The Use of a Novel Head-Up Display to View Intra-operative X-rays During A One Level Cervical Arthroplasty

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Disclosures

Dr. Jang Yoon is the co-founder of MedCyclops
Introduction

- In a standard cervical arthroplasty procedure, surgeons repeatedly shift away from the surgical field to view an X-ray screen, which can cause loss of focus, and pauses in completing surgical tasks.
- A heads-up display (HUD) addresses these issues by projecting images in the surgeon’s view, allowing simultaneous visualization of surgeon’s hands and X-ray images during instrumentation (Fig. 1).

We present use of a HUD during a single-level arthroplasty performed on a 35 yr. old male with right-sided disk herniation at C6-7.
Methods

- Moverio BT-35E Smart Glasses (Epson Inc, Suwa, Japan) were worn by the lead surgeon throughout the procedure to view X-ray images during key surgical steps.

- The glasses were linked to a 3D-fluoroscopy machine via a DVI-HDMI adapter and central converter that was clipped onto the surgeon’s clothing under a sterile gown (Fig. 2).

Figure 2. Overview of HUD components and connectivity.
Results

- Intra-operative imaging was immediately projected onto the HUD.

- Two Caspar pins were placed parallel to the endplate into C6 and C7 vertebral body under lateral fluoroscopy guidance (Fig. 3).

- Fluoroscopic images were transferred to the HUD, eliminating pauses and turning during pin placement.
Results

- The surgeon was able to mallet a trial and artificial disk into the disk space under lateral fluoroscopy without losing sight of his hands.

- The device is comparable to regular loupes and did not significantly obstruct view of the surgical field.

- Following surgery, the patient’s C7 radiculopathy was resolved.

Figure 4. Post-operative X-ray imaging of the cervical spine.
Discussion

- A HUD allows the surgeon to visualize the operative field throughout the cervical arthroplasty procedure, minimizing loss of concentration or strain caused by diverting focus to a separate screen.

- The Moverio BT-35E Smart Glasses offer an affordable and ergonomic means by which to view intraoperative imaging during neurosurgical procedures.

- In the future, this system can be adapted to stream 3D navigation information during spine instrumentation.

- We plan to combine the utility of the HUD system with surgical loupes.
Summary

- In a standard operative room set-up, surgeons may lose focus and experience fatigue when having to constantly divert attention to a separate monitor screen in order to view intraoperative imaging.

- A Moverio BT-35E Smart Glasses HUD can be effectively used by surgeons to view X-rays during a single-level cervical arthroplasty for optimal positioning of Caspar pins and artificial discs.

- In the future, this HUD system will be adapted to use for 3D navigation during spine instrumentation, as well as integration with surgical loupes.