrument travels a greater distance than the oscillating shaft that resides within the incision, a much greater amount of energy is delivered at the tip than at the shaft. This greatly reduces the possibility of temperature elevation/thermal injury at the incision.

The sweeping side-to-side motion of the OZil handpiece shears off nucleus pieces without repelling them, thereby eliminating ‘chatter’ or repulsion and improving followability, according to Richard Packard MD, FRCS, FRCOphth.

“The beauty of the system is the flexibility that it gives the surgeon. You have the option of using either torsional alone or longitudinal alone or you can combine the two by having longitudinal mode first and then torsional if you prefer that approach,” he said.

Nevertheless, Dr Packard added that the cutting efficiency of the OZil handpiece has been so impressive that he has not yet needed to switch modes when dealing with harder nuclei.

“When I was first introduced to this technology, I was told that I might need to consider using some longitudinal to boost the torsional with a hard cataract. That has not been my experience and I know other surgeons that feel exactly the same about this. I have not felt or had the need to use longitudinal phaco even with the hardest cataract. It seems to cut remarkably well and there seems to be no disadvantage or trade off,” he said.

Dr Packard noted that using a Kelman or similar curved tip enables maximum cutting efficiency with torsional phaco.

“What happens is that all of the crucial action takes place at the tip end. The geometry of the angled tip used in a side-to-side displacement causes what I believe to be more efficient cutting. The tip seems to create a shearing effect in the tissue that you are trying to remove. With longitudinal phaco, we are essentially pushing at the nucleus using compression and it only cuts when a forward movement is employed. With torsional phacoemulsification, surgeons get the benefit of cutting both right and left,” he said.

### Attraction not repulsion

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### Torsional ultrasound addresses drawbacks of traditional ultrasound

**KHIUN TJIA**

Khiun Tjia MD is another surgeon who believes that torsional ultrasound goes a long way towards addressing the two principal drawbacks of traditional ultrasound.

“As one of the primary investigators, I have had the opportunity to study torsional ultrasound since September 2004. From the the very first case, I was absolutely stunned by its performance. I firmly believe that torsional ultrasound is the greatest revolution since Charlie Kelman’s invention of phaco."

“Firstly the traditional method is associated with excessive heat production at the incision site, which carries with it the potential danger for wound burn. Torsional ultrasound, on the other hand, generates two to three times less heat at the same power level which reduces the risk of wound burn, even using 100% continuous torsional ultrasound,” he said.

“**Sculpting through very hard nuclei is markedly easier, faster and more efficient with torsional ultrasound**”

Another major advantage of torsional ultrasound, notes Dr Tjia, is the fact that there is no repulsion induced by the forward movement of the phaco tip, which in traditional ultrasound results in chatter and decreased efficiency. Instead torsional ultrasound greatly reduces any repulsion and nuclear quadrants appear to be ‘glued’ at the tip.

Sculpting through very hard nuclei is markedly easier, faster and more efficient with torsional ultrasound, added Dr Tjia.

“It is clear that the tip end shows a very effective lateral displacement and does not induce any repulsion. There is continuous contact between the tip and nucleus giving a faster and more effective emulsification. But also because of this continuous occlusion, protective viscoelastic substances are retained much better than with the traditional method and the surgeon can set much lower settings than were previously possible,” he said.

“The superior efficacy of torsional ultrasound is clearly demonstrated (and of utmost importance) in all cases with the need for low flow settings such as..."
Improved visibility during deep sculpting is one advantage of the Kelman tip. The technique includes sculpting without distorting and stressing the cornea. The 22 degree angulation means that it is easy to sculpt deeply (if the surgeon's experience is good). The friction in the incision means there is no risk of a burn. Seeing this sign is common with OZil; however, in this context it is a danger sign that occlusion of the tip has occurred, and as there is now no flow through the needle there is a risk of incisional burn if phaco power is continued. Seeing this sign is common with OZil; however, in this context it is confirmation that occlusion is maintained well (no repulsion), and the reduced friction in the incision means there is no risk of a burn.

