

Optimizing Angle Surgery With ACT

BY SHAKEEL SHAREEF, MD



Angle-based surgery is at an exciting point in its evolution. Many microinvasive glaucoma surgical devices require implantation through a gonioscope. The video by Shakeel Shareef, MD, featured in this installment of "Inside Eyetube.net" helps surgeons learn how to view the angle clearly and to use the gonioscope effectively during surgery. Dr. Shareef explains his techniques, solutions, and reasons for better anesthesia, control, and timing of goniosurgery, all of which are crucial to surgical success.

—Soosan Jacob, MS, FRCS, DNB, section editor

The field of angle surgery is growing exponentially, with many devices targeting this surgical space. Surgeons need to consider several variables when performing microinvasive glaucoma surgery (MIGS). The essential components of anesthesia, control, and timing—or ACT—which are described in my video, are necessary to ensure patients' safety and build surgical confidence.

ANESTHESIA

The use of topical anesthesia has become commonplace for routine cataract surgery. Topical tetracaine and nonpreserved intracameral lidocaine supplemented with intravenous sedation provide adequate pain and anxiety control with minimal manipulation of the ocular surface during phacoemulsification.^{1,2} For MIGS, the placement of a goniolens stimulates the subepithelial nerve endings responsible for the sensations of touch, pain, and temperature in the entire corneal surface. The cornea is the most densely innervated structure in the human body, with nerve endings originating from 50 to 450 sensory trigeminal neurons that transmit nerve fibers via the ophthalmic division of the fifth cranial nerve.³ Additional nerve fibers originating from the trigeminal ganglion cells terminate uniformly at the corneoscleral limbus, forming the limbal plexus.³

Some surgeons use an ophthalmic viscosurgical device (OVD) as a coupling gel between the goniolens and cornea to visualize the angle. I have found that, to provide



further analgesia, administering topical lidocaine jelly in the preoperative holding area and as a coupling agent with the goniolens minimizes patients' discomfort. Several reported benefits of lidocaine gel include a decreased need for supplemental

anesthesia to maintain patients' comfort when used preoperatively, ease of entry and exit of surgical instruments via corneal wounds, better cooperation from patients due to improved tolerance of the placement of a goniolens on the cornea and conjunctiva during angle surgery, enhanced efficacy with higher intraocular levels from lidocaine jelly versus topical lidocaine drops, and lower sensation of tissue manipulation.^{4,5}

Compared to retrobulbar anesthesia, topical anesthesia provides several advantages, including speedier postoperative visual recovery in monocular patients, avoidance of ocular complications (eg, retrobulbar hemorrhage, ocular penetration, central nervous system depression), and patients' assistance during surgery.¹ It does not provide akinesia, posing a potential risk for intraocular complications when instruments are introduced under direct gonioscopic visualization, including bleeding, damage to the lens and zonules, and iridodialysis due to a sudden eye movement or saccade.^{1,2}

Careful patient selection for topical anesthesia and communication during critical parts of the surgery is important. Alternatively, when learning to perform angle



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DESIRED CHARACTERISTICS OF A SURGICAL GONIOLENS

- Clear view of the angle's structures
- Absence of Descemet folds
- Globe stability, especially under topical anesthesia
- Accessibility of instruments via the peripheral corneal wound
- Simultaneous viewing and surgical manipulation of the angle's structures

surgery, it is not unreasonable to consider alternatives such as a peri- and retrobulbar block to build surgical confidence.

CONTROL

Prior to performing angle surgery, the surgeon must consider several variables such as proper positioning of the goniolelens with the nondominant hand, head and microscope adjustments, and increased working distance between the oculars and surgical field by approximately 8 inches. The magnification and lighting will likely need to be modified. Additionally, novice surgeons have the challenge of learning and mastering a new surgical skill set, direct gonioscopy, the rate-limiting step to successful angle surgery.⁶ During preoperative planning, the surgeon needs to be proficient at performing office-based indirect gonioscopy to identify angle structures and thus determine the feasibility of angle surgery.⁷ He or she then needs to select an appropriate surgical goniolelens with the desired characteristics, particularly when performing MIGS under topical anesthesia, to counter involuntary eye movements intraoperatively.

