



Surgeons' Point-of-View Video Recording Technique for Scleral Buckling

Recording scleral buckling surgery has traditionally been limited by several factors. Commonly used overhead recording systems are costly and require constant repositioning during surgery to ensure that they capture the images of interest. A common alternative to overhead recording devices is to use an assisting photographer to capture images over the shoulders of the surgeons in an obtrusive and labor-intensive process. These approaches are limited in that the surgery is recorded from a perspective that is different from that of the surgeon. Point-of-view (POV) cameras record high-definition video and are used extensively in adventure sports. Point-of-view cameras have a low profile, compact design, and are easy to use. Previously, Bizzotto et al¹ used a previous generation head-mounted version of these POV cameras to record surgery. They concluded that the technology was helpful in many respects for surgery involving larger subject matter such as orthopedic surgery but inadequate to film microsurgical techniques. In a similar vein of research, Gooi et al² mounted a POV camera to a microscope to successfully record hand positions during ophthalmic surgery. In this report, we present the findings of our evaluation of a current head-mounted POV camera system to record scleral buckling surgery.

Methods

The study adhered to the principles of the Declaration of Helsinki. Ethics Committee approval was not sought, as there were no modifications to the surgical techniques the patients underwent. All patients involved in the study consented to their surgery and the recording of video and still images. We selected the GoPro Hero3+ Black Edition, firmware v 2.00 (GoPro, San Mateo,

CA) as our head-mounted POV camera. A variety of settings were used while recording multiple scleral buckle procedures. These variations included different resolutions (4K, 2.7K, and 1080p), different angles of view (Wide, Medium, and Narrow), and with or without the Spot Meter function. The video files were downloaded and edited with the GoPro Suite.

Results

The captured video was effective in recording the surgical field and adequate at recording the fine movements of the instrument tips (see **Video, Supplemental Digital Content 1**, <http://links.lww.com/IAE/A309>). Optimal settings for the head camera were 1080p resolution at 30 frames per second, on a Narrow field of view, with the Spot Meter on (see **Video, Supplemental Digital Content 1**, <http://links.lww.com/IAE/A309>). Adequate quality still images were taken from the video, which were detailed enough to recognize the salient steps of the procedure (Figure 1). The head camera's view, and a digitally magnified view, was combined into a single video frame to provide a simultaneous view of the wider surgical field and the corresponding movements at the instrument's tips (Figure 2, see **Video, Supplemental Digital Content 2**, <http://links.lww.com/IAE/A310>).

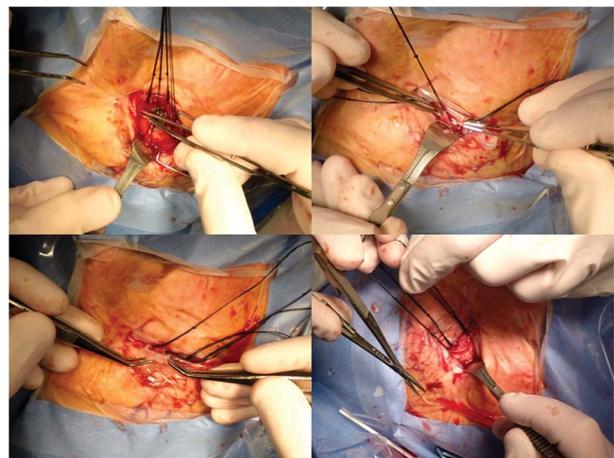


Fig. 1. Various still images drawn from the 1080p resolution video.

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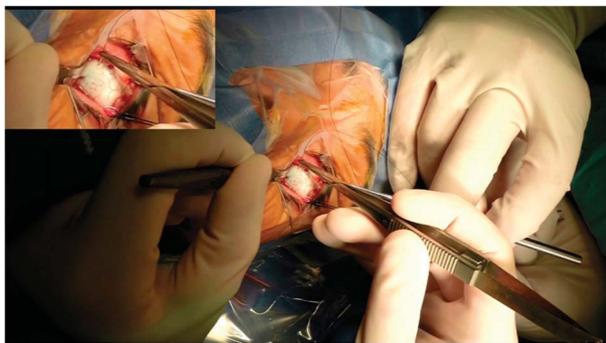


Fig. 2. Still image of the magnified picture in **Supplemental Digital Content 2** (see **Video**, <http://links.lww.com/IAE/A310>).

Discussion

The system presented here is a major improvement over current video recording approaches in terms of cost, personnel requirements, and primary surgeon's perspective. These POV cameras have never been described for recording scleral buckling surgery, and in contrast to the conclusion of Bizzotto et al, we found that the video image quality was adequate to capture the details of microsurgery not requiring a microscope. Although next-generation POV cameras will have even higher resolution and be able to capture more details, manufactures of POV cameras should also consider increasing the magnification of their products for use in surgery. Mounting the single camera on the head strap does enable recording during sterile procedures; however, the weight of the system limits the duration of filming, as it increases the risk of surgeon neck strain.^{3–5} This technology has great promise for surgical education in the coming years. Over the past decade, a growing body of research has made it clear that video-assisted learning is an important aspect of modern medical education. Medical school survey research has indicated that medical

students prefer appropriate video-assisted learning, and randomized trials have demonstrated that this approach improves performance of technical skills such as suturing.^{6–8} Future work will need to determine whether these techniques will assist in the education at the postgraduate level within residency training programs.

Key words: scleral buckle, video, education, teaching, recording, point of view, camera, high definition.

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