

Comparing the Portable Laparoscopic Trainer with a Standardized Trainer in Surgically Naive Subjects

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Abstract

Purpose: To evaluate the effectiveness of the portable laparoscopic trainer in improving skills in subjects without prior laparoscopic experience.

Materials and Methods: Twenty-nine medical students were given a pretest of 3 tasks on a standardized laparoscopic trainer. Subjects were evaluated objectively and subjectively. Fifteen subjects were randomized to receive a portable laparoscopic trainer and 14 subjects were assigned to the standardized laparoscopic trainers at our facility. The portable trainer group subjects were advised to complete at least 3 hours of training. The group at the facility had a proctored 1-hour session each week for 3 weeks. Each subject was then retested and evaluated with the same pretest tasks. Objective and subjective improvements between the groups were compared.

Results: Baseline demographics and pretest scores were similar between both groups. All students in the facility group completed the three 1-hour proctored sessions. The portable trainer group reported an average 204 minutes of practice. The facility group did objectively better on the post-test in overall time, and in two exercises. Subjectively, the facility group had a significant improvement compared with the portable trainer group (4.6 vs 2.4 point average increase, $P = 0.03$).

Conclusions: Both groups showed objective and subjective improvement after a 3-week period of training. The portable trainer group did report longer average practice time, but this made no significant difference in subjective or objective improvement. The portable laparoscopic trainer is comparable to the standard trainer for improvement of basic laparoscopic skills.

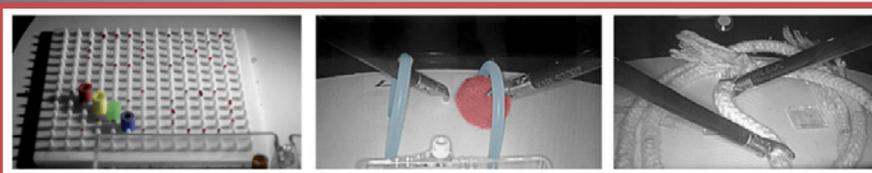


Figure 1: Pre and Post-Test Activities – (a) Peg Transfer, (b) Fuzzy Ball, (c) Running the Bowel

Introduction

Minimally invasive surgery has become a mainstay in the surgical management of disease and is even considered the standard of care in many cases. Learning laparoscopic skills has become an integral part of training during a surgical residency. Because of the significant learning curve, operating on a live patient is not an ideal setting in which to learn. Various simulators have been created to help physicians in this regard. These include models as simple as box trainers to complex virtual reality simulators. Prior studies have shown low fidelity models to be as effective as high fidelity models and do so at a lower cost. Several different portable webcam and box trainers have been tested and validated in the past. Webcam trainers are convenient and can be used anywhere, in contrast to the standard laparoscopic trainers. In addition, they are relatively inexpensive, which makes it feasible to use at home. This makes it an ideal model for subjects who are novices in laparoscopy who may need extra practice in simple tasks. We compared the effectiveness of improving laparoscopic skills between the TASKit (Ethicon Endo-surgery Inc.) portable webcam trainer and the standard video laparoscopic trainer (Karl Storz Endoscopy) in surgically naive subjects. We theorized that both groups would improve, but that the portable group would have the advantage objectively, due to unlimited practice time and that the proctored facility group would have an advantage subjectively due to focused instruction.

Materials and Methods

Twenty-nine medical students without prior laparoscopic experience were randomized into 2 groups – portable trainer (15) and facility trainer (14). All subjects were timed and subjectively scored (Table 1) on 3 pre-test activities (Fig 1). The peg transfer exercise consisted of transferring four pegs onto a designated diagonal line of a peg-board. The second task involved transferring a fuzzy ball under a plastic hoop between two instruments. The final task involved transferring a 140-cm string end-to-end, grasping at designated marks between two graspers to simulate running the bowel laparoscopically (Fig. 1). The facility group trained on a standard trainer (Karl Storz) in weekly 1-hour sessions with a proctor. The portable group was advised to complete 3 hours of at-home training using the TASKit trainer (Ethicon). All subjects re-tested after three weeks and subjective and objective improvement was compared.

Performance	Scale				
	1	2	3	4	5
Motion	Unnecessary moves		Efficient, but unnecessary moves present		Efficient and excellent movement
Instrument Handling	Awkward, inappropriate movement		Competent but awkward		Fluid without awkward movement
Use of Two Hands	Only used 1 hand		Used 2 hands but inappropriately		Excellent use of 2 hands
Overall Performance	Unable to perform tasks independently		Competent, minimal assistance		Independent, superior, confident

Table 1: Subjective Scoring Rubric

Results

Both groups demonstrated statistically significant improvement over three weeks. The facility group had better subjective scores and overall time on the post-test. Both groups had equivalent overall time improvement. However, the facility group had a significant improvement in subjective performance compared with the portable trainer group (Table 2).

	Group A	Group B	p value
Fuzzy Ball			
Average Time (sec)	36	49	0.009
Average Score (4-20)	14.8	13.1	0.17
Average Time Change (sec)	-38	-39	0.95
Average Score Change	4.3	3	0.15
Running the Bowel			
Average Time (sec)	55	72	0.07
Average Score (4-20)	15.2	13.6	0.19
Average Time Change (sec)	-20	-29	0.66
Average Score Change	3.3	3.1	1.00
Peg Transfer			
Average Time (sec)	52	79	0.01
Average Score (4-20)	18.2	11.8	<0.001
Average Time Change (sec)	-67	-52	0.42
Average Score Change	6.1	1.1	<0.001
Total			
Average Time (sec)	144	198	0.04
Average Score (4-20)	16.1	12.8	0.001
Average Time Change (sec)	-126	-120	0.45
Average Score Change	4.6	2.4	0.03

Table 2: Average Post-test Times, Scores and Change from Pre-test to Post-test (Group A = Facility Group, Group B = Portable Group)

Conclusions

The portable trainer is an effective method to improve laparoscopic skills in naive subjects. Proctored training sessions on a standard trainer produce greater subjective improvement, but equivocal objective improvement when compared to the portable trainer. The inferior subjective performance of the portable laparoscopic trainer group reinforces the importance of supervision and feedback in novice subjects. Nonetheless, the portable trainer is an effective method for at-home laparoscopic training.