When we used the early prototypes we were using a tapered Kelman phaco needle. We found that there was a small amount of clogging when removing very hard cataracts with pure torsional, and we added a small amount of longitudinal phaco (on a ratio of 80% torsional:20% longitudinal). With more experience we have now found that if you use a standard Kelman needle (ie without the taper tip), even the hardest of cataracts can be removed with pure torsional phaco.

The other advantage is that the angulation means the phaco tip can be used to manipulate nuclear fragments rather better than a straight tip.

My recommendation to other surgeons is: ‘Just try it’. Once you have used it on a medium or hard cataract you will not want to go back to traditional longitudinal phaco.

**Why OZil represents the future of small incision lens removal**

**DAVID ALLEN**

I first used OZil in August 2005 and have been using it since then whenever possible. It works extremely well in removing the lens tissue. There is simply no repulsion of material from the tip during active phaco, and the whole procedure of nucleus removal is so much quicker and efficient. I have conducted studies demonstrating a statistically significant reduction in BSS use during nuclear removal. Reduced BSS flow through the eye, coupled with less turbulence and fewer fragments flying around the AC must translate into less potential trauma to the corneal endothelium.

“My recommendation to other surgeons is: ‘Just try it’. Once you have used it on a medium or hard cataract you will not want to go back to traditional longitudinal phaco”

When we used the early prototypes we were using a tapered Kelman phaco needle. We found that there was a small amount of clogging when removing very hard cataracts with pure torsional, and we added a small amount of longitudinal phaco (on a ratio of 80% torsional:20% longitudinal). With more experience we have now found that if you use a standard Kelman needle (ie without the taper tip), even the hardest of cataracts can be removed with pure torsional.

Given the above advantages, and the fact that there are to date no downsides that we have found, there is no reason now for us to continue using longitudinal phaco.

Those surgeons who are already familiar with the Kelman tip will have no problem with transition - no change of technique is required. If they use a chopping technique they may at first be alarmed at seeing lens ‘milk’ when burying the tip into the nucleus prior to a chop. In traditional phaco this is a danger sign that occlusion of the tip has occurred, and as there is now no flow through the needle there is a risk of incisional burn if phaco power is continued. Seeing this sign is common with OZil; however, in this context it is confirmation that occlusion is maintained well (no repulsion), and the reduced friction in the incision means there is no risk of a burn.

Surgeons who have not used a Kelman tip before will very soon come to realise that there are significant advantages in its routine use. This is principally because the 22 degree angulation means that it is easy to sculpt deeply (if the surgeon's technique includes sculpting) without distorting and stressing the cornea. Improved visibility during deep sculpting is one advantage of the Kelman tip.

**OZil means safer, less traumatic and more efficient phacoemulsification**

**RICHARD MACKOOL**

I have been using the torsional phacoemulsification system OZil since December 2004. I initially used the technology on every third patient (I use three operating rooms and only had one torsional system), but I now use the technology for every phacoemulsification procedure. As of July 2006, I have performed approximately 1,000 torsional phacoemulsification procedures.

Both subjectively and objectively, the results have been remarkable. Subjectively, the elimination of lens chatter was immediately apparent. More recently, objective studies using small beads to observe the dispersion characteristics of particulate objects within the eye have verified this clinical observation. Because lens material remains on the tip, the efficiency of the procedure is dramatically increased.

In microcoaxial phaco, irrigation flow is reduced by 20-35%, which would normally slow down our procedure. With torsional ultrasound, my 2.2mm Ultrasleeve micro coaxial phaco procedures are faster and smoother than my regular coaxial longitudinal phaco cases. I have entirely switched to 2.2mm microcoaxial torsional phaco as my standard procedure.

Another huge improvement of Torsional ultrasound, is the possibility to lower fluidic parameters to increase the margin of safety for resident training. The incidence of both posterior capsular rupture and wound burn are dramatically reduced during resident training procedures, which is very favourable to patient outcomes, residents’ confidence and teachers’ comfort.”
Another great advantage of torsional phacoemulsification is the absence of any significant learning curve. The procedure looks and feels like traditional phacoemulsification, except for the fact that it is smoother and more efficient. I recommend that surgeons employ a non-leaking phaco incision and that the handpiece be operated in the continuous (not pulse or burst) mode. The latter adjustments are unnecessary because their main value is to reduce lens chattering and thermal delivery to the incision. As described above, these are unnecessary with torsional phaco and in fact offer no advantages.

