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Original Article

Mandatory completion of a box trainer curriculum prior to laparoscopic apprenticeship in the OR for surgical residents: A Before and After study

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ABSTRACT

Introduction. – Training on laparoscopic box trainer (BT) improves surgical skills in the operating room (OR). Despite a large consensus on the educational value of the BT, its use is currently left up to local initiatives among French residency programs. This study evaluated the impact of a requirement to complete the Fundamentals of Laparoscopic Surgery (FLS) curriculum before starting companionship in the OR.

Methods. – This was a "Before and After" study conducted in two French academic hospitals in 2015-2017. Gynaecology and urology residents were given open access to a FLS BT during a six-month surgical rotation. Residents in the first group (Before group) trained on the BT while receiving classic companionship. Residents in the second group (After group) had to complete the FLS curriculum before they were allowed to participate in laparoscopic procedures as a primary operator. Outcomes measures were the time to curriculum completion and the intracorporeal suturing performances based on two validated assessment tools (FLS and GOALS scores).

Results. – Twenty-one surgical residents were included. All but two residents in the Before group completed the curriculum. The time to curriculum completion was longer in the Before group than the After group (69.5 days versus 28 days, $P = 0.001$). Post-curriculum performances were lower in the Before group than in the After group for the FLS scores (452.5 versus 496, $P = 0.01$) and the GOALS scores (14.5 versus 18, $P = 0.01$).

Discussion. – The mandatory completion of a BT curriculum prior to receiving active companionship in the OR is beneficial to residents in reducing time to curriculum completion and in enhancing laparoscopic skills on the BT.

Introduction

Mentorship in the operating room (OR) is no longer the only method of instruction that prepares surgical trainees to enter the modern surgical field. Laboratory practice sessions with a box trainer (BT) have proven to be highly effective for laparoscopic training as compared to performance levels achieved by conventional companionship training [1]. The important question is: "How should simulation training be incorporated into surgical residency programs?"

In many countries, surgical registrars exercise and play with different simulation models in an unstructured manner. BT is common among French residency programs, but its use remains optional and it is used with great disparity – usually without training goals [2]. Structured proficiency-based training curricula like the Fundamentals of Laparoscopic Surgery (FLS) are recognized methods that can be used for laparoscopic skills training in different surgical specialties, including gynaecology [3]. Successful completion of the FLS program is mandated by the American Board of Surgery to ensure an adequate laparoscopic skill level in surgical trainees.

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During surgical residency, it is unclear whether simulation training should be proposed as an adjunct to clinical instruction or should be done before clinical training starts. The simulation laboratory is often used during work hours, and the lack of free time during work hours is most commonly cited reason for underutilization [4]. Other situations may contribute to BT underutilization, including the fact that it is never prioritized as a part of a resident's busy schedule. If training opportunities in the OR are only permitted after successfully passing a skills test on the BT, residents probably would prioritize BT use in order to pass to the following training block.

The primary objective of this study was to evaluate, during a six-month surgical rotation, if the time to FLS curriculum completion is reduced when curriculum completion is a mandatory requirement to start companionship as a primary operator in the OR. The secondary objectives were to assess the residents' opinions and their laparoscopic suturing performances after they completed the curriculum.

Materials and methods

This observational "Before and After" trial was conducted at two French academic hospitals (La Conception – Marseille and Arnaud de Villeneuve – Montpellier) between November 2015 and October 2017 (Fig. 1).

Participants

The study recruited surgical residents (second to fourth year) undergoing a six-month rotation in gynaecology or urology. The exclusion criteria were as follows: prior validation of the FLS curriculum and experience of more than five intracorporeal knots performed in a genuine laparoscopic setting. Before the initial assessment, all residents attended a laparoscopic skills training seminar.

Settings

Participants were trained on a FLS BT in a dedicated room. They had unrestricted access to this room and open access to the didactics of the FLS programs and video demonstrations. They were asked to train on three FLS tasks: pegboard transfer, pattern cutting and intracorporeal knot. The curriculum was considered complete once previously published levels of time (expert) and errors were consecutively reached on three tasks [5,6]. Proficiency was required on two consecutives attempts plus 10 additional attempts for the pegboard transfer and the intracorporeal knot task, and on two consecutive attempts for the pattern cutting task. Each resident received one session of constructive feedback from a content expert following the first session on the intracorporeal knot-tying task. A weekly email was sent to each participant to remind them of training goals.

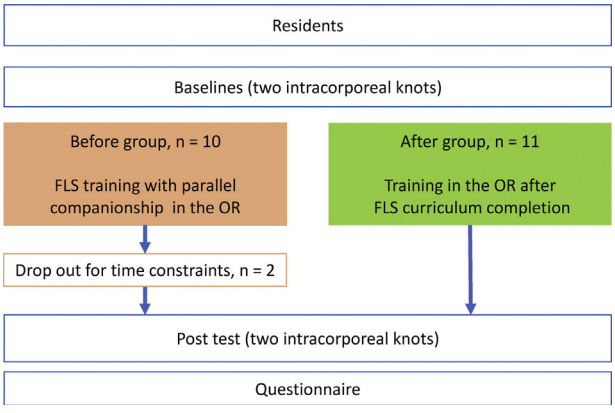

Fig. 1. Study design.

Intervention

During the first period (November 2015–October 2016), residents from the Before group were invited to complete the FLS curriculum while receiving conventional companionship training in the OR. During the second period (November 2016–October 2017), residents from the After group had to complete the FLS curriculum before they were permitted to participate in laparoscopic procedures as a primary operator in the OR. Until curriculum completion, they were only permitted to assist in laparoscopic procedures.

Assessment measures

The participants self-recorded their performances for each task on a dedicated spreadsheet. The required periods (days) and the number of attempts and sessions to complete the curriculum were collected for each participant, based on self-reporting.

During the curriculum completion, practice and assessment was conducted as described in the FLS curriculum [6]. At baseline and following the curriculum completion, intracorporeal knot-tying performance was assessed using FLS scores and GOALS scores. GOALS is a rating scale developed to evaluate intraoperative laparoscopic skills. The five domains of GOALS include depth perception, bimanual dexterity, efficiency, tissue handling, and autonomy. Each domain is scored using a range of one to five points. The autonomy category was removed, since no guidance was provided to residents. Consequently, GOALS scores ranged from 4 to 20 [7] (Appendix). All operators performed two knots during each assessment. Performances of the second knot were video-recorded and analysed. Two experienced laparoscopic surgeons (AA and PC), who were blinded to identity and session, independently assessed the videos.

Assessment schedule

The baseline performances of residents on the intracorporeal suturing task were assessed throughout the first month of their rotation. Post-training assessment took place during a separate session two days after curriculum completion. Before each assessment, participants in both groups were given 15 minutes of warm-up on the FLS BT.

Questionnaire

At the end of the rotation, participants were asked to report their thoughts regarding FLS box training on a Google Forms questionnaire. It was composed of five questions focusing on the perceived educational value of box training and residents' opinions about the ideal timing for box training during residency program (Table 1).

Statistics

First, a descriptive analysis of the demographic and previous laparoscopic experience data was performed. Inter-rater reliability for the GOALS scale was calculated using the intraclass correlation coefficient (ICC). For each group, the residents' performances were compared before and after completion of the FLS curriculum. Performances were compared between the two groups. As the