Several commercially available goniolelenses are modifications of the Swan-Jacob goniolelens (Ocular Instruments).^{6,8} With the exception of the Volk Transcend Vold Gonio Surgical Lens (Transcend Medical), the handle on the instruments listed in the Table is contiguous with the lens at its base. For globe control, the Hill Gonioprism (Ocular Instruments) has a peripheral flange built at the base of the surgical lens to counter any involuntary saccades, and it

TABLE. COMMERCIALLY AVAILABLE SURGICAL GONIOLENSSES

Ocular Instruments	Ahmed 1.5X
	Double Mirror
	Hill
	Khaw
	Mori Upright
	Osher Posterior Pole Lens
	Ritch Panoramic
Transcend Medical	Swan-Jacob
	Volk Transcend Vold Gonio Lens

allows for additional nasal globe rotation to bring the angle into view. The Volk Transcend Vold Gonio Surgical Lens has several unique features, including a cleat ring continuous with the main handle providing globe fixation. Nasal rotation and cyclotorsion permit targeting of a desired clock hour when performing angle surgery. Finally, a free-floating lens originates from a separate handle suspended on a hinge from the main handle. When the surgeon applies downward pressure to fixate the globe with the cleat ring, the lens is displaced upward, providing an unimpeded view of the angle's anatomy.

TIMING

For combined cataract and trabecular bypass surgery, the current FDA recommendation is to perform angle surgery after phacoemulsification. Based upon my own per-

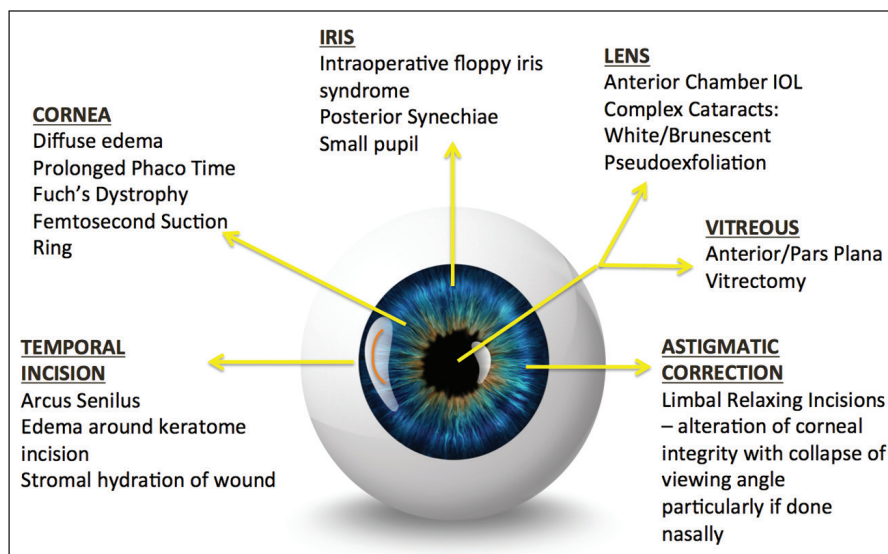


Figure. Potential obstacles to postphacoemulsification implantation of a MIGS device.

sonal experience, there are several distinct advantages, however, to the opposite order. These include a pristine view of the angle's anatomy through an unaltered temporal incision and cornea, intact ocular integrity, the ability to create a small keratome incision (ie, 1.5 mm), and optimal anesthesia (sedation, topical, intracameral) at the start of surgery. Moreover, the surgeon can use a soft shell technique to protect the corneal endothelium with a viscodispersive OVD and create and maintain space in the angle with a viscohesive OVD to safely introduce instruments in a confined trabecular space of 0.7 mm.^{9,10} Additionally, the surgeon can bypass potential obstacles that may arise from cataract surgery¹¹ (Figure), subsequently obscuring his or her view of the angle and either leading to prolonged implantation time or aborting angle surgery itself, especially when surgery is performed along the iris plane confined to the anterior chamber depth of 2 to 3 mm.

CONCLUSION

With attention to anesthesia, control, and timing—or ACT—surgeons can safely care for their patients and build surgical confidence for performing angle surgery in the era of MIGS.¹² ■

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