“I strongly recommend that all surgeons make a thorough and concerted effort to obtain and use this technology. It is my opinion that it will permit the vast majority of surgeons to perform safer, less traumatic and more efficient phacoemulsification”

One minor issue regarding torsional phaco deserves comment. When removing extremely dense cataracts (approximately 1% of eyes) the torsional tip can become temporarily obstructed. This can be easily dealt with, however, by performing the following manoeuvre. The console should be programmed to deliver 80 milliseconds of torsional phaco alternating with 20 milliseconds of traditional ultrasound. I usually set the traditional ultrasonic power at a fixed level of 60% at this time. Foot pedal depression into position three will then eliminate the obstruction within approximately 0.5 seconds, and the settings are then returned to 100% torsional phaco for the remainder of the procedure.

Except for these rare situations, no other modification of technique is required with torsional phacoemulsification. Torsional phaco is suitable for all grades of cataract and I have been unable to identify any situations in which the torsional technology was inappropriate.

I strongly recommend that all surgeons make a thorough and concerted effort to obtain and use this technology. It is my opinion that it will permit the vast majority of surgeons to perform safer, less traumatic and more efficient phacoemulsification.

Crystal-clear corneas using torsional phacoemulsification
MARC WEISER

I have been using OZil for about four months, and have treated around 20 patients only due to a lack of handpieces. The outcomes have been outstanding, especially at Day 1 after surgery with crystal-clear corneas.

In my opinion, this technology is revolutionary because it reduces dramatically the surgical trauma to the eye. One can feel and see, during the surgery, unexpected levels of smoothness in the anterior chamber. I do think that it may replace, very soon, standard longitudinal phacoemulsification because it does succeed in reducing surgical trauma without needing any modification in surgical technique or strategy.

“This technology is revolutionary because it reduces dramatically the surgical trauma to the eye. One can feel and see during the surgery unexpected levels of smoothness in the anterior chamber”

With my short and preliminary experience, OZil handpieces with Kelman tips are probably the most appropriate to use with this technology. One should therefore be used to Kelman tips prior to OZil technology conversion.

In my personal experience, the transition to OZil from traditional phacoemulsification was absolutely straightforward and required no additional learning curve. In fact, I was so impressed with the technique that my third patient was a one-eyed hyperopic patient with a very flat anterior chamber!

In my clinical experience, OZil technology is suitable for any type of cataract, except at this stage the brunescent ones. With extremely hard nuclei, the OZil handpiece has a tendency to become obstructed with nuclear material, requiring transition to longitudinal phacoemulsification in order to deblock the handpiece and allowing the surgeon to continue the procedure either with OZil or traditional ultrasound.

In short, I would have no hesitation in encouraging other surgeons to make the transition to torsional phacoemulsification, I believe that once they see the results for themselves they will be similarly convinced that this technology is a significant advance on longitudinal phacoemulsification and will make their work so much easier.

OZil – a perfect marriage with coaxial approach through 2.2mm incision
ROBERT H OSHER

My extensive experience using torsional ultrasound in almost every case has been extremely satisfying like so many others who have tried this new technology, yet my technique has been quite different than the other surgeons. I became an advocate of coaxial microphacoemulsification using UltraSleeve through a 2.2 mm incision shortly after this new approach was developed several years ago.

It seemed a perfect marriage to couple this microincisional approach with a more efficient ultrasound that would cut lens material with virtually every oscillation without causing repulsion. Yet I preferred using a 1.1mm flared tip which has always been more effective with my technique of slow-motion phacoemulsification with surgeon-controlled pulsed ultrasound and lower infusion, aspiration rate, and vacuum settings. Moreover, I was not as proficient with an angled Kelman tip as with a straight tip.

Therefore, I began using a straight 1.1mm flared tip with torsional ultrasound through a 2.2 mm microcoaxial incision with UltraSleeve. My initial trials yielded sub-optimal results because the tip would ‘apple core’ the lens material. To overcome this behaviour, I simply added a small amount of longitudinal ultrasound and duty cycle into the equation.

