ELSEVIER

THE JOURNAL OF
MINIMALLY INVASIVE
GYNECOLOGY

Pilot Study

Impact of Laparoscopic Experience on Performance on Laparoscopic Training Drills among Obstetrics and Gynecology Residents: A Pilot Study

Rebecca S. Urwitz-Lane, MD*, Richard H. Lee, MD, Sarah Peyre, MSEd, Sameena Rahman, MD, Laurie Kwok, RN, and Laila Muderspach, MD

From the Departments of Obstetrics and Gynecology (Drs. Urwitz-Lane, Lee, Rahman, and Muderspach, and Ms. Kwok) and General Surgery (Dr. Peyre), University of Southern California, Los Angeles (all authors).

ABSTRACT **Study Objective:** To assess whether volume of laparoscopic experience correlates with residents' performance on laparoscopic training drills.

Design: Residents performed 4 laparoscopic drills in the inanimate laboratory: peg transfer, bean drop, rope pass, and triangle transfer. Performance times were recorded. Laparoscopic experience as primary surgeon was determined from resident case logs. The resident data were divided according to volume of laparoscopic experience (0–19, 20–39, $\geq$40 cases). Performance times were compared among the groups according to volume of laparoscopic surgical experience. Design classification: II-3.

Setting: This study was conducted in a university school of medicine surgical skills laboratory.

Participants: Participants in this study were obstetrics and gynecology residents entering their second through fourth years of training.

Interventions: Laparoscopic trainer drill performance times were recorded and correlated with amount of operative laparoscopic experience.

Measurements and Main Results: In all, 25 residents participated. Only the peg transfer drill showed statistically significant correlation between faster performance time and increasing laparoscopic experience ($p = .01$). No significant association existed between laparoscopic experience and performance time on the bean drop, triangle transfer, or rope pass drills.

Conclusion: Residents with more laparoscopic experience performed the peg transfer drill significantly faster than those with less experience. Journal of Minimally Invasive Gynecology (2009) 16, 72–75 © 2009 AAGL. All rights reserved.

Keywords: Surgical skills; Laparoscopy; Obstetrics and gynecology; Evaluation; Objective Structured Assessment of Technical Skills

Surgical education has historically used an apprenticeship model, with all technical experience being gained in the operating department. This training method is nearly impossible to standardize. The skills acquired using such a model vary according to the number and difficulty of procedures that each resident performs. Graduates of obstetrics and gynecology residencies are presumed to obtain the necessary surgical skills to be credentialed for their performance, but currently no United States standards exist for assessment of technical competence. One study surveyed residency program directors in obstetrics and gynecology regarding the teaching and evaluation of surgical skills. Only 74% of responding programs evaluated their residents' surgical competence, and this assessment was usually obtained using subjective faculty evaluations [1]. Such evaluations use direct observation without standard criteria, and have poor reliability and only modest validity [2]. Another common method of assessing residents' technical competency is use of resident case logs [3]. Although this is an objective measure of experience and breadth of cases, it provides only an assumption of technical skill.

To improve the standardization of surgical skills evaluations, the Objective Structured Assessment of Technical

The authors have no commercial, proprietary, or financial interest in the products or companies described in this article.

Presented at the 2007 CREOG and APGO annual meeting, Salt Lake City, UT, March 7-10, 2007.

Corresponding author: Rebecca Urwitz-Lane, MD, Department of Obstetrics/Gynecology, University of Southern California, 1240 N. Mission Rd Room L1022, Los Angeles, CA 90033.
E-mail: urwitzla@usc.edu.

Submitted May 14, 2008. Accepted for publication September 13, 2008.
Available at www.sciencedirect.com and www.jmig.org

1553-4650/$ - see front matter © 2009 AAGL. All rights reserved.
doi:10.1016/j.jmig.2008.09.609

