

Professional development: Cadaver Lab



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At the base of the teaching pyramid are the learning methods that involve an active involvement of the learners and unequivocally support the value of simulation in the acquisition of surgical techniques. Faced with what we like to call "the perfect storm", or the sum of all those factors that characterize urgent / emergency cases, the general surgeon must quickly gain complete control of the situation.

The Holy Grail of is undoubtedly the corpse simulation.

This is what prompted SICUT to develop a course to improve knowledge of anatomical exposures for advanced thoracoabdominal vascular control on a reperfused corpse and soon there may be "pulsatile reperfusion", which allows the simulation of various clinical scenarios to vary physiological parameters (beat, frequency, blood pressure ...).

KEY WORDS: Cadaver lab, Learning curve, Simulation, Technical skills

At the base of the "learning pyramid" the "active" teaching methods, namely the discussion of clinical cases, practical exercises and transmission of knowledge to other learners, unequivocally support the importance of simulation in the acquisition of surgical techniques.

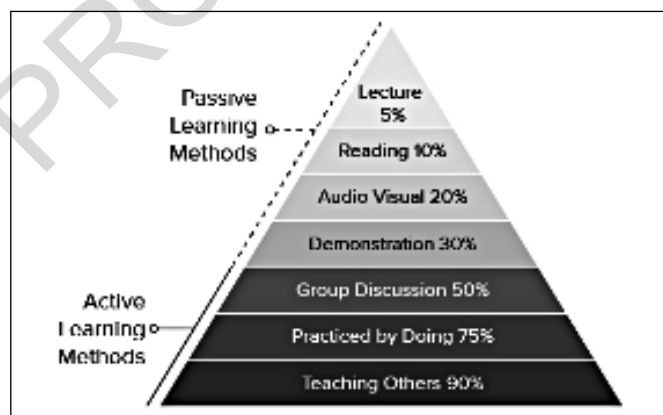
It is worth emphasizing the fact that there is talk of simulation aimed at both young surgeons in training and mature professionals who need specific knowledge and techniques.

If we focus our attention on the fact that emergency surgery constitutes 50% of the surgical activity of a department and is associated with 80% of deaths it is clear that any gaps in training must be filled.

But who can and should actually teach?

In the face of extreme myopia the need for growth in the field, and the value of professional credentials (II level masters, postgraduate courses) are slowly making some headway.

The unpredictability, the surgical timing, the getting ready of the surgical staff, the hemodynamic instability of the patient, mostly due to penetrating trauma, the variability of the logistical conditions and not least the obstacles to centralization make it essential that within the surgical team there are professional figures able to handle, for example, a massive thoracoabdominal hemorrhage.



The sum of factors that require rapid and effective decisions is for the general surgeon in any sleepy provincial hospital what we like to call the "perfect storm" (rare, unexpected and unpredictable conditions),

Here is an example: the surgical procedure described by Dr. Tom Shire who, on November 24, 1963, found himself struggling with his perfect storm. The patient (nothing less than the murderer of JF. Kennedy) had a gunshot wound that caused splenic, pancreatic, caval, aortic, renal, hepatic and pulmonary injuries ... It was 1963 and there was already talk of Damage Control Surgery!

Simulation in the surgical field can allow the acquisition of technical skills, and help to guarantee quality control and safety of medical services (Scott, 2008; Sachdeva,

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 ...Upon entering the peritoneal cavity, approximately 2 to 3 liters of blood, both liquid and in clots, were encountered. These were removed. The bullet pathway was then identified as having shattered the upper medial surface of the spleen, then entered the retroperitoneal area where there was a large retroperitoneal hematoma in the area of the pancreas. Following this, bleeding seemed to be coming from the right side, and upon inspection there was seen to be an exit to the right through the inferior vena cava, thence through the superior pole of the right kidney, the lower portion of the right lobe of the liver, and into the right lateral body wall... The inferior vena cava hole was clamped with a partial occlusion clamp... The inspection of the retroperitoneal area revealed a huge hematoma in the midline. The spleen was then mobilized, as was the left colon, and the retroperitoneal approach was made to the mid-line structures. The pancreas was seen to be shattered in its mid portion, bleeding was seen to be coming from the aorta... Bleeding was controlled by finger pressure by Dr. Malcolm O. Perry. Upon identification of this injury, the superior mesenteric artery had been sheared off the aorta... This was clamped with a small, curved DeBakey clamp. The aorta was then occluded with a straight DeBakey clamp above and a Potts clamp below. At this point all major bleeding was controlled... Shortly thereafter... the pulse rate... was found to be 40 and a few seconds later found to be zero. No pulse was felt in the aorta at this time.

~ Operative Record of Lee Harvey Oswald,
 Parkland Memorial Hospital 11/24/63
 Cited in: The Warren Commission Report: Report of the President's
 Commission on the Assassination of President John F. Kennedy,
 St Martin's Press, 1992



2011). And, to be fair, this is a concept poorly understood in Italy but absolutely established in other countries.

Surely the animal model (pig) has been and still is adequate but the "holy grail" of surgical simulation is undoubtedly the cadaver lab.

Below is a study conducted by the University of Leeds and published in 2015 at the annual congress of the Society of Academic and Research Surgery.

Take for example advanced vascular control in thoracoabdominal hemorrhage; undoubtedly it is a necessary maneuver, implemented during emergency surgery, in critical logistical conditions and mainly following a traumatic event in a hemodynamically unstable patient. It is a technique that can hardly be taught during routine interventions since the peculiarities of humans are obviously different from those of animal models but during the surgical residency program there are no courses that include human cadaver dissection (cadavers not available, lack of anatomical theaters now turned into museums). Moreover, due to the unavailability of anatomical preparations in Italy, partly due to ethical and partly economic reasons, there is a sort of unidirectional flow of learners abroad, especially to Spain, France and Belgium where it is possible to take advantage of this opportunity for professional growth at a low price. This is the reason why more than 50% of the students enrolled in Cadaver Lab in France are Italian!