“OZil, through a 2.2 mm incision, is an exciting and evolving new frontier that requires a minimal learning curve, few new instruments and superior outcomes, raising the bar for cataract surgeons worldwide”

This combination of components provided the most control that I have ever experienced. Moreover, the incision size provided great fluidics, consistent chamber stability, and extremely competent incisions. It was an added benefit that a full-size single-piece AcrySof IOL could be injected into the capsular bag without having to enlarge or make a separate incision.

In coming weeks I will be testing a new blended-tip which will feature some of the thermal and efficiency advantages of a Kelman tip but is designed for the surgeon who prefers a straight-tip. Coaxial microphacoemulsification with torsional ultrasound is an exciting and evolving new frontier that requires a minimal learning curve, few new instruments and superior outcomes, raising the bar for cataract surgeons worldwide.
Patients who are bilaterally implanted with the ReSTOR apodised diffractive IOL report a very high level of appreciation for the implant and most would recommend it to their friends and family, according to several leading vision experts.

Richard B Packard, MD, FRCS, FRCOphth, said that the ReSTOR is his lens of choice for patients who are motivated by a strong desire to be spectacle independent.

“In my experience, the vast majority of patients are able to read without glasses and very few need them for any intermediate tasks after ReSTOR implantation,” Dr Packard said. “While some patients do complain of night vision disturbances, these tend to be minimal and dissipate over time just as vision at all distances continually improves over time. The key point is that almost all of these patients would recommend this lens to their friends and relatives.”

“The key point is that almost all of these patients would recommend the ReSTOR to their friends and relations” Richard Packard

Dr Packard has implanted the ReSTOR in over 240 patients since October 2003. In a questionnaire sent to 40 patients, with a follow-up of more than one year, to investigate their response to daily life with the IOL, patients were asked to rate their visual comfort in a series of daily activities on a scale of one (low) to seven (high), and were asked about their spectacle use. Other questions related to driving comfort in daytime and night-time conditions, glare and halos.

The vast majority of the patients could manage “very well” without reading glasses, and of the 30 patients who use the computer, only five said they wear glasses specifically for that purpose. Patients who play cards (a high percentage of the group) reported “absolutely no problem” playing without spectacles, according to Dr Packard.

Patients were very happy with their driving vision during the day and at night, he said. The vast majority felt they had no significant problems with glare or halos. Six patients reported some night-vision disturbances, which was not deemed serious enough for them to stop driving at night. Of the 40 patients, 35 said they would highly recommend the lens, none less than a moderate recommendation, Dr Packard said.

Almost 100% of patients never wear glasses

Similarly positive results were obtained in a separate survey by Robert A Kaufer MD, who said that nearly 100% of 51 patients implanted with the ReSTOR in his clinic were free of spectacle use one year after surgery.

Even though less than 10% wore spectacles in some situations, when asked if they achieved spectacle freedom, 100% said yes and would have the same surgery again. They would also recommend the surgery to their best friend, he said. The majority of patients reported no or mild night-vision difficulties, halos or glare. The side effects were deemed “tolerable” by the patients and were not intrusive enough to forego having the surgery, he said.

The mean uncorrected distance vision was 20/20, and mean uncorrected near visual acuity was 20/16. Mean uncorrected intermediate VA was 20/30 at 50 cm, Dr Kaufer said.

Specifically addressing the question of intermediate vision, Dr Kaufer said that he believed that this topic was primarily responsible for some companies and their consultants’ recommendations in the US to mix different multifocal IOLs in the same patient.

“I have no personal experience with mixing multifocal IOLs, however, I am not in favour of the practice simply because my outcomes with bilateral implantation of ReSTOR have been so good that I have not seen the need to mix technologies,” he said. “I have a private practice and some of these patients are extremely demanding but the fact is that intermediate vision has not been an issue for my patients,” he said.

Chair-time makes the difference

According to Dr Kaufer, it is careful patient selection and rigorous pre-operative preparation that makes the difference.

“The most important message, I believe, is that chair time is fundamental here. I genuinely believe that 99% of the success with this lens is down to what you tell the patient, how you tell the patient and what expectations you put on the patient, especially in terms of time,” he said.

