Harnessing Simulation Technology to Teach Abdominal Aortic Aneurysm Repair in the Team Setting

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Introduction

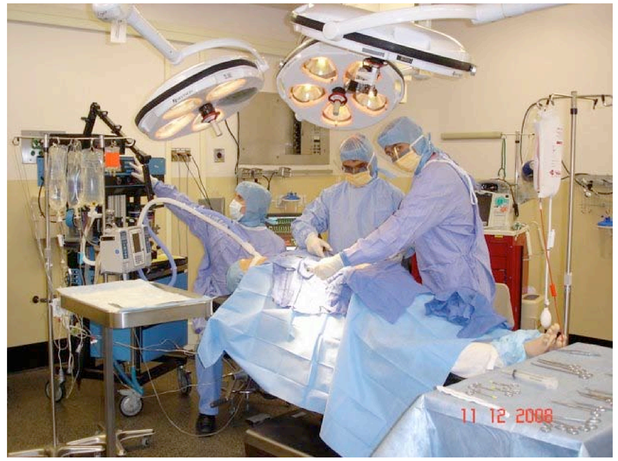
Simulation science has achieved significant milestones in surgical education yet still has limitations. Many simulators continue to be prohibitively expensive and focus on technical skills alone, primarily laparoscopic skills. Program directors want their trainees to acquire critical thinking aptitude along with technical skills during residency; however, there is a scarcity of low-cost open surgery simulators that allow for team training. We could find no such model for Abdominal aortic aneurysm (AAA) repair so we assembled one using "off-the-shelf" components.

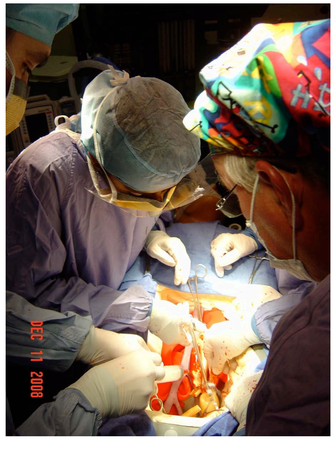
Model Design

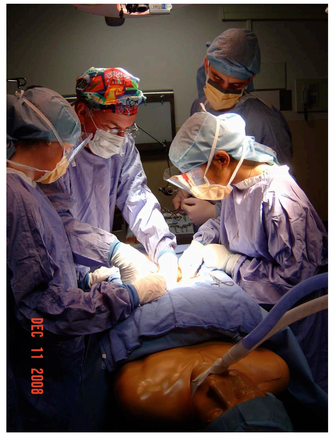
Our training model has the following components:

1)Head/torso from the Blue Phantom Central venous access mannequin
2)Operative abdomen from the Limbs & Things AAA repair trainer
3)Lower limbs from Laerdal's SimMan. SimMan Software was used as a simulated patient monitor with touch-screen technology

The SimMan software allowed changes in physiological parameters as the surgery progressed, creating intraoperative hemodynamic instability for assessing decision-making and team behavior. The assembly was prepped and draped on an operating table in a simulated OR to create a realistic experience. An integrated video debriefing system was used to give post-procedure feedback, and each resident's operative skills were assessed using an OSAT scoring system.



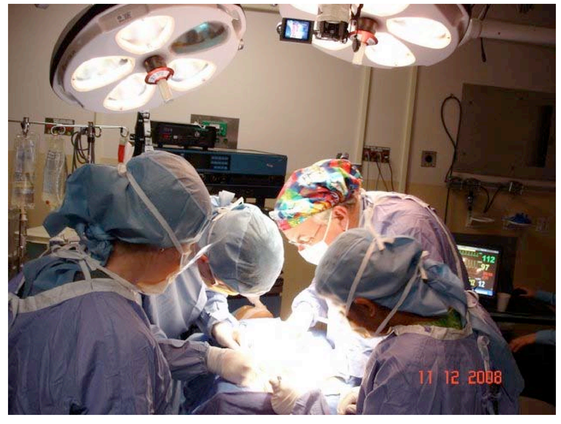




A 60 min didactic and skills session allowed trainees to practice vascular anastomosis using Dacron graft under expert supervision with a 2:1 student-faculty ratio. Trainees were presented with a scenario of a ruptured AAA followed by a 30-minute direct faculty interaction discussing patient work up and evidence surrounding open AAA repair. Subsequently, trainees performed the repair on the aforementioned AAA model in a simulated OR environment.

Preliminary Results

Nine surgery residents have trained on this model. Feedback on the model was assessed using a 4-point Likert scale. Residents found the model to be a true replication of the AAA repair and believed that the model helped them significantly in understanding the technical aspects of complex AAA repair.



Conclusion

Reduced training hours and increased focus of surgical training on Laparoscopic and Endoscopic procedures underscores the need for alternative teaching methods for learning open surgery. We propose an easy assembly, cost-effective, proficiency-based training module that allows development of technical and decision-making skills for teaching surgical residents open AAA repair.

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