

A Novel Combined Neurosurgery-Anesthesiology Real Time Crisis Management Simulation-Endoscopic Endonasal Cavernous Carotid Cerebral Perfusion Vascular Injury Model: A Combined Cadaveric and SimMan Model

J. N. Ciporen; B. Lucke-Wold; D. Spight; M. Noles; D. Dillman; W. E. Cameron; C. Haley; S. McCartney Oregon Health & Science Univ. Departments of Neurological Surgery & Anesthesiology & VirtuOHSU Simulation Lab

All neurosurgery residents



Introduction

Vascular injury is a rare but serious complication during neurosurgical procedures. To evaluate the effectiveness of surgical simulation we utilized our established cadaveric endoscopic endonasal cavernous carotid cerebral perfusion and vascular injury model as a means to teach and access paired neurosurgical and anesthesia residents "learner" crisis management.

Crisis Management: Simulation of Cavernous Carotid Bleeding Model



Neurosurgery and Anesthesiology Simulated Operating Room

Results

artery bleeding was perfused. Cadaver head was placed above the SimMan (connected to standard anesthesia operating equipment; real time response and management of cardiac arrythmias, pulmonary and hemodynamic changes were reflected in the SimMan). Learners (neurosurgical; n=6, and anesthesia residents; n=6) were tested on individual crisis management tasks in three patient scenarios (two 7-minute and one 4-minute scenario) per resident pair. Learners performed pre- and postsimulation self-assessment, and resident performance evaluation (individual, communication skills, and functioning as a team), blood loss data, and a pre- and post -anatomical exam data was collected and analyzed.

Methods

Right-side cavernous carotid

Learning Objectives

 the development of a first in kind simulation experience; anesthesia and neurosurgery residents working together 2.
learner assessment of a simulated vascular injury model
resident performance of appropriate management of carotid injury: simulated model

"would participate in simulated training in the future if given the choice" and strongly agreed that "the model offers benefits not available in existing training modules". Anesthesia residents agreed (n=1) or strongly agreed (n=5) that the simulation session was "valuable". A sub analysis comparison of junior (= postgraduate year (PGY) 4; n=3) vs. senior (=PGY 5; n=3) for situation awareness, decision making, communication and teamwork, and leadership revealed that senior residents performed better in all categories, with the largest mean difference in communication and teamwork (t=4.889, p<0.001). For neurosurgery residents blood loss amount significantly improved between scenarios 1129±56.28 compared to 875.8±28.9 (t=3.667, p<0.01). Anatomic knowledge improved pre- vs. post simulation training.

Crisis Management: Simulation of Cavernous Carotid Bleeding Model



Neurosurgery and Anesthesiology

Crisis Management: Simulation of Cavernous Carotid Bleeding



Neurosurgery Resident with Faculty Performing Endoscopic Endonasal Repair of the Cavernous Carotid Injury Crisis Management: Simulation of Cavernous Carotid Bleeding Model



Real-Time Simulation Control Center: Manipulating the vital signs of the SimMan

Conclusions

We describe for the first time a novel multi-disciplinary approach to simulation, whereby neurosurgery and anesthesia residents worked together to manage carotid injury. Learner skill set was improved, communication techniques were practiced, and vascular injury algorithms learned.

References

Lai, A et al Learning Crisis resource management: Practicing versus an observational role in simulation training-a randomized controlled trial. Anaesth Crit Care Pain Med 2016 Saver, C. et al Simulation lab a safe way to practice management. OR Manager 32, 13-17 2016