For Dr Kaufer, the message is one of patience – all good things come to those who wait.

“My outcomes with bilateral implantation of ReSTOR have been so good that I have never had the need to mix and match” Robert A Kaufer

“Intermediate vision is not going to be perfect at the beginning. You have to mention that. You have to advise patients that they might have to get closer to the computer screen to be comfortable. But tell them not to worry. As weeks go by, that distance will stretch out and they will feel more comfortable. It is absolutely vital to mention that to the patients because intermediate vision does get better with time,” he said.
With proper patient counselling, Dr Kaufer believes that the case for mixing technologies is considerably undermined.

“If you mention the time factor up front, that can make a difference, and maybe the mixing comes up because a small number of patients want intermediate vision right away and are not willing to wait for the adaptation to take place. But if you are willing to wait, if you believe in this, you have to tell them to be patient and it will improve. So not only is it selecting the right patient, but also dedicating all the time and reassuring these patients that their intermediate vision will kick in and will not be an issue,” he said.

**Mixing technologies is not the answer**

Dr Kaufer’s view is not an isolated one among European surgeons. French ophthalmic surgeon Beatrice Cochener MD has experimented with a mixing approach as well as bilateral implantation of ReSTOR. In her view, bilateral ReSTOR implantation delivers the most consistent proven outcomes over time.

“I tell patients that they need to be patient in the first few months and try to train their brain to adapt to the lens and they are usually very happy with the final result”

_Beatrice Cochener_

“Mixing was the new fashion and everybody seemed ready to try this method after the last ASCRS meeting where several surgeons were very enthusiastic about their results using different multifocals in the same patient. I did 10 cases of mixed multifocal IOLs (ReSTOR or Tecnis and ReZoom) in the dominant eye. First of all we did not observe any improvement in intermediate vision. But note that 90% of patients in our series of bilateral implantations don’t wear any glasses in all situations of their life including computer or music partition reading. I had to remove two ReZoom lenses because of binocular vision problems especially in near vision. The problem was solved by an exchange with the same diffractive multifocal ReSTOR lens in the second eye. I also confirm the need for patient information concerning the required time for cortical adaptation to multifocality, that is variable from one patient to the other (taking one day to three months),” she said.

Francesco Carones MD is another surgeon who remains unconvinced for the moment by the arguments of the mixing advocates.

“I have never tried mixing technologies because I have never felt the need to get improvement in intermediate vision with ReSTOR”

_Francesco Carones_

“I have never tried mixing technologies because I have never felt the need to get improvement in intermediate vision with ReSTOR,” he said. “Basically, I like to tell my patients that intermediate vision will not be as immediately effective as their distance or near vision and that they may need some kind of short term spectacle correction (in few cases) to get the best performance for certain tasks. Also, from my point of view there is another issue which is more of a medical-legal one. Obviously two different optics in the same patient will perform differently and I don’t really like to have patients coming into my office and saying, ‘Hey doctor I see much better with this eye, why did you not put the same IOL in the other eye?’ So I don’t like to do it as a matter of principle,” he said.

**More science-based studies needed**

Thomas Kohnen MD said that more science-based studies were needed to determine the safety and efficacy of mixing technologies, unlike the ReSTOR which has performed excellently in large-scale, randomised clinical trials. He also stresses the point that patient information for this type of lens is absolutely vital.

“We have to inform our patients that there might be a recovery time before the visual system has really learned to adapt to this multifocal optic and also tell them that intermediate vision might be a problem, at least in the short term, or that they may need glasses for computer activity. But basically all of the 175 patients that I have now implanted are very satisfied with this type of intraocular lens,” he said.

Objective data also indicates that bilateral implantation of the ReSTOR results in the greatest patient satisfaction because of the additive effect of two similar images. This improvement after the second eye is done is noticeable to virtually every patient and at all distances — far, intermediate, and near.

Preliminary data from a study by Australian ophthalmologist Con Moshegov MD compared bilateral ReSTOR with either a ReSTOR and Array (Advanced Medical Optics) contralateral group or a ReSTOR and ReZoom (AMO) contralateral group.