Skills (OSATS) was developed at the University of Toronto, Ontario, Canada. Checklists and global rating scales were used to evaluate general surgery residents' performance on a series of bench stations. This assessment proved to be a valid and reliable method of evaluating technical skill [4]. Subsequent studies have confirmed the applicability of OSATS to procedures performed in the specialty of obstetrics and gynecology [5–9]. One study developed a series of laparoscopic and open bench tasks and found that they could evaluate residents' surgical skills with good interexaminer reliability and construct validity [10]. ''Construct validity'' is a term that indicates that a tool actually measures what it is intended to measure, in this instance, surgical skill. To show construct validity, the OSATS score must increase with improved surgical skill. Because surgical skill is difficult to measure, a construct is used that is assumed to correlate with surgical skill. Construct validity for OSATS was always established using level of training as the construct. If more advanced trainees perform better on an OSATS, the assessment is believed to have construct validity. It is well known, however, that there can be variability in the technical proficiency of residents in a given year of training. Discrepancies often also exist in the number of surgical procedures performed by residents at the same level. A study reported in 2000 that the number of laparoscopic operative procedures recorded by graduating seniors at the University of Washington Department of Obstetrics and Gynecology ranged from 42 to 75 [1]. Because technical skill presumably improves with repeated exposure, we propose that the amount of a resident's surgical experience is a better surrogate marker of skill than training level. For this reason, in this pilot study, we sought to correlate laparoscopic experience with performance time on a series of laparoscopic trainer drills with indicated construct validity [10,11].

Materials and Methods

As part of a newly implemented laparoscopic training curriculum, obstetrics and gynecology residents entering their second through fourth years of training performed 4 laparoscopic trainer drills before receiving any training in the inanimate laboratory. None of the residents had experience with these drills. The 4 drills performed were as follows [12,13].

1. The peg transfer drill. There are 2 pegboards and 6 pegs. The operator lifts each peg from one pegboard with a left-handed grasper, transfers it to a right-handed grasper, and places it on other pegboard. The process is then reversed, and all pegs are transferred back to the first board. This drill was designed to improve hand-eye coordination and ambidexterity.
2. The bean drop drill. In this drill, the nondominant hand transfers a bean from a cup into the aperture of a cylinder. This drill requires dexterity of the nondominant hand, depth perception on a 2-dimensional screen, hand-eye coordination, and fine instrument control.
3. The rope pass drill. A 60-inch rope with colored bands is coiled on a template in the trainer box. The rope is grasped with the endograspers and passed from one hand to the other until the entire length has been moved to another spot in the trainer box. This drill requires ambidexterity, depth perception, fine instrument control, and rhythmic coordinated movement.
4. The triangle transfer drill. Five triangles are placed on one side of the trainer box. A needle mounted on a needle driver is passed through a metal loop at the apex of the triangle. Each triangle is moved across the field, and the needle removed. These movements are similar to those used to pass a needle through tissue. The drill requires ambidexterity, depth perception, fine control of instruments, and coordinated rhythmic motion.

Performance time was recorded for each drill. Drills were performed in random order. This study was approved by the institutional review board of the Los Angeles County and University of Southern California with exempt status because of the educational nature of the research. The number of laparoscopic procedures each resident had performed as primary surgeon was determined from resident case logs. The resident data were divided into 3 groups according to volume of laparoscopic experience. Residents who were primary surgeon for 0 to 19 laparoscopic procedures were considered novice, those with 20 to 39 were considered intermediate, and those with more than 40 were considered advanced. The Kruskal-Wallis test was used to compare median performance times on each laparoscopic drill according to category of laparoscopic experience. When statistical significance existed among the 3 groups using Kruskal-Wallis, Dunn multiple comparison test was used to find significant pairwise differences. Spearman correlation coefficient was calculated to assess whether a relationship existed between the number of laparoscopic cases performed as primary surgeon with performance times for the laparoscopic drills. Chi square was used to compare proportions. A p value of less than .05 was considered to be statistically significant.

Results

In all, 25 residents completed the inanimate laboratory session at the beginning of the 2006 academic year, and were included in this analysis. Of these, 11 were in the novice category, 8 intermediate, and 6 advanced. The median number of laparoscopic procedures performed as primary surgeon are listed for each group in Table 1. In addition, the total number of laparoscopic procedures performed (primary and assistant) are also listed. As expected, more residents in the third- and fourth-year resident class had more laparoscopic experience ($p < .01$) (Table 1).

Median drill performance times are shown in Table 1. The advanced residents performed the peg transfer drill significantly faster than the novice (136 [105–188] vs 249 [203–318] seconds, $p = .01$). The advanced residents also