

Voluntary Autonomous Simulator Based Training in Minimally Invasive Surgery, