Technical Feasibility and Safety of Ultrasound Guided Supraclavicular Nerve Block with Assistance of a Wearable Head-up Display

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Introduction

Since the introduction of the wearable head-up displays, there has been much interest in adopting these devices in clinical settings. Increasingly, more studies are being published in literature about their use to increase efficacy of workflow in the hospitals and clinics. In this study, we report the use of a novel video capture and streaming device that has capability to stream ultrasound images to a head-up display screen on Google Glass. This system was successfully utilized in supraclavicular nerve block.

Methods

We devised a novel video capture and streaming device that is capable of broadcasting videos via a password wireless network to a wearable head-up display. This system was connected to the ultrasound machine via High Definition Multimedia Interface (HDMI). Voice controlled video streaming software was installed on Google Glass.

Results

Ultrasound images were transmitted to Google Glass head-up display in real time without delays. The senior author (SRC) wore Google Glass to perform supraclavicular nerve block. He did not break the line of his sight towards the needle and did not divert his attention to look at the ultrasound monitor. The patient underwent the procedure without complications.

Conclusions

Head-up display allowed the clinician to monitor ultrasound images without stopping the procedure and turning his head to view the ultrasound screen. Head-up display has potential to enhance efficacy of ultrasound-guided procedures by eliminating the need to divert attention while performing critical procedural steps.

Learning Objectives

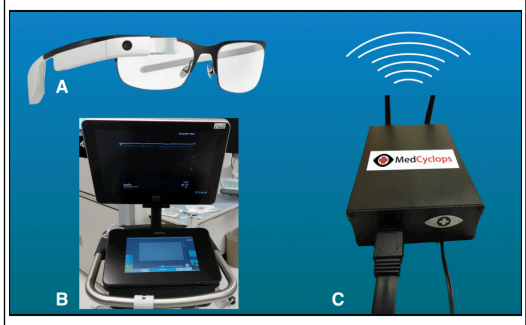
1) Describe the potential role of wearable computing device in ultrasound-guided procedures

2) Discuss in small groups shortcomings of the currently available head-up display system and suggest improvement that can be made

3) Identify an effective way to utilize wearable head-up display system in surgical procedures

References

Figure 1



A general overview of the setup. The video -capture component picks up the video signal from the medical imaging device and processes the signals using video compression techniques. Specifically, the native video size and resolution are converted to a new size and resolution that are compatible with the wearable head-up display. After the video is processed, it is passed to the video streaming component. The video streaming component consists of a custom-designed hardware chip and software protocol. Software on the video streaming component detects the reception of the video signal from the video capture component. After the video signal is detected, a video streaming protocol is automatically launched. The video streaming protocol launches a secure wireless connection between the medical imaging capture and stream system and the wearable head-up display.

Figure 2