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Introduction

One of the most common challenges in surgical education for trainees is gaining practical experience through observing procedures in the operating room. Video glasses are new devices that offer the potential to project the primary surgeon's exact view to learners in real-time, allowing for an enhanced operative experience. Momentum is recently building for the potential use of wearable technology in the field of clinical medicine (1-5). Subjective assessments in terms of ease of use and feasibility in clinical settings have also been documented (3,6). Regarding its application to medical education however, the published literature is limited. The objectives of this study are to explore whether viewing live feed from the video glasses showing the surgeon's point of view has the potential to improve the operative experience for trainees in the operating room and to provide preliminary data, which can be used to direct future studies regarding the applications of video glasses in surgical education.

Materials

The video glasses chosen for this study were the Design for Vision, Inc. surgical loupes mounted with LED DayLite® & NanoCam^{HD}®. The NanoCam^{HD}® records video in 1080p High Definition at a frame rate of 30 frames per second in 24 Bit Color. See Figure 1 for an example.

Figure 1: Design for Vision, Inc. surgical loupes with LED DayLite® & NanoCam^{HD}®



<http://www.designsforvision.com>

Methods

Subjects recruited for this study are medical trainees rotating through the Pediatric Otolaryngology Clinic at BC Children's Hospital. Medical trainees include 20 medical students and 10 residents in the Division of Otolaryngology Residency Program at UBC. These trainees are randomly assigned to view either a tonsillectomy or adenoidectomy procedure, two common surgical procedures in Otolaryngology involving removal of soft tissue either at the back of the throat or the back of the nasal cavity, respectively. Subjects are then randomized to observe either the live feed from the video glasses on a monitor in the operating room first or the open procedure tableside first and then vice versa. After completing both observations, subjects complete a post-test questionnaire assessing their overall learning experience from observing the live feed from the video glasses, as compared to observing the live procedure tableside. See Figure 2: Post-test questionnaire.

Figure 2: Video Glasses Study Post-Test Questionnaire

Evaluation of Video Glasses versus Open Procedure

1) How many times have you seen this procedure prior to participating in this study?

Rated on a 0-100 point sliding scale from "Terrible" to "Excellent":

2) How would you rate your overall learning experience of the procedure in the operating room under direct visualization?

3) How would you rate your overall learning experience of the procedure in the operating room using a live feed from the video glasses?

Rated on a 0-100 point sliding scale from "Difficult" to "Easy":

4) How would you rate your ability to view the visual field of an open procedure?

5) How would you rate your ability to view the visual field of the procedure using a live feed from the video glasses?

6) How would you rate your ability to view anatomical structures during an open procedure?

7) How would you rate your ability to view anatomical structures related to the procedure using a live feed from the video glasses?

8) How would you rate your ability to follow the procedural steps during an open case?

9) How would you rate your ability to follow the procedural steps using a live feed from the video glasses?

Questions Relating to Video Glasses Feed

Rated on a 5-point Likert scale from "Very unrealistic" to "Very realistic":

10) How would you rate the ability for the video glasses to realistically simulate an open procedure in the operating room?

Rated on a 0-100 point sliding scale from "Very unimportant" to "Very important":

11) How important do you think video glasses will be as a tool in surgical education?

Results

Six subjects have completed testing: 3 residents and 3 medical students. Preliminary analysis of the data show that on scale a from 0-100, from "Difficult" to "Easy", subjects rated their overall learning experience with the video glasses as 78.6, compared to 52.5 during the open procedure. In rating the ability for the video glasses to realistically simulate an open procedure, all six participants rated the video glasses as either "Realistic" or "Very Realistic".

Discussion

Although the results are very preliminary with only 6 subjects tested thus far, the video glasses show definite promise as a beneficial tool in teaching surgical skills to medical trainees. Anecdotally, use of the video glasses in the operating room was well received by participating trainees and the technology was easily set up by the operating surgeon. We encountered minimal issues with the quality of the video feed or delays to the surgical procedure when using the glasses.

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