To date, the bilateral ReSTOR group is achieving the highest level of spectacle freedom at 87%, compared to 61% in the ReSTOR/Array group and 56% in the ReSTOR/ReZoom group. In addition, the bilateral ReSTOR group is outperforming the contralateral groups with respect to contrast sensitivity, in both photopic and mesopic conditions.

“Basically all of the 175 patients that I have now implanted are very satisfied with this type of intraocular lens”

_Thomas Kohnen_

Another study by Leonardo Mastropasqua MD and colleagues at the University “G.d’ Annunzio”, in Chieti–Pescara, Italy, further demonstrates why mixing different technologies in the same patient is a highly questionable approach.

In Dr Mastropasqua’s study, 60 eyes of 60 patients were randomised to receive two multifocal diffractive IOLs. In group 1 (30 eyes) the multifocal aspheric Tecnis IOL was implanted, while group 2 (30 eyes) received the ReSTOR lens. Interestingly, anterior capsule fibrosis was found in 83.3% (60% severe, 23.3% moderate) of the Tecnis patients and only 36.6% (all moderate, 0% severe) of ReSTOR patients.

“The anterior capsule fibrosis was severe enough to cause phimosis of the anterior capsule and decentration,” said Dr Mastropasqua. “The combination of decentration, phimosis and an opaque anterior capsule can limit optic performance because the Tecnis lens is a full optic diffractive lens, which already has limited light (maximum 45%) being delivered to each focal point. The ReSTOR lens, on the other hand, contributes significantly more light to distance as the patient’s pupil adapts to situations such as night time driving,” he concluded.
Careful patient selection holds the key to success with ReSTOR

Rigorous patient selection is mandatory to achieving high satisfaction outcomes with any multifocal implant and the ReSTOR apodised diffractive IOL is no exception in this regard, according to leading surgeons.

For surgeons who are just starting to introduce ReSTOR into their practice, Erik Mertens MD advises starting with the ‘low-hanging fruit’ in terms of patient selection.

“...my advice would be to start implanting the ReSTOR with cataract patients who are in the 65 to 75 age bracket with a good macular function. These patients are usually happiest with the end results. If you start with these patients, you will learn how to deal with the lens and perform the correct pre-operative calculations and fine-tune your personal A-constants,” he said.

Dr Mertens emphasises that chair time spent with the patient before surgery is crucial.

“The patient needs to know what he can expect. We need to explain, first of all to emmetropes that in some patients their distance vision may decrease a little bit, one line or two lines at the most. Can they accept that or not? Secondly, for reading, they should understand that they will initially be at around 30cm or 35cm, but this will also improve with time. Some patients may need to put their computer screen a little bit closer or in some cases wear +1.0 D glasses for computer work. We have to warn patients about visual symptoms, particularly halos at night, especially in the first month after surgery. In my experience, after one year, nobody complains any more about night halos or they are accustomed to it or they do not notice it anymore,” he said.

Err on the side of caution

For Robert Kaufer MD, the wisest policy is to err on the side of caution. He advises starting with cataract patients or presbyopic hyperopes in the case of refractive lens exchange.

“When choosing the patient one of the things I have learned is, when in doubt, don’t proceed. So when I am talking to the patient and I have any doubt about whether this is a good candidate or if I see anything on the macula or the cornea that I don’t like, then I don’t implant the ReSTOR. Secondly, one of the things that I do tell the patient is that the idea here is for them to be spectacle independent. While I don’t want them to depend on their glasses, I advise them that there may be some situations in which they may feel more comfortable wearing glasses. This approach has worked very well for me,” he said.

In terms of unsuitable patients, Angel Lopez-Castro MD said he considered myopic patients between -1.0 D and ~3.0 D to be the least preferred candidates for RLE and ReSTOR implantation.

“In general these are not the best patients for presbyopic correction because they are used to having very good near vision without correction and they are very demanding in terms of their final results,” he said.

In cases of refractive lens exchange, Dr Lopez-Castro said that the ideal candidate groups are presbyopic or pre-presbyopic hyperopes, especially high hyperopes, followed by high myopes with greater than ~6.0 D. The third best group are emmetropic presbyopes and the least likely candidates are low myopes.

