



GoPro HERO 4 Black Recording of Scleral Buckle Placement during Retinal Detachment Repair

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Introduction:

This Case of the Month features a new surgical recording technique that improves resident/fellow education. GoPro and Google Glass technology has previously been used to record procedures in medical fields¹⁻⁸. In ophthalmology, orbital and extraocular procedures are difficult to record on traditional ophthalmic surgical microscopes with mounted recording systems. For this surgery, the fellow wore GoPro's latest HERO 4 Black edition camera (released September 2014) mounted on a Head Strap + QuikClip mount to record the placement of a scleral buckle (41 band, 72 sleeve, 5-0 nylon sutures) during a retinal detachment repair, Figure 1.

Technique:

At the start of the case, the camera and mount was adjusted by the surgeon wearing a sterile plastic bag or by a nonsterile operating room member to ensure the field of view was centered on the live feed on the iPad. The camera was set to record using the 4K SuperView setting with default ProTune settings (recording speed, white balance, color, ISO limit, Sharpness, Exposure Value Compensation) and an Apple iPad was connected via Bluetooth to the GoPro App to remotely start or stop the recording. An internal microphone captured high-fidelity sound, but the audio



Figure 1: HERO 4 Black edition camera and Head Strap + QuikClip mount by GoPro.

was not included in this video to protect patient privacy. Although 12MP photographs can be captured, only video input with the 4K SuperView setting was utilized to document this case. After recording, we imported the entire surgery into the GoPro Studio software platform. First, we spliced the film to eliminate the uneventful frames. Then, the remaining sections were optimized by increasing the zoom and adjusting the horizontal and vertical positioning to center the frames. The overhead

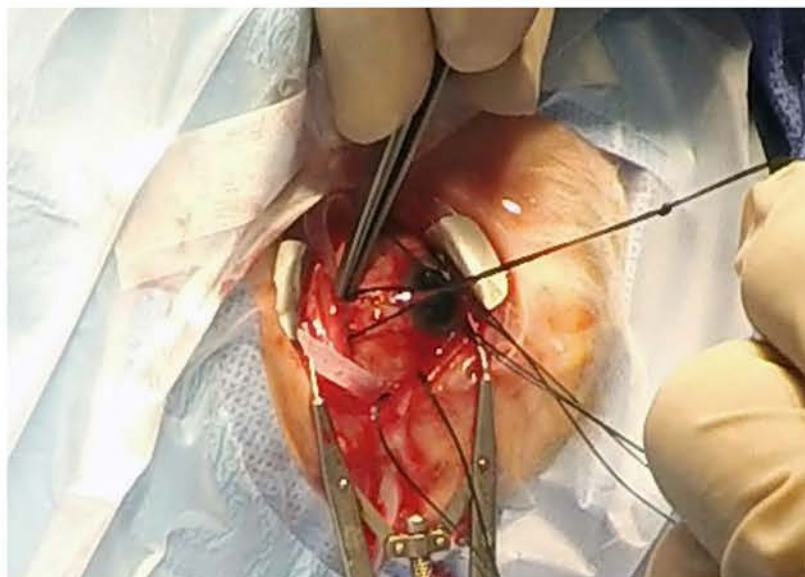


Figure 2: Placement of 41 band under inferior rectus muscle.

