



Introduction

High Fidelity Surgical Simulation methods should convey a sense of reality to replace live surgery, by providing the anatomical characteristics, life-like presentation, and ability of bleeding. At the same time, methods should be cost effective, readily available, and ethically acceptable. The live cadaver model has proved efficient in providing the highest level of surgical simulation by combining the real human anatomy with the life-like conditions of the living body. In this report we will show how to utilize this model for residents training on neurovascular procedures.

Methods

Seventy-five cadaveric head specimens were used in training hands -On workshops for neurosurgery residents. The major vessels in the neck section were cannulated and connected to blood simulant reservoirs the arterial reservoir was further connected to a mechanical pump to provide pulsating pressure, and the subarachnoid space was cannulated and connected to a clear liquid to simulate the cerebro spinal fluid (**Fig 1**). An arterial pressure of 80-120 mm Hg, a pulse rate up to 100 beats per minute, and a venous pressure of approximately 15 mm Hg were applied to replicate real life conditions in terms of bleeding, pulsation, and life-like circulation.

Working station



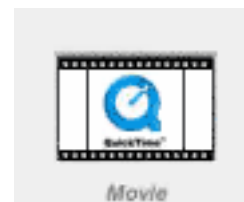
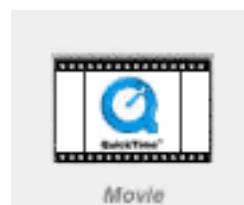
Fig 1

Results

Participating residents and faculty members were able to practice neurovascular procedures under life-like conditions on the same human anatomy simulating actual surgical procedures. Aneurysm clipping, endovascular procedures, vascular bypass, management of intraoperative vascular complications and aneurysmal rupture, and neurovascular surgical maneuvers were practiced in the same manner as in a live patients (**Video 1-2**, showing the settings of the model and some procedures including dealing with intraoperative rupture) Improvement of surgical skills was noticed after several sessions of practice on the model.

Conclusions

The live cadaver model replicates live surgery and management of intraoperative complications with higher fidelity and more realistically than available simulators, and thus is a major advance in producing best training outcomes. It is readily available, cost-effective when compared with other training models, and of great value in teaching rare and difficult cases, as well as management of complications. The live cadaver model is also ideal for assessment and refinement of surgical skills, and has numerous research applications in the areas of validation and outcomes.



References

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