

# The Performance Gap for Residents in Transfer of Intracorporeal Suturing Skills From Box Trainer to Operating Room

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**OBJECTIVE:** Training on laparoscopic box trainer (BT) improves suturing skills in the operating room (OR). Optimal laboratory training should provide trainees with an adequate level of skills that can be transferred to the OR with no decline in performances. This study aimed to compare OR intracorporeal suturing performances of residents who trained with a fundamentals of laparoscopic surgery (FLS) BT vs. those of experienced laparoscopists.

**DESIGN:** This was a prospective observational study. Residents received training with an FLS BT over a period of 4 months. Their performances with the BT and in the OR were then compared with those of experienced senior surgeons. OR assessment took place during a laparoscopic myomectomy. Performance evaluation was based on time taken and 2 validated qualitative assessment tools (GOALS and the Moorthy checklist).

**SETTINGS:** One academic tertiary care center, La Conception Hospital, Assistance Publique—Hôpitaux de Marseille, Marseille, France, was involved.

**PARTICIPANTS:** Twelve gynecology residents and 6 experienced laparoscopic surgeons.

**RESULTS:** Following the FLS training period, performances of residents with the BT were equivalent to those of the experienced surgeons. When tested in the OR, the trained

residents performed more slowly than experienced surgeons (279.75 vs. 159.75 s;  $p = 0.001$ ), and they obtained lower qualitative outcomes in terms of GOALS (13 vs. 16.75;  $p = 0.002$ ) and checklist (18.25 vs. 21;  $p = 0.049$ ). Transfer from the BT to the OR revealed an increase in time taken that was significantly higher for the trained residents' group than for the experienced group (137 s vs. 49 s;  $p < 0.001$ ).

**CONCLUSION:** A performance gap emerged between trained residents and experienced surgeons when transferring from the BT to the OR. Finding an intermediate training platform between the BT and independently suturing in the OR is hence warranted. (J Surg Ed ■■■-■■■. © 2017 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

**KEY WORDS:** laparoscopic training, transfer, performance assessment, intracorporeal suturing

**COMPETENCIES:** Minimally Invasive Surgery, Medical Training

## INTRODUCTION

Knot tying is one of the first skills to be taught to junior surgeons. Over the last decade, laparoscopy has replaced open surgery as the standard of care for many common operations, and mastering the techniques of laparoscopic suturing is now essential for surgeons. Although laparoscopy provides benefits for patients, there are substantial challenges to training surgeons to perform laparoscopic suturing. Laboratory practice sessions with a box trainer (BT) have proven to be highly effective for training, while easing

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the learning curve in the operating room (OR), as compared with performance levels achieved by conventional companionship training.<sup>1–3</sup> Thus, simulation has been used increasingly to train in laparoscopic suturing outside the OR. The fundamentals of laparoscopic surgery (FLS) curriculum was designed by the Society of American Gastrointestinal and Endoscopic Surgeons to teach and assess surgeons' cognitive and psychomotor skills. This simulated program can be used for training on laparoscopic suturing in different surgical specialties including gynecology.<sup>4,5</sup> Successful completion of the FLS program is now mandated by the American Board of Surgery to ensure adequate laparoscopic skills level of surgical trainees. The proficiency criteria were defined by expert performance on the FLS tasks.<sup>6</sup> It is implicit that performing full surgical procedures in the complex setting of the OR is more difficult, and hence favors experienced operators. Yet, for essential skills such as laparoscopic suturing, optimal laboratory training should provide trainees with an adequate level of skills that can be transferred to the OR with no decline in performance. To date, comparison of trained residents vs. experienced surgeons in the OR has remained largely unexplored.<sup>7</sup>

The main objective of this study was to compare suturing skills of gynecology residents trained on an FLS BT to those of experienced surgeons. The following 3 aspects were investigated:

1. Residents' performances were compared before and after an FLS training period using the BT and in the OR.
2. Residents' post-training performances were compared with the performance of experienced surgeons in the BT setting and in the OR.
3. Performances upon transferring from the BT to the OR were compared within groups.

The secondary objective was to analyze correlations among the 3 assessment methods in the BT setting and in the OR.

## MATERIALS AND METHODS

This prospective study was conducted at an academic tertiary care center in Marseille, France, in 2014–2015. Ethics approval was obtained from the French gynecology and obstetrics ethics board (CEROG 2014-GYN-0904). The study design is presented in Figure 1.

### Participants

Two groups with different levels of surgical experience were recruited. The first group was composed of residents undergoing a 6-month rotation in gynecology. The exclusion criteria were as follows: prior validation of the FLS

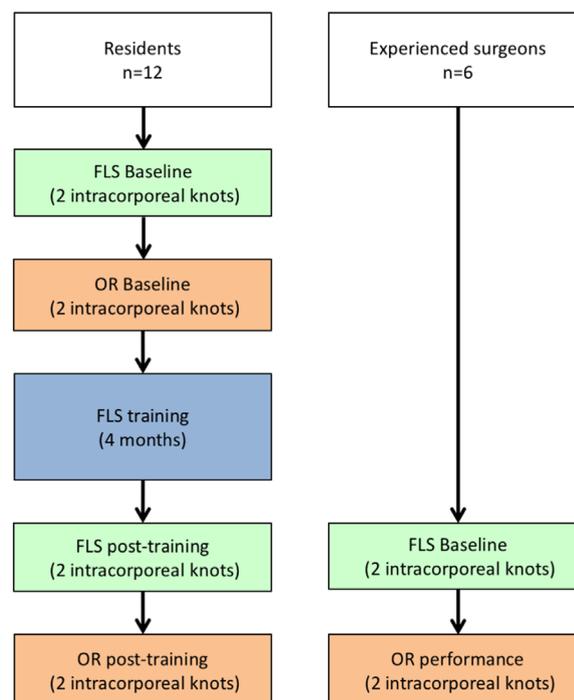


FIGURE 1. Study design.

curriculum and experience of more than 5 intracorporeal knots performed in a genuine laparoscopic setting. Before initial assessment, all residents attended a laparoscopic skills training seminar. The second group was composed of experienced senior laparoscopists.

### Settings

All participants were initially assessed in the laboratory on an FLS BT<sup>8</sup> and subsequently in the OR. The assessment in the OR took place during a laparoscopic myomectomy. Selected cases presented with a vertical uterine incision following the myoma resection, located medially in the pelvis. The camera view was centered. Interrupted intracorporeal simple knots were placed during the closure of the external part of the uterine wall, using a 12-cm polyglactin thread (Fig. 2). This setting is readily reproducible. Furthermore, this is a key part of the procedure for hemostasis and uterine wall restoration. This enabled to assess suturing skills transfer to real operative conditions. Residents performed only the suturing part of the procedure and were assisted by a senior surgeon who provided no guidance except to ensure patient safety.

### Intervention

Following initial assessment, all residents were trained using an FLS BT to which they had unrestricted access in a dedicated room over a period of 4 months. They had open access to didactics of the FLS program and video

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