see IC3D Digital Camera

see High definition three chip camera.

Advances in video and fiber optics since the 1990s have led to the development of several commercially available high-definition neuroendoscopes. This technological improvement, however, has been surpassed by the smartphone revolution. With the increasing integration of smartphone technology into medical care, the introduction of these high-quality computerized communication devices with built-in digital cameras offers new possibilities in neuroendoscopy. The aim of a study of Mandel et al., was to investigate the usefulness of smartphone-endoscope integration in performing different types of minimally invasive neurosurgery.

They presented a new surgical tool that integrates a smartphone with an endoscope by use of a specially designed adapter, thus eliminating the need for the video system customarily used for endoscopy. They used this novel combined system to perform minimally invasive surgery on patients with various neuropathological disorders, including cavernomas, cerebral aneurysms, hydrocephalus, subdural hematomas, contusional hematomas, and spontaneous intracerebral hematomas.

The new endoscopic system featuring smartphone-endoscope integration was used by the authors in the minimally invasive surgical treatment of 42 patients. All procedures were successfully performed, and no complications related to the use of the new method were observed. The quality of the images obtained with the smartphone was high enough to provide adequate information to the neurosurgeons, as smartphone cameras can record images in high definition or 4K resolution. Moreover, because the smartphone screen moves along with the endoscope, surgical mobility was enhanced with the use of this method, facilitating more intuitive use. In fact, this increased mobility was identified as the greatest benefit of the use of the smartphone-endoscope system compared with the use of the neuroendoscope with the standard video set.

Minimally invasive approaches are the new frontier in neurosurgery, and technological innovation and integration are crucial to ongoing progress in the application of these techniques. The use of smartphones with endoscopes is a safe and efficient new method of performing endoscope-assisted neurosurgery that may increase surgeon mobility and reduce equipment costs [1)].

Three commercially available cameras were tested: GoPro Hero 4 Silver, Google Glass, and Panasonic HX-A100 action camera. Typical spine surgery was selected for video recording; posterior lumbar laminectomy and fusion. Three cameras were used by one surgeon and video was recorded throughout the operation. The comparison was made on the perspective of human factor, specification, and video quality.

The most convenient and lightweight device for wearing and holding throughout the long operation time was Google Glass. The image quality; all devices except Google Glass supported HD format and GoPro has unique 2.7K or 4K resolution. Quality of video resolution was best in GoPro. Field of view, GoPro can adjust point of interest, field of view according to the surgery. Narrow FOV option was the best for recording in GoPro to share the video clip. Google Glass has potentials by using application programs. Connectivity such as Wi-Fi and Bluetooth enables video streaming for audience, but only Google Glass has two-way communication feature in device.

Action cameras have the potential to improve patient safety, operator comfort, and procedure

efficiency in the field of spinal surgery and broadcasting a surgery with development of the device and applied program in the future [2].

Patients were operated on through transnasal transsphenoidal endoscopic approaches performed using Olympus NBI 4K UHD endoscope with a 4 mm 0° Ultra Telescope, 300 W xenon lamp (CLV-S400) predisposed for narrow band imaging (NBI) technology connected through a camera head to a high-quality control unit (OTV-S400 - VISERA 4K UHD) (Olympus Corporation, Tokyo, Japan). Two screens are used, one 31“ Monitor - (LMD-X310S) and one main ultra-HD 55” screen optimised for UHD image reproduction (LMD-X550S). In selected cases, we used a navigation system (Stealthstation S7, Medtronic, Minneapolis, MN, US). We evaluated 22 pituitary neuroendocrine tumors (86.3% macroadenomas; 13.7% microadenomas). 50% were not functional (NF), 22.8% GH, 18.2% ACTH, 9% PRL-secreting. Three of 22 were recurrences. In 91% of cases we achieved total removal, while in 9% near total resection. A mean follow-up of 187 days and average length of hospitalisation was 3.09 ± 0.61 days. Surgical duration was 128.18± 30.74 minutes. We experienced only 1 case of intraoperative low flow fistula with no further complications. None of the cases required any post- or intraoperative blood transfusion. The visualisation and high resolution of the operative field provided a very detailed view of all anatomical structures and pathologies allowing an improvement in safety and efficacy of the surgical procedure. The operative time was similar to the standard 2D HD and 3D procedures and the physical strain was also comparable to others in terms of ergonomics and weight [3].

Pham et al., created a shoulder-mounted camera system utilizing a GoPro HERO3+, its Smart Remote (GoPro, Inc., San Mateo, California), a high-capacity external battery pack, and a commercially available shoulder-mount harness. This shoulder-mounted system was more comfortable to wear for long periods of time in comparison to existing head-mounted and loupe-mounted systems. Without requiring any wired connections, the surgeon was free to move around the room as needed. Over the past several years, we have recorded numerous MIS and complex spine surgeries for the purposes of surgical video creation for resident education. Surgical videos serve as a platform to distribute important operative nuances in rich multimedia. Effective and practical camera system setups are needed to encourage the continued creation of videos to illustrate the surgical maneuvers in minimally invasive and complex spinal surgery. They describe here a novel portable shoulder-mounted camera system setup specifically designed to be worn and used for long periods of time in the operating room [4].

Recent innovation of the wearable action camera with high definition video recording enables surgeons to use camera in the operation at ease without high costs. The purpose of this study is to compare the feasibility, safety, efficacy of commercially available action cameras in recording video of spine surgery. SUMMARY OF BACKGROUND DATA: There are early reports of medical professionals using Google Glass throughout the hospital, Panasonic HX-A100 action camera and GoPro. This study is the first report for spine surgery. METHODS: Three commercially available cameras were tested; GoPro Hero 4 Silver, Google Glass and Panasonic HX-A100 action camera. Usual spine surgery were selected for video recording; Posterior lumbar laminectomy and fusion. Three cameras were used by one surgeon and video was recorded throughout the operation. The comparison was made on the perspective of human factor, specification and video quality. RESULTS: The most convenient and lightweight device for wearing and holding throughout the long operation time was Google glass.

Image quality; All devices except Google glass supported HD format and GoPro has unique 2.7K or 4K resolution. Quality of video resolution was best in GoPro. Field of view; GoPro can adjust point of interest, field of view according to the surgery. Narrow FOV option was the best for recording in GoPro to share the video clip. Google glass has potentials by using application programs. Connectivity such as Wi-Fi and Bluetooth enables video streaming for audience, but only Google glass has two-way communication feature in device.

Action cameras has the potential to improve patient safety, operator comfort, and procedure efficiency in the field of spinal surgery and the broadcasting a surgery with developing of the device and applied program in the future [5].

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