The American Journal of Surgery (2016) 212, 645-648

The American Journal of Surgery®

Association of Women Surgeons

Laparoscopic simulation for surgical residents in Ethiopia: course development and results

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KEYWORDS:
Surgical education;
Simulation;
Laparoscopic;
Training;
Ethiopia

Abstract

BACKGROUND: We aimed to develop and implement a laparoscopic skills curriculum in an Ethiopian surgical residency program. We hypothesized that residents would improve with practice.

METHODS: We developed a laparoscopic curriculum by adapting existing training models. Six courses were conducted during 2012 and 2013 in a teaching hospital in Ethiopia. Eighty-eight surgical residents participated. Main outcome measures were laboratory task completion times and student survey responses.

RESULTS: Students showed improvement in time needed to complete skills tasks with practice. Mean times improved for all 5 tasks ($P \leq .01$). Students uniformly reported that the course was valuable. The curriculum is now taught and sustained by local faculty.

CONCLUSIONS: The development and implementation of a collaborative and sustainable laparoscopic curriculum is possible in a low-resource environment. Such a curriculum can result in improved laparoscopic expertise, surgical trainee satisfaction, and may increase utilization of laparoscopy.
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The setting for this study was Addis Ababa, the capital city of Ethiopia. The physician density in Ethiopia is less than .03 per 1,000 people,[1] and health care expenditures per capita are 25 US dollars.[2] In 2010, the University of Washington Center for Video Endoscopic Surgery began a partnership with Addis Ababa University to develop training in Laparoscopic Surgery. Tikur Anbesa (Black Lion) hospital is the largest public hospital in Ethiopia and is the main teaching hospital for Addis Ababa University. All medical instruction is conducted in English, which facilitated teaching opportunities and fostered discussion regarding training needs.

There are 2 primary needs for successful performance of laparoscopy: equipment and expertise. Financial and resource impediments to performing laparoscopy exist in a low-resource environment. There is need for electricity,

There were no relevant financial relationships or any sources of support in the form of grants, equipment, or drugs. The surgical skills lab at Addis Ababa University has been supported in the form of equipment by Karl Storz, Ethicon Endosurgery, Simulab, and Covidien.

The authors declare no conflicts of interest.

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Manuscript received February 1, 2016; revised manuscript March 15, 2016

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0002-9610/$ - see front matter Published by Elsevier Inc.
http://dx.doi.org/10.1016/j.amjsurg.2016.06.022

availability and maintenance of equipment and instruments, and disposables such as clips. The other resource needed to allow the safe implementation of these techniques is effective training, which is the focus of this study.

In this report we describe (1) the process of course development; and (2) the results of the course. Our main outcome measure was the time required to complete laparoscopic skills tasks in the simulation laboratory. Secondary outcomes included participant survey data, as well as changes in the clinical practice of laparoscopy over this time period.

Methods

A needs assessment was performed via conversation with trainees and faculty at The Black Lion hospital, during the initial stages of this collaboration. Ethiopian surgical trainees were interested in learning laparoscopy but had minimal opportunities for practice. This was due to minimal laparoscopic case volume and the largely observational tradition of operating room teaching. Furthermore, the faculty surgeons were somewhat discouraged from performing laparoscopic procedures because of a lack of qualified assistants (ie, residents). As a result of these communications, it seemed that training residents in laparoscopy had the potential to enhance their technical skills and also increase clinical training opportunities by encouraging the faculty to perform more laparoscopy.

We first supplemented training of faculty surgeons by assisting in basic and complex laparoscopic cases. We then implemented a basic laparoscopy course for surgical residents. Our resident course was developed and implemented in 2012 and 2013. Six courses were conducted; 5 for the surgical residents and 1 for the obstetrics and gynecology residents. Courses were conducted in the surgical skills laboratory and in the operating rooms. Program instructors included 3 groups of fellowship-trained minimally invasive surgeons and a gynecologist from the University of Washington in collaboration with the skills laboratory director and surgical faculty of Addis Ababa University. All year 3 and 4 residents assigned to the Tikur Anbessa Hospital at the time of the training were released from their routine clinical duties.

Each course included a half day of didactics. Lectures were given on laparoscopic equipment and troubleshooting, safe entry technique, and laparoscopic cholecystectomy. The practical skills laboratory tasks were also introduced. Lecture topics were catered somewhat to the experience level of the participants. In addition, the course for gynecology residents was adapted and taught by an expert gynecologist.

The technical skills portion included 5 tasks in the dry laboratory, which were modeled after Fundamentals of Laparoscopic Surgery (FLS) and Top Gun programs.[3,4] The tasks were adapted for local availability of materials. For example, laparoscopic mechanical clips and preformed loops (as are used in FLS) are not widely available. These tasks were therefore omitted and replaced. Peg transfer, intracorporeal suturing, and pattern cut were performed as in FLS. The novel tasks that were included are described in detail below (Fig. 1):

1. Bean drop: The student holds a grasper in their dominant hand and the laparoscope in the nondominant hand. They transfer beans from a dish to a cup with a small opening. Dropped beans outside the cup must be retrieved, and time ends when all beans are placed in the cup.
2. Running string: A white string has colored segments at several centimeter intervals. This is coiled in one end of the box. Two graspers are used to pass the string from hand to hand until the other end of the string is reached.

Time to complete each task was recorded for each participant during at least 2 practice sessions per station. Each participant's first and second times on each task were then compared using a paired *t* test. A *P* less than .05 was considered significant. Participants were also asked to answer survey questions about their education before the course, and to evaluate the course.

The second day of the courses consisted of observation of live human laparoscopic cases (cholecystectomy) in the

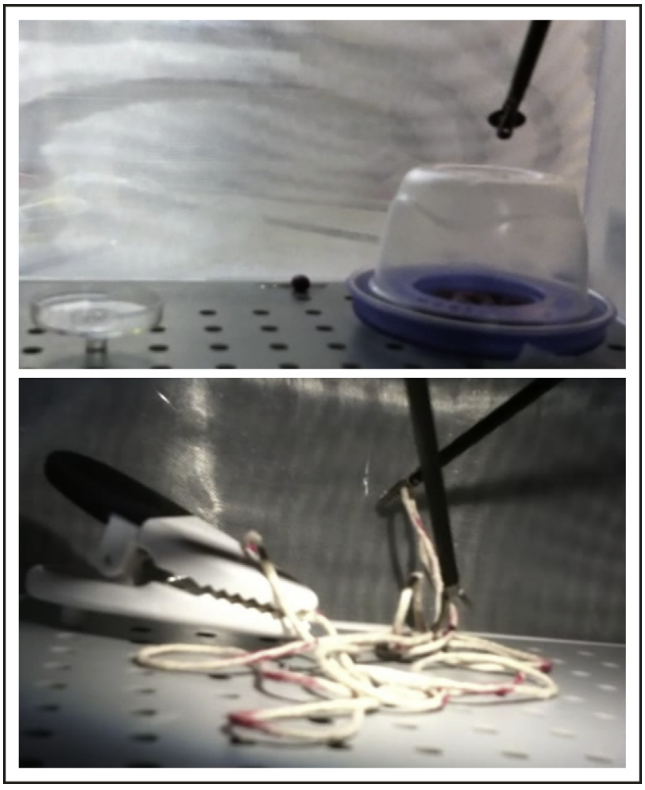

Figure 1 Adapted laparoscopic skills tasks: bean drop and running string.