“Multifocal implantation should be done with strong caution in emmetropes and patients with minor refractive errors because of the potential for halos and secondary symptoms. Informed consent should clearly state the frequency of secondary procedures, in particular IOL exchange and excimer LASIK touch-up. It should also clarify that subsequent PRK or LASIK enhancement can improve distance vision but not halos,” he said.

Summing up, Dr Lopez-Castro said that personal and worldwide studies of patients who are satisfied with their IOL performance show that most would choose to have the ReSTOR implanted again.

“This suggests that ReSTOR can provide enhanced quality of life for active patients who wish to reduce their dependence on spectacles. It provides a satisfactory full range of vision with less dependence on spectacles and with less induced spherical aberration compared with AcrySof monofocal IOLs. A few patients notice mild to moderate halos and glare. A good selection of patients in terms of expectations, lifestyle and previous ocular conditions is crucial to achieving a high index of patient satisfaction,” he said.

Getting the best outcomes from ReSTOR

Obtaining the best possible outcome from the implantation of the ReSTOR apodised diffractive IOL depends on a combination of meticulous pre-operative measurements, rigorous surgical technique and careful patient selection, according to a number of leading vision specialists.

“The first thing to remember is that biometry is extremely important with this type of lens,” said Prof Thomas Kohnen MD. “We need to explain to our patients that the residual refractive error, if we cannot reach emmetropia as our final target, can be corrected with excimer surgery, usually LASIK,” he said.

Prof Kohnen said that his target refraction for these patients is slight postoperative hyperopia of between +0.25 D to +0.35 D. “My clinical experience shows that this is ideal because then the near visual acuity and distance visual acuity seem to work the best together,” he said.

Prof Kohnen said that he carries out lens power calculations using a 3rd or 4th generation formula such as the SRK/T or Holladay II, with refractive predictability up to about 80.5% for more recent outcomes.

Proper lens centration and the size of capsulorhexis are also very important in obtaining good results with ReSTOR, said Prof Kohnen.

“We always aim for a capsulorhexis that is always a little bit smaller, around 5.3mm to 5.5mm. It is vital to have these lenses properly placed in the capsular bag, with good capsule overlap and properly centred over the visual axis,” he said.

Another vital factor in the performance of the ReSTOR is that the optics must be perfectly clear, said Dr Francesco Carones.

“For monofocal lenses we know that some slight opacification is accepted but that is not the case with a multifocal lens. This will contribute to an added loss of contrast so the patients will perform poorly, and will complain about poor vision. So perform YAG laser early if necessary, not because the ReSTOR induces more posterior capsule opacification but because even a very slight opacification does reduce the performance of the lens,” he advised.

Dr Carones also emphasised the quality of the tear film for optimal ReSTOR performance. He advises aggressive treatment in the case of dry eyes with punctum plugs and/or drops to improve the quality of the ocular surface. Finally, Dr Carones underscored the status of the macula as having a crucial role to play in the performance of the lens.

“Even a very mild cystoid macular edema will reduce the performance of the lens, so it is more mandatory with these kind of IOLs to avoid cystoid macular edema or other macular problems in the postoperative period,” he said.
ReSTOR – proven success in European and US clinical trials

One-year results from European and US FDA-approved clinical trials showed that the ReSTOR IOL provided excellent near visual acuity without compromising distance vision.

Chief investigator in the study, Thomas Kohnen MD, said that the apodised diffractive optic of ReSTOR is designed to allow a broad range of functional vision independent of pupil size and to minimise photic phenomena.

The study included one-year follow-up of 127 first-eye implants and six-month follow-up of 119 second-eye implants at eight European centres.

At the six-month postoperative visit, binocular mean uncorrected distance and near logarithm of the minimum angle of resolution VAs for the ReSTOR MA60D3 were 0.04±0.14 and 0.09±0.12 (n = 118), respectively.

In addition, 88% and 84.6% of ReSTOR subjects achieved spectacle independence for distance and near vision, respectively. Glare and halos were reported as severe by only 8.5% and 4.2% of patients, respectively. Ninety-two percent of patients stated that they would choose to have the same lens implanted again after the first implant, and 95.7% answered likewise after the second implant.

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