

Introduction

Current training methods for simulating neurovascular procedures lack the combination of life-like conditions and real human anatomy essential for effective surgical training. We previously introduced a realistic cadaver based training method that combined both, the life-like conditions and the real human anatomy for practicing neurovascular procedures and the management of intraoperative complications, In this report we present the effectiveness of this model in enhancing surgical skills in aneurysmal clipping and management of intraoperative aneurysmal rupture.

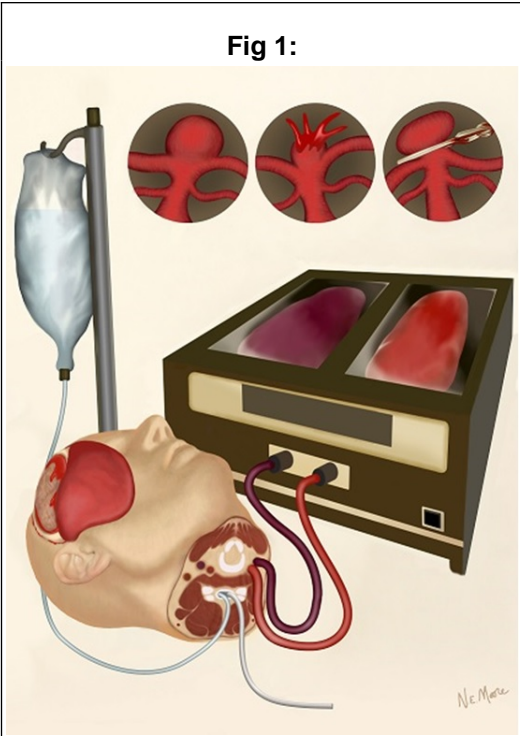
Methods

32 cephalous were used in 21 hands-on workshops. The carotid artery, jugular vein and at least one vertebral artery were cannulated and connected to blood simulant reservoirs. The arterial side then was connected to a pump that provided pulsatile pressure.

Results

In five courses, we rated the performance of residents for two tasks.
First “Clipping cerebral aneurysms”: number of attempts to clip an aneurysm decreased with multiple sessions from 3-5 attempts to one or two.

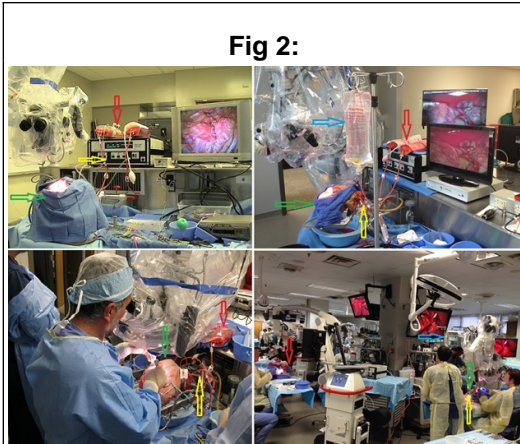
Second “controlling bleeding”: the time to control bleeding from a ruptured aneurysm dropped from 80-160 seconds, to 50 seconds after three sessions of practice in most cases.



artistic illustration of the head specimen connected to the pump and blood simulant reservoir, and the CSF simulant reservoir is hung on serum pole and connected to the subarachnoid spaces through the spinal canal.

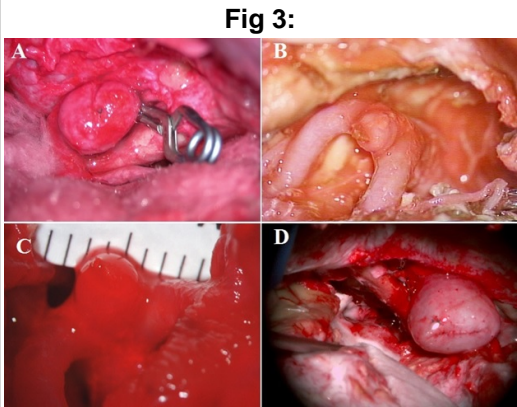
Conclusions

the “Live Cadaver” model is a valuable tool for enhancing surgical skills. It offers an identical environment as that in the operating room allowing “real” surgical practice without endangering patients’ lives. Practicing complex surgical procedures using the live cadaver model can enhance surgical skills and performance of young neurosurgeons and neurosurgery residents.

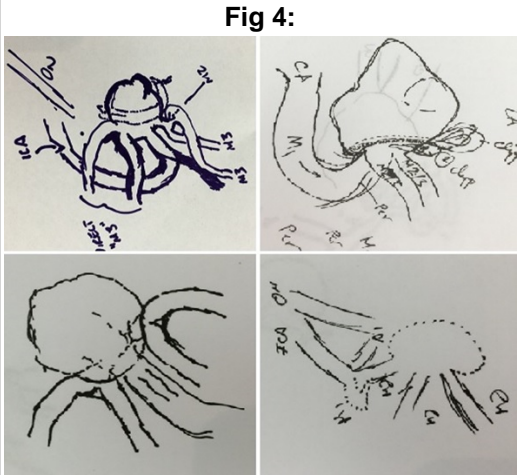


settings of working stations: blood simulant reservoirs (red arrows).

CSF simulant reservoir (blue arrows),
Connecting tubes between the head specimen and reservoirs (yellow arrows),
head specimens (green arrows)



Artificial aneurysms, “Clinoidal Segment” Carotid artery aneurysm (A,D), Middle cerebral Artery (MCA) bifurcation aneurysm (B, C).



example of hand drawing of a MCA Bifurcation Aneurysm by residents before clipping attempts.