Technological and medical advances are increasingly integrated. When was the last time you considered the trial and error and technology involved in the development of an IOL in the eye of a patient after cataract surgery, or in the measurement of posterior corneal elevation at a LASIK consultation, or vitreomacular traction on an OCT scan?

Many technological advances have changed our lives and our patients’ lives for the better, but we must not forget that each new technology, device, and procedure has its quirks and complications. For example, there was no diffuse lamellar keratitis (DLK) or pressure-induced intralamellar stromal keratitis before there was LASIK.

Although many innovative technologies move eye care forward, others fail to make the cut, and still others fail to stand the test of time. It is therefore imperative that we stay current on all advances and failures so that we can provide optimal care to our patients over their lifetimes.

REFRACTIVE SURGERY

Correcting refractive errors has been at the core of optometry and ophthalmology since the specialties began. Radial keratotomy was supplanted by PRK and LASIK. Femtosecond lasers have since become an integral part of refractive surgery. Initially, the technology was used to create the LASIK flap, but a more recent evolution is small-incision lenticule extraction. Market forces will determine how this procedure fits into the surgical armamentarium. Meanwhile, applications for the femtosecond laser have expanded into cataract surgery, where the device is used to create incisions and fragment the nucleus.

A dramatic shift may be upon us in the form of adjustable IOL.
technologies, such as RxSight’s Light Adjustable Lens and the Perfect Lens system (Perfect Lens; not FDA approved), which can be fine-tuned in vivo. Laser-induced refractive index change (Clerio Vision; not FDA approved) and electrical collagen remodeling may offer new ways of changing corneal shape to correct refractive errors in the future.

Intacs intrastromal corneal ring segments (CorneaGen) were developed for the treatment of low myopia, but the technology has since made an evolutionary shift to instead become a treatment option for keratoconus and corneal irregularity.

Our ongoing search for effective solutions to presbyopia led to the development of corneal inlays. After an impressive start, with two devices cleared by the FDA and another in development, this avenue of refractive surgery encountered trouble. The FDA recalled the Raindrop Near Vision Inlay (ReVision Optics; no longer available) earlier this year because of a risk of corneal haze (Figure). As with DLK, this haze usually improves with steroid therapy, but it has the potential to be permanent and sight-threatening. Presbia terminated development of its Flexivue microlens in April, leaving the Kamra (CorneaGen) as the only corneal inlay on the market. However, other companies such as Allotex are working to develop allograft inlays. Those of us with patients who received a Raindrop Near Vision Inlay should monitor them closely for haze and DLK. Because this device is not currently on the market, most patients can be monitored annually or biannually.

GLAUCOMA SURGERY

Microinvasive glaucoma surgery (MIGS) represents a paradigm shift in glaucoma management. MIGS has given patients and surgeons a much more diverse portfolio of IOP-lowering options. Not only do these procedures target different aqueous outflow pathways, but they also involve differing levels of surgical complexity and carry different risk-reward profiles. In general, MIGS permits earlier surgical intervention with less risk than traditional filtration surgery while preserving the option of filtration surgery for later in the disease course, if necessary.

The safety profile of MIGS has spurred and expanded the combining of surgical procedures. With the introduction of the iStent Trabecular Micro-Bypass Stent (Glaukos) and other MIGS devices, cataract surgery has become an opportunity to manage glaucoma as well as to improve quality of vision.

MIGS has drawn a great deal of research and development dollars and offers much promise, and several devices and procedures have been approved by the FDA. Even so, the field has not been without adversity. Alcon voluntarily recalled the CyPass Micro-Stent in August 2018 because of a possible reduction in corneal endothelial cell counts. The American Society of Cataract and Refractive Surgery should be commended for its work in forming a task force to frame and communicate a response to this recall. The society’s statement (bit.ly/ASCRS719) summarized the data in regard to endothelial cell loss, presented monitoring options, and described revision considerations for eyes with this implant.

EYE ON THE PRIZE

As conscientious providers, it is our responsibility to be vigilant in our care of patients with new or relatively recent technologies. Increased testing, monitoring, and documentation can hasten our learning curve and allow us to intervene earlier when a device or procedure does not meet expectations or when unknown or unforeseen complications occur. Vigilance also provides us with some level of reassurance that all is proceeding as anticipated.
Although many technological advances have improved the lives of both practitioners and patients, each new technology, device, and procedure has its quirks and complications.

It is therefore imperative to stay on top of all advances and failures so that ODs can provide optimal care to patients over their lifetimes.

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AT A GLANCE

- Regular documentation with OCT, gonioscopy, photography, or a combination thereof should allow us to detect shifts in a device’s location or position as well as other changes over time. With any anterior chamber device, we should be attentive to the corneal endothelium and document both central and peripheral cell counts. Modern corneal topography allows us to assess posterior shape, obtain pachymetry readings, and perform densitometry. When paired with anterior segment OCT, these tools are especially powerful and can help us to track corneal technologies and health better than ever before. We should monitor our patients’ refractive status as well because shifts can warn us of change.

- With new technologies, more is more, as far as documentation goes. Not only can additional testing alert us to complications, but it can also help us to better understand new devices and procedures, the pathology that they are treating, and the anatomy that they modify. Greater knowledge, in turn, can improve implementation and care. As eye care continues to evolve, staying current with technology will be integral to providing the best care for our patients.

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