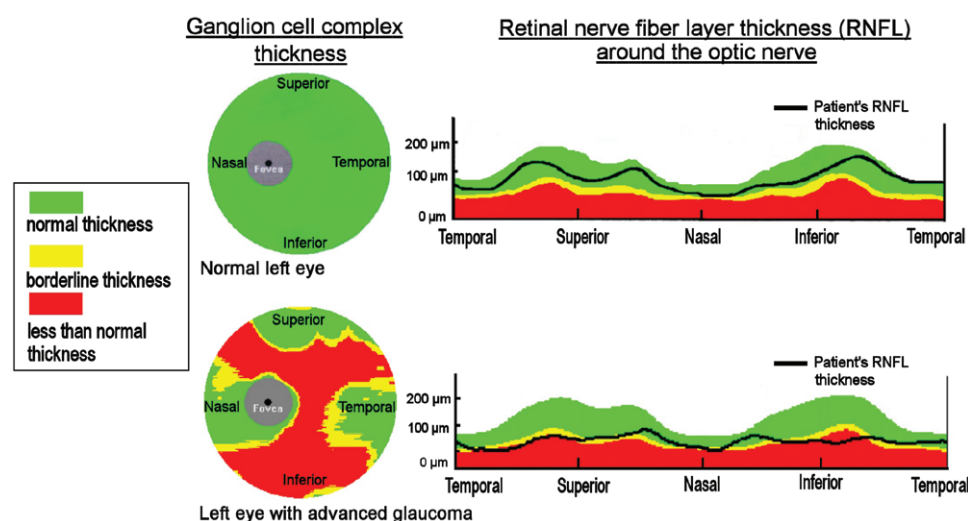


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# Images in Anesthesiology: Robotic Surgeries in Patients with Advanced Glaucoma

Hamdy Awad, M.D.,\* Obaid S. Malik, B.A., Adam R. Cloud, M.D., Paul A. Weber, M.D.

\*Department of Anesthesiology, The Ohio State University Medical Center, Columbus, Ohio.  
 hamdy.elsayed-awad@osumc.edu



NINETY thousand radical prostatectomies in the United States in 2009 and 110,000 hysterectomies worldwide in 2010 were performed robotically. These procedures require a non-physiologic steep Trendelenburg positioning, which causes a significant increase in intraocular pressure.<sup>1</sup>

We present two cases of patients with primary open-angle glaucoma scheduled for robotic surgery. However, ophthalmology consultations recommended

against robotic surgery after an eye examination that included optical coherence tomography. They concluded that a significant increase in intraocular pressure during robotic surgery may cause additional damage to the patients' optic nerves. Their surgeries were changed to open procedures without complications.

Optical coherence tomography is a noninvasive tool with proven measurement reproducibility that uses near-infrared light to visualize retinal thickness. This is useful in evaluating glaucomatous damage where increased pressure leads to death and thinning of the retina.<sup>2</sup> Ganglion cell complex and retinal nerve fiber layer thicknesses are of particular importance in glaucoma evaluation. The ganglion cell complex consists of the three innermost retinal layers and is preferentially affected in glaucoma because they contain the dendrites, axons, and the cell bodies of ganglion cells.<sup>3</sup> Retinal nerve fiber layer thickness can be measured with a circular scan around the optic nerve head, and this produces a cylindrical cross-section of the retinal thickness. The ganglion cell complex and retinal nerve fiber layer thicknesses are then compared with healthy individuals to infer the extent of glaucomatous damage (fig.).<sup>3</sup>

Until further research is completed, it may be prudent to explain this potential risk and review optical coherence tomography images to identify preexisting optic nerve and retinal nerve fiber layer damage before steep Trendelenburg positioning in patients with advanced glaucoma. We also recommend that ophthalmologists be key consultants in this process. These two cases highlight the theoretical risk of vision loss from a transient and significant increase in intraocular pressure during robotic surgery in this population.

## References

- Awad H, Walker CM, Shaikh M, Dimitrova GT, Abaza R, O'Hara J: Anesthetic considerations for robotic prostatectomy: A review of the literature. *J Clin Anesth* 2012; 24:494–504
- Schuman JS, Puliafito CA, Fujimoto JG: Optical coherence tomography: Its history, how it works, and what its images show, *Everyday OCT: A Handbook for Clinicians and Technicians*, 1st edition. Edited by Schuman JS, Puliafito CA, Fujimoto JG. Thorofare, NJ, SLACK Inc., 2006, pp 87–120
- Kotowski J, Wollstein G, Folio LS, Ishikawa H, Schuman JS: Clinical use of OCT in assessing glaucoma progression. *Ophthalmic Surg Lasers Imaging* 2011; 42:S6–14