Published in final edited form as:

JAMA Ophthalmol. 2015 December ; 133(12): 1483–1484. doi:10.1001/jamaophthalmol.2015.3865.

Stereoscopic Surgical Recording Using GoPro Cameras: A Low-Cost Means for Capturing External Eye Surgery

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To the Editor

We read with interest Rahimy and Garg's experience using Google Glass to film a scleral buckling procedure.¹ We agree there is a need for better videography methods for ophthalmic surgery, and we have had success filming a scleral buckling procedure in stereo with 2 GoPro HERO cameras. The surgeon wore a 3-dimensional–printed plastic mount (<http://www.thingiverse.com/thing:673214>), which offset the cameras approximately 60 mm in the horizontal plane. We recorded at 1280 × 720-pixel resolution, 60 frames per second, with each camera filming simultaneously. We combined the files to create a stereoscopic video (Video 1 and Video 2) in the GoPro Studio software, which took approximately 1 hour. The resulting video is viewed side by side using a stereo viewer (Screen-Vu; Berezin Stereo Photography Products). Red-cyan anaglyph viewing is also possible (glasses at <http://www.3dstereo.com>), depending on how the file is saved, but this degrades the viewing experience because each eye receives different color channels.²

Given the limitations of evaluating this technology in only 1 case so far, we found several advantages to this GoPro system, in addition to stereopsis. The ample memory, long battery life, and placement on the surgeon's midline forehead made it easy and comfortable to use. The automatic white balance setting and central spot metering avoided overexposure and whiteout effects noted in other reports.^{3,4} As Rahimy and Garg discussed,¹ we likewise did not use the Wi-Fi or Bluetooth features out of concern for patient privacy, but once secure networks can be established, this method offers promise for telemedicine and remote telementoring. The main disadvantages were the wide field of view and the limited resolution at 60 frames per second. Some of these issues are mitigated on the higher-end HERO models, which have options for a narrower view and higher resolution (allowing for digital zoom). Aftermarket telephoto lenses can also adjust zoom/magnification, focus, depth of field, and aperture. Neither the Google Glass method nor the GoPro method allows for visualization of the retina, but other head-mounted devices may allow recording and sharing these aspects of the surgery.⁵

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Conflict of Interest Disclosures: All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

Several features we perceive as advantageous to a surgical video-capture device include low cost, production of high-quality video with stereopsis, capturing the relevant surgical field with adequate detail, and having options for real-time streaming. The proliferation of such cameras, smartphone-based virtual reality headsets, and televisions with 3-dimensional viewing means there are now many low-cost ways to allow trainees to see procedures exactly as the surgeon sees them.

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