

Recent Advances in Ocular Imaging Techniques

An Expert Interview with Parag A Majmudar

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Parag A Majmudar

Parag A Majmudar is a fellowship-trained corneal and refractive surgery specialist. After receiving his degree at the Medical College of Pennsylvania in Philadelphia, where he was a member of the prestigious Alpha Omega Alpha Honor Society, Dr Majmudar completed his ophthalmology residency at the University of Chicago, serving as Chief Resident in the Department of Ophthalmology. He followed his residency with a subspecialty fellowship in cornea and external diseases and refractive surgery at Rush-Presbyterian St. Luke's Medical Center in Chicago.

An active participant in clinical research activities, Dr Majmudar is a highly regarded lecturer and instructor on the subjects of corneal and refractive surgery. Currently, he serves as an Associate Professor of Ophthalmology at Rush University in Chicago, as well as being the former co-director of the Corneal Fellowship at Rush. Dr Majmudar is an active member of the American Society of Cataract and Refractive Surgery as well as the American Academy of Ophthalmology, and he recently received the Academy's Senior Achievement Award. He is an International Council Representative from the US for the International Society of Refractive Surgery.

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Imaging of the eye is an integral part of ophthalmic examination, and is essential for the diagnosis, assessment of severity and progression, and evaluation of management of ocular disease. Advances in imaging technology are progressing at a rapid pace. In an expert interview Parag A Majmudar discussed a number of aspects of optical imaging including the role of optical coherence tomography (OCT) in corneal and refractive surgery, optimal imaging of the eye during toric intraocular lens (IOL) implantation, and the role of aberrometry during anterior segment imaging.

Q: What is the optimal procedure for pre- and intraoperative imaging of the eye during toric IOL implantation?

Toric IOLs have perhaps enjoyed the greatest reproducible success of any premium lens type in use over the past decade. However, their success depends greatly on accurate placement, and this requires some effort on the part of the surgeon. Even simple measures, such as marking the limbus pre-operatively with a marking pen, are generally sufficient in order to achieve consistently good results. However, technology has definitely made an impact in this area. We are currently able to image the cornea pre-operatively using advanced topography and biometry to take into consideration the effect on posterior corneal astigmatism on our outcomes. We also have the ability to identify landmarks on the ocular surface and in some cases project an image into the oculars of the operating microscope in order to identify the correct axis of implantation.

Q: What is the role of aberrometry during anterior segment imaging?

Ray-tracing aberrometry plays a large role in our clinic in managing various aspects of refractive surgery planning. We are able to identify the optimal procedure for patients—whether cornea-based or lens-based, depending on the localization of the aberrations within the eye. In addition, aberrometry is invaluable in troubleshooting complaints following refractive or cataract surgery especially with multifocal IOLs. It is also an important patient education tool to help them understand the problems of their visual system before surgery.

Q: How can the use of corneal imaging techniques improve outcomes after refractive surgery?

The newest phase of refractive surgery worldwide, and more recently in the US, involves using topography to plan and execute a refractive treatment that takes into consideration, not only the lower order aberrations of sphere and cylinder, but also higher order corneal aberrations. Surgeons

internationally have been able to use this technology not only in “normal” eyes but also in eyes that have had complications from prior keratorefractive surgery or in cases of corneal ectasia.

Q: In what other ways can OCT be used in cornea and refractive surgery?

We have been using OCT in several ways. Primarily we are using it as a way to identify the post-operative anatomy of Descemet membrane endothelial keratoplasty (DMEK) and Descemet’s stripping automated endothelial keratoplasty (DSAEK) graft adherence. We have also been using the OCT to calculate the true corneal power, and this has made a huge impact in

our post-refractive surgery IOL calculations. A newly available modality will be epithelial thickness mapping. Although available for many years internationally, surgeons in the US have only recently had widespread access to this.

Q: How important is the use of intraoperative OCT?

Intraoperative OCT may be of benefit in DMEK and DSAEK cases as a way to help identify correct orientation of the tissue as well as ideal positioning. There may also be uses in posterior segment (retina) surgery. At the moment, while it is a nice tool, it is cost-prohibitive for the majority of surgeons. □