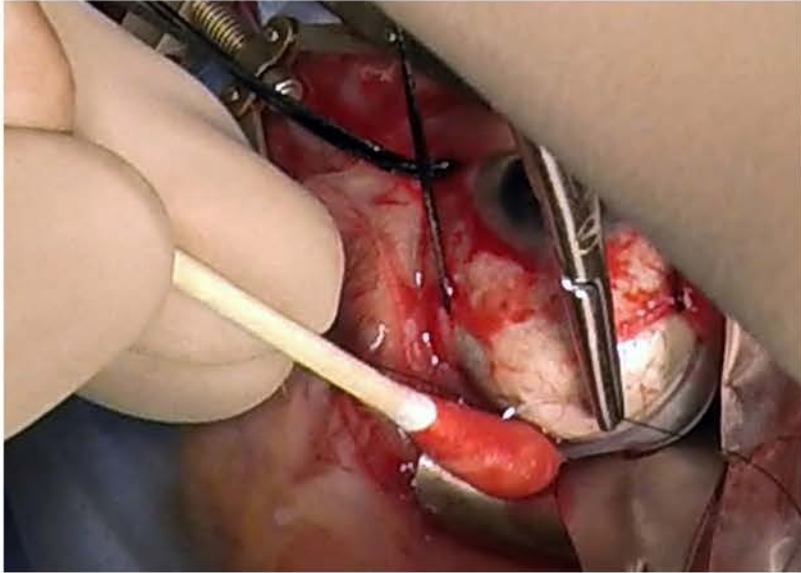
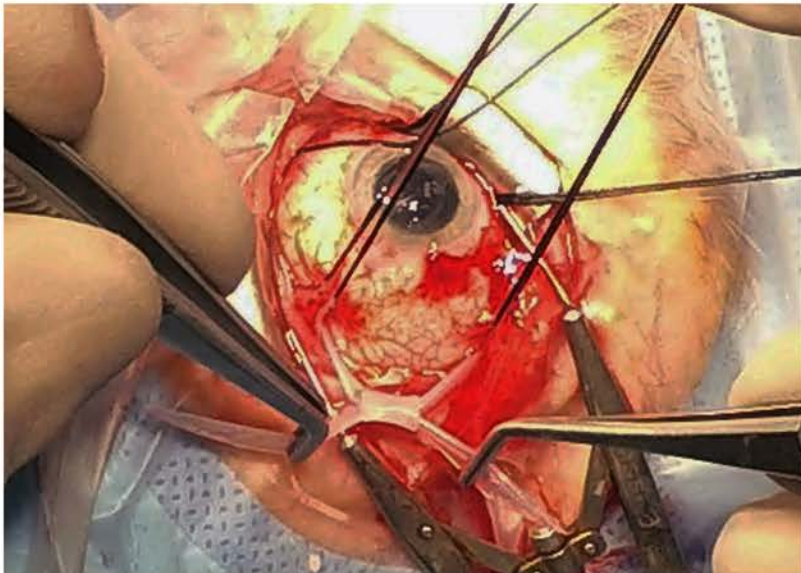
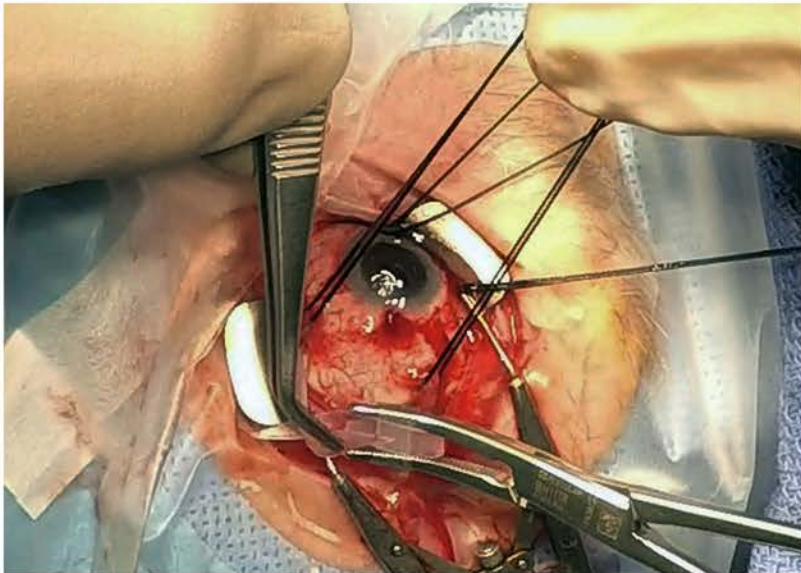


Figure 3 (top): Partial thickness scleral pass with 5-0 nylon suture.

Figure 4 (middle): Placement of 72 sleeve with Nugent forceps and mosquito clamp.

Figure 5 (bottom): Tightening scleral buckle with Nugent forceps.



lighting in the operating room remained relatively consistent throughout the surgery and the camera's ProTune automatic white balance setting was utilized so the video required minimal exposure and contrast tunings, Video 1 <https://youtu.be/7QxZsHQDz9I> and Figures 2-5.

Discussion:

This was a proof of concept study of utilizing the GoPro HERO 4 Black camera to record extraocular surgery (scleral buckle placement) from a surgeon's prospective during a retinal detachment repair. This camera/mount was easy to use because it is portable, works with loupes, and can be controlled remotely outside the surgical field. Furthermore, prior GoPro HERO models required manual screen resolution and field of view adjustments on the camera to optimize the image quality^{1,2}. This step is no longer needed because all recordings can be done with the 4K SuperView setting with automatic white balance and post production editing produces high quality videos and video stills.

Disadvantages of this technique include the need for minor intraoperative adjustments to the camera to center the video, battery life limitations, need for nonsterile assistant to control the recording on a phone/tablet, background noise during narration, and need for possible password/encryption protection of patient sensitive videos on Bluetooth or Wi-Fi networks.

Future ideas for this new concept include using sterile wraps for a GoPro Smart Remote or phone/tablet to increase surgeon independence, investigating intraoperative photograph

capture, utilizing ceiling/wall mounts or sterilized plastic cases/mounts to provide different views of the procedure, creating stereoscopic videos with dual camera mounts^{3,4} or attaching magnification lenses or polarizing filters to the camera to improve video capture^{1,5,6}.

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