

Pilot study for a long distance live, immersive, and interactive educational experience in robotic urology: A new horizon in surgical training

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Introduction & Objectives: Technology and training are two concepts that over the years have started intermingling and we can say that nowadays have already become inseparable. The advent of the 5G/6G connection in surgery have created the possibility to connect from distance in order for the surgeon to perform surgical procedures. The concept of long distance live training might revolutionize the protocols of education leading to an increase availability and a constant proctoring. The aim of this study is to prove the feasibility of distance robotic tutoring through a live immersive, and interactive experience through augmented-reality (AR) glasses.

Materials & Methods: This is a pilot experimental study involving the use of AR glasses (Apple Vision Pro, Apple inc. Cupertino, California). AR glasses were low-res OLED with a lenticular panel in front of it to provide a mild 3D effect that were connected with audiovisual feedback either to another identical AR glasses or to a normal screen through the hospital 6G Wi-Fi connection. Despite no change in management was performed, three patients were involved. Two patients underwent robot-assisted radical prostatectomies (RARP) and a partial nephrectomy (RAPN) with the HUGO RAS system. All patients and surgeons signed an informed consent to transmit the images of the procedure.

Results: The first experience consisted in the supervision of operating room (OR) setting, trocar placement, and robotic arm docking during RARP by a company specialist located in another room and subsequently by the surgeon. The images were transmitted by another pair of AR glasses wore by the OR nurse. The second experience consisted in submerge through the surgeon's view. The surgeon in the OR wore the AR glasses and the image was transmitted to a normal screen to another room where an expert surgeon and a company specialist were supervising patient positioning, and location, inclination, and docking of the robotic arms during a RAPN. The third experience added an AR function into the proctoring with the surgeon in the OR not only showing the operative field, but drawing the trocar placement during a RARP with the AR function of the glasses permitting an even higher level of interaction with another expert surgeon placed in a different part of the hospital and guiding the surgical step. The connection was established and remained stable during all experiences. All procedures were correctly performed and were uneventful, all patients were discharged on the first day post-op as by department protocol.

Conclusions: We explored and proved feasible a live interactive educational experience at distance. This study opens the doors to a game changing technology in an educational, assistance, and tutoring setting. This technology might potentially allow a longer and effective telementoring of young urologists intensifying training program even at distance.