Transforming the Healthcare Simulation Spectrum:
Now, Next and Beyond

19 - 21 October 2022 | Academia, Singapore

SingHealth DukeNUS ACADEMIC MEDICAL CENTRE
Institute of Medical Simulation

SESAM

SIMGHOSTS

National Dental Centre Singapore
SingHealth

aumed

IMPROVING CONFIDENCE LEVELS OF RESIDENTS FOR ENDODONTIC MICROSURGERY

Pei Yuan Chan, Jeen Nee Lui
Department of Restorative Dentistry, National Dental Centre Singapore

Introduction

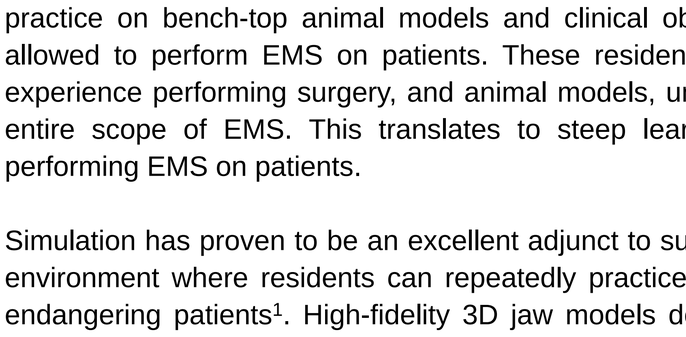
Endodontic microsurgery (EMS) is a procedure to treat and preserve a tooth that does not respond to conventional root canal treatment. Current microsurgical training involves practice on bench-top animal models and clinical observations, before residents are allowed to perform EMS on patients. These residents often have no prior hands-on experience performing surgery, and animal models, unfortunately, do not permit for the entire scope of EMS. This translates to steep learning curves for residents when performing EMS on patients.

Simulation has proven to be an excellent adjunct to surgical education, providing a safe environment where residents can repeatedly practice a range of clinical skills without endangering patients[1]. High-fidelity 3D jaw models developed through a collaboration with AudMed Pte Ltd were used for an Endodontic microsurgical training, to facilitate the acquisition of surgical skills and improve the familiarity of residents to the surgical field. The aim of this study was to evaluate the use of high-fidelity 3D jaw models on the confidence levels of residents for Endodontic microsurgical training.

Material and Methods

Residents in their surgical training (n=4) were given bi-weekly simulation practice using the 3D jaw models (Figures 1 and 2) mounted on simulation heads (Figures 3 to 6), over the course of 2 months from July to August 2021. We structured the simulation surgical training curriculum based on the Ericsson 1996 framework on deliberate practice[2].

The simulation training was done with coaching and immediate feedback on their performance by their supervisors and included a variety of clinical scenarios with different tooth types of increasing complexity. Reflective debriefing[3] was done after each training to promote reflective thinking and deeper learning.



Figures 1 and 2: 3D jaw models

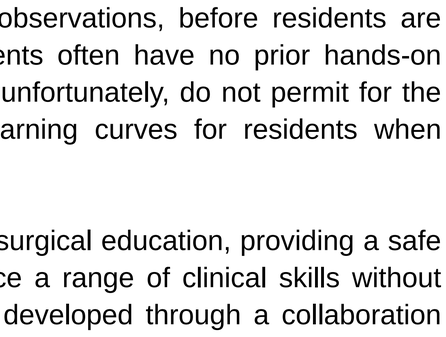
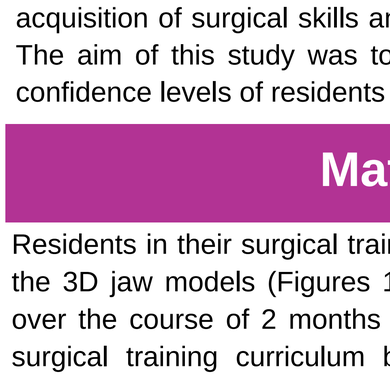
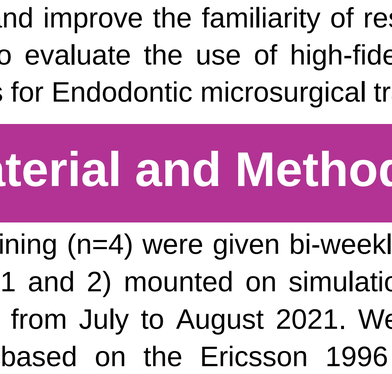