All these issues led the SICUT to devise a training course that helps to improve the knowledge of the main anatomical exposures for the control of hemorrhage, to acquire the technical skills required to expose and isolate

the main vascular structures and to implement the confidence and self-critical capacity of the learner when performing a maneuver.

The headquarters of the course is the ICLO Teaching and Research center, in Arezzo that provides 7 operating theaters for a total of about 47 workstations (each of these stations can be connected live with an adjoining room and video recording of the session is available practice); the cadavers, coming from the USA, are equipped with a complete medical history folder and serology

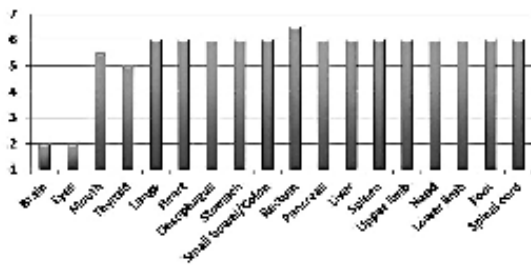
The 2-day course is structured as follows:

1 DAY:

Lectures and group discussions on surgical techniques aimed at vascular control in thoracoabdominal massive hemorrhages:

- Pelvic Packing
- Medial visceral rotations (Cattel-Braasch and Mattox)
- Supraceliac clamping of the abdominal aorta by anteriorly
- Renal ilo vascular isolation
- Pringle maneuver
- Liver mobilization and liver packing
- Midline looping
- Isolation and clamping of iliac vessels
- Enlarged left anterolateral thoracotomy in clamshell
- Overdiaphragmatic aorta clamping
- Pulmonary twist / pulmonary ileus clamping
- Pneumectomy en bloc
- Pericardiotomy and piercing suture of the heart

Feedback – similarity to live tissue

**Thiel Cadavers: The holy grail of surgical simulation?**

Society of Academic and Research Surgery Annual Conference January 2015

Thiel Cadavers: The holy grail of surgical simulation?

Marina Yiasemidou Specialty Trainee General Surgery Honorary Tutor, University of Leeds D. Glassman, J. Tomlinson, D. Roberts, D. Miskovic. Special Thanks to Peter Culmer and Sarah Wilson

Feedback

	Opinion before	Opinion after	p-value
Cadaveric tissue feels significantly different from live tissue	6 agree	3 rather disagree	0.001
Cadaveric tissue looks significantly different from live tissue	6 agree	3 rather disagree	0.001
The use of cadavers for surgical simulation is of little benefit	2 disagree	1 not being completely disagree and 2 disagree	0.223
It is difficult to identify anatomical landmarks in cadavers	2.5, 2 disagree and 3 rather disagree	2 disagree	0.105
Using cadavers for surgical training is unethical	1 completely disagree	1 completely disagree	0.551
Cadaveric dissection is expensive	4.3 – 4 undecided, 5 rather agree	3.5, 3 – rather disagree	0.015
The smell of cadavers can be disturbing	5 rather agree	3 rather disagree	0.012

allow the simulation of physiological parameters (beats, breathing, circulation) controlled with mechanical systems. A further innovation in the works is the control, via wi-fi, from a tablet, in real time of the clinical conditions in order that the students experience different clinical situations that must be managed urgently (hemodynamic instability, massive hemorrhage, hemorrhagic shock, ...).

Riassunto

Alla base della piramide dell'insegnamento i metodi di apprendimento che prevedano un coinvolgimento attivo dei discenti supportano inequivocabilmente il valore della simulazione nell'acquisizione delle tecniche chirurgiche. Di fronte a quella che amiamo definire "la tempesta perfetta", ovvero la somma di tutti quei fattori che caratterizzano l'urgenza/emergenza, il Chirurgo generale deve rapidamente avere il completo controllo del setting operativo.

Il Santo Graal per l'apprendimento sul campo è indubbiamente costituito dalla simulazione su cadavere.

Ecco cosa ha spinto la Sicut ad ideare un corso atto a migliorare la conoscenza delle esposizioni anatomiche per il controllo vascolare avanzato toraco-addominale su cadavere ripperfuso; e in un futuro prossimo non si esclude la possibilità di procedere ad una "riperfusion pulsatile" che consenta la simulazione di vari scenari clinici al variare dei parametri fisiologici (battito, frequenza, pressione arteriosa...).

2nd DAY:

- Performing maneuvers by students assisted by a teacher on reperfused corpse
- 4 to 1 student / teacher ratio
- Duration of exercises about five hours (with live commentary from the plenary hall)
- Group discussion on the maneuvers acquired
- Administration of post course test and delivery of video of the surgical session
- Course rating form

And in the near future?

The SICUT Faculty is working on a project to have de-pulsing and "reperfusion" of the cadavers in order to

TABLE I - Mean results of perfused cadaver survey results

I Gained new knowledge	I learned new techniques	The pressurized cadaver aids in realistic anatomic dissections	The pressurized cadaver adds reality to surgical procedures	I feel I will be safer performing this procedure in a clinical setting	Preprocedure confidence	Postprocedure confidence
4.85	4.86	4.74	4.77	4.76	2.85	4.20*

*Preprocedure compared to postprocedure confidence $P < .00$.

References

1. Carey J, et al.: *Perfused Fresh Cadavers: Method for application to surgical simulation*. The American Journal of Surgery.
2. Yasemidou M, et al: *Thiel cadavers: The holy grail of surgical simulation?* Society of Academic and Research Surgery annual conference, 2015.

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