Real-Time Interactive Presence (RTIP) to Teach Arthroscopic Shoulder Surgery in Developing Countries

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Disclosures

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Objective (Context)

- Arthroscopy has traditionally been taught to residents or other surgeons through one-on-one in-person guided training within the U.S.

- Simulators have also been used, but with significant limitations and little correlation to practical improvement.

- In developing countries, arthroscopic surgical skills are not often emphasized in training programs, and in particular, shoulder arthroscopic skills may not be taught at all.

- There is an educational gap that can be filled by telesurgery (AKA telemedicine or telementoring).
Objective (Purpose)

- We have developed a cost-effective and easily-reproducible telesurgery platform (SurgTime), which utilizes a Real-Time Interactive Presence (RTIP) to teach surgery remotely.

- We have demonstrated that the inclusion of RTIP in telesurgery facilitates a collaborative environment to improve surgical teaching methods, regardless of geographic location.

- The purpose of our study is to determine whether the SurgTime platform is a reliable and effective source for teaching arthroscopy in developing countries.
Materials and Methods

- Twelve orthopedic surgeons from 3 continents with an interest in shoulder surgery were recruited for the project.

- They were all part of a collaborative effort to bring modern shoulder surgical techniques to their particular regions, including parts of Asia, Eastern European, and the U.S.

- On a bi-monthly basis over an 18 month period of time, the abroad surgeons were invited, via SurgTime, to connect to a interactive teaching session hosted by the performing surgeon in the United States.

- SurgTime enabled the observing surgeons to visualize the same arthroscopic picture that the operating surgeon was seeing, ask questions in real time, and annotate on the screen to point out structures or clarify surgical techniques.
Materials and Methods cont.

- Following the procedure, each surgeon that participated was sent a 10-question survey.
- This Likert-scale questionnaire was scored out of 50 points, each question worth 5 points.
- Participating viewers were asked to provide their responses and feedback regarding the educational utility, ease and efficiency of use, and overall safety of the system.
- We then reviewed the data from the transmission surveys and assessed the results.
Results

- Over the 18 month period, at least 30 transmissions occurred and were observed via SurgTime on the viewer’s home or office computer, cell phone, or tablet.
- 69 post-procedure surveys were filled in that time period, averaging about 2 per transmission (range 1-6).
- First 2 attempts to transmit were unsuccessful because of poor wireless internet connection, specific to our operating room in Burbank, CA.
- There was no loss of connectivity in any of the other procedures once switched to a strong ethernet connection.
Results cont.

- All of the observing surgeons (as well as the telesurgeon) agreed that the system was easy to use, reliable, easy to connect to, and had sufficient image resolution with no significant lag in motion or audio transmission.

- They also felt it was useful to highlight shoulder anatomy and pathology and to observe the telesurgeon’s surgical technique.

- The telesurgeons (including the senior author) did not feel there were any safety concerns with the procedure nor did it interfere with the surgical procedure.

- All surgeons felt it was an effective teaching tool.
Conclusions

- Real-time interactive presence (RTIP) proved to be an effective as a teaching tool in teaching shoulder arthroscopy, regardless of geographic boundaries.

- SurgTime is an effective RTIP platform that can safely and efficiently teach surgeons arthroscopic techniques.

- The use of RTIP can enhance knowledge transfer, skill acquisition, arthroscopic surgical technique, patient safety, and operative outcomes.
Significance

- Telesurgery has the potential to shape the future of surgical training, both domestically and abroad.

- SurgTime is an economical and easily-reproducible teaching tool, making it readily accessible to developing nations across the globe.

- Surgeons can gain insight or clarity in real-time during a surgery, without needing a colleague to be physically present.

- This technology can accelerate the learning curve for doctors in developing countries and help bridge gaps in knowledge.
Questions

- As this study was limited to arthroscopic shoulder surgeries, can it also be successfully used for other joints?

- Can this tool be used for open surgeries or other kinds of minimally invasive surgeries such as laparoscopies?

- Are there additional areas in medicine we can implement RTIP to enhance learning or productivity?

- How can we continue to improve on areas such as lag time and audio/visual quality in the future?