Figure 3: 3D jaw model mounted on phantom head





Figures 4 and 5: Simulation training using 3D jaw model

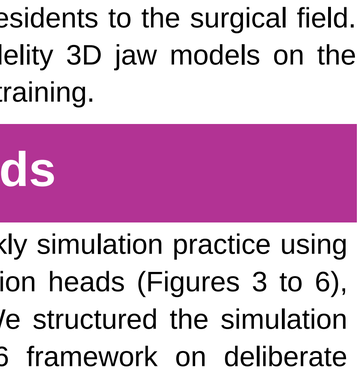


Figure 6: Root-end resection for upper right central incisor

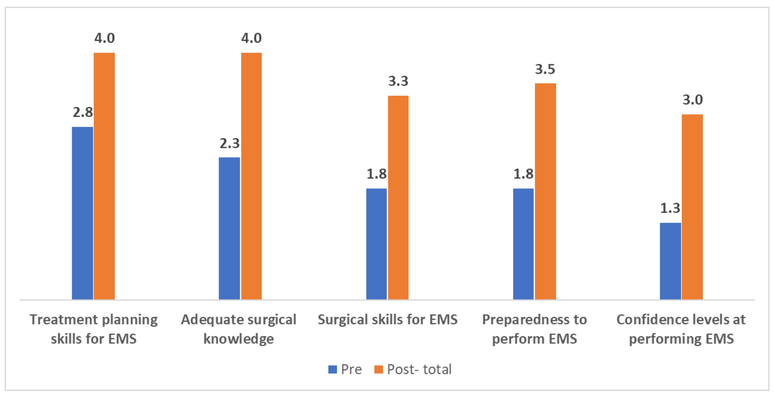
A pre-workshop questionnaire was done a week prior to the workshop. Post-workshop questionnaires were conducted immediately after the workshop and after their first EMS. The residents responded using a 5-point Likert scale (1-strongly disagree to 5-strongly agree) on their level of agreement for eight items related to the confidence levels on various aspects of EMS for the pre- and post-workshop questionnaire and five items related to the use of the 3D jaw models for Endodontic microsurgical training after their first EMS.

Results

All the residents agreed that the Endodontic microsurgical training using the 3D jaw models covered critical content necessary for them to become competent for EMS.

The post-workshop questionnaire revealed that there was an improvement in the confidence of having treatment planning skills (mean 2.8 versus 4.0), adequate surgical knowledge (mean 2.3 versus 4.0), surgical skills (mean 1.8 versus 3.3), preparedness (mean 1.8 versus 3.5), and confidence levels (mean 1.3 versus 3.0) to perform EMS (Figure 7).

Figure 7. Confidence Levels of the learners



The post-EMS questionnaire found that the residents felt more prepared to perform EMS after going through the 3D surgical simulation (mean 4.8), and that the simulation training led to reduced stress levels when performing their first EMS (mean 4.5).

100% of the residents agreed that the 3D simulation training prepared for excellence in surgical training and should be used for future endodontic surgical training.

Discussion

The use of high-fidelity 3D jaw models for Endodontic microsurgical training with deliberate practice[2] and reflective debriefing[3] has demonstrated high student satisfaction and an increase in confidence levels and preparedness for EMS among the residents. Nestel et al 2011[4], in a systematic review on simulation for learning and teaching procedural skills, found that simulation leads to improved knowledge and procedural skills in the healthcare profession.

Simulation training for EMS using high-fidelity 3D jaw models closely simulates the clinical situation, thus creating a safe, continuous and efficient learning environment to improve the resident's coordination and familiarity to the surgical field. This would develop the capacity and capability of the residents, improve on their confidence while performing surgery and ensure that the residents are competent to provide the highest standards of care for their patients.

Conclusion

Endodontic microsurgical simulation training using high-fidelity 3D jaw models has provided a safe and efficient learning environment to develop the capacity and capability of the residents, improved on their confidence while performing surgery, and ensured that the residents are competent to provide the highest standards of care for their patients.

References

1. Khan, Kamran, Tim Pattison, and Morgan Sherwood. "Simulation in medical education." Medical teacher 33.1 (2011): 1-3.
2. Ericsson, K. Anders, Ralf T. Krampe, and Clemens Tesch-Römer. "The role of deliberate practice in the acquisition of expert performance." Psychological review 100.3 (1993): 363.
3. Sabei, Sulaiman D. AL, and Kathie Lasater. "Simulation debriefing for clinical judgment development: A concept analysis." Nurse Education Today 45 (2016): 42-47.
4. Nestel, Debra, et al. "Simulation for learning and teaching procedural skills: the state of the science." Simulation in healthcare 6.7 (2011): S10-S13.