



A Well-Structured, Timed Curriculum That Incorporates Simulated Laparoscopic Surgical Training Improves Resident Education and Passage of the FLS Exam

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Abstract

Background: The exponential growth of minimally invasive surgery has challenged conventional systems for surgical training and establishment of competency. The longstanding dogma of “see one, do one, teach one,” is being increasingly challenged by legal and ethical concerns for patient safety issues, malpractice concerns, operating room efficiency and surgeon efficiency. A conundrum of how best to teach technical skills to our residents complexes and challenges the current surgical training system. Evidence suggests that a well-structured curriculum, which incorporates simulated laparoscopic surgical training, improves performance in both the animate and human operating rooms and enables graduating general surgery chief residents to pass the Fundamental Laparoscopic Skills (FLS) exam required by the American Board of Surgery for general surgery board certification.

Methods: Since August 2007, all of the current general surgery residents were enrolled in our surgical skills course. This is a well-structured, timed curriculum that incorporates simulated laparoscopic surgical training. In particular, the scheduled training sessions involved the use and training on laparoscopic computer simulators and laparoscopic box trainers. Subjects were trained and continuously assessed on appropriate laparoscopic camera skills, instrument handling, object positioning, dissection, ligation, cutting, suturing, and knot tying. Using the Fundamental Laparoscopic Skills (FLS) exam as their final test, 5 of the current chief residents enrolled to take the test in December 2009. The FLS exam specifically assessed laparoscopic peg transfers, ligation, cutting, suturing, and intracorporeal and extracorporeal knot tying.

Results: All graduating general surgery chief residents passed their Fundamental Laparoscopic Skills exam as required by the American Board of General Surgery.

Conclusions: A well-structured, timed curriculum that incorporates simulated laparoscopic surgical training that is easily accessible to the trainee improves surgical performance and resident education. Additionally, on-going routine practice with laparoscopic trainers leads to better performance, surgical outcome, intraoperative laparoscopic skills, better module for resident education and passage of the Fundamental Laparoscopic Skills exam as required by the American Board of General Surgery.

Introduction

New methods of developing and teaching laparoscopic skill sets are necessary because it is becoming increasingly clear that laparoscopic surgery requires a completely different skill set with manipulation of surgical instruments on a two-dimensional video screen in an actual three dimensional operative field. Spatial relationships, psychomotor skills and the development of ambidextrous skills in a small intra-abdominal space are often a very difficult task for novices to perform when learning the principles of minimally invasive surgery. With the added restrictions on work hours, teaching residents to proficiently perform these advanced laparoscopic procedures, essentially requires them to master some of these techniques prior to their actual performance in the operating room environment. This is most often accomplished with the aid of surgical simulators.

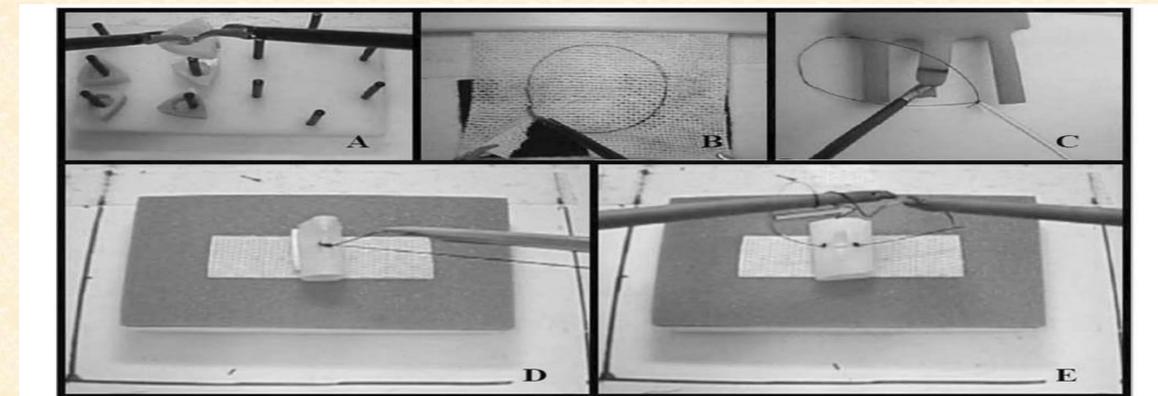
Structured task repetition practice over a number of sessions instead of massed training during a single session are important aspects of motor training that are pivotal to achieving proficient laparoscopic skill acquisition and long-term retention. Although these principles have been embraced by many academic centers, a little more than half of the surgical programs with surgical simulations have mandatory resident attendance. This infers that many surgical residency programs may not be instituting an appropriately structured simulation curriculum. Hence, uniform training and thus mandatory participation can lead to good compliance that can be translated to maximum curricular efficiency.

Additionally, the American Board of Surgery (ABS) announced that passage of the FLS exam is a new requirement for surgeons seeking board certification in general surgery. This was enacted to better ensure that surgeons will possess the critical skills needed for modern surgical practice. The new requirement applies to applicants for certification who complete their general surgery residency in the 2009-2010 academic year or thereafter.



Methods

- A well-structured, timed curriculum was established which incorporated simulated laparoscopic surgical training.
- The FLS manual skills program consisting of 5 tasks of increasing complexity was implemented within our surgical skills course:



Task A: peg transfer. A series of 6 plastic rings are picked up in turn by a grasping forceps from a pegboard on the surgeon's left, transferred in space to a grasper in the right hand, and then placed around a post on the corresponding right-sided pegboard. After all of the rings are transferred from the left to right, the process is reversed, requiring transfer from the right to left hand.

Task B: pattern cut. In this exercise, a 4-inch square gauze is suspended by clips. The surgeon is required to cut a precise circular pattern from the gauze along a premarked 1-mm-wide template.

Task C: ligating loop. For this task, the trainee must introduce the pretied ligating loop (endoloop) through one trocar, while controlling a tubular structure (foam appendage) using a grasping forceps through the other trocar. The loop is then cinched precisely on a previously marked 1-mm line on the appendage.

Tasks D and E: suturing with intracorporeal and extracorporeal knot tying. In these exercises, a 2-0silk suture with a curved needle is introduced through the trocar and positioned properly using the needle holders. A stitch is then placed through target points on either side of a slit in a Penrose drain, and the suture is tied using either an extracorporeal knot-tying technique with the aid of a knot pusher (task D, 120-cm-long suture) or an intracorporeal (instrument) technique (task E, 12-cm-long suture).

Results & Conclusions

- All graduating general surgery chief residents passed their Fundamental Laparoscopic Skills exam as required by the American Board of General Surgery
- A well-structured, timed curriculum that incorporates simulated laparoscopic surgical training that is easily accessible to the trainee improves surgical performance and resident education.
- On-going routine practice with laparoscopic trainers leads to better performance, surgical outcome, intraoperative laparoscopic skills, better module for resident education and passage of the Fundamental Laparoscopic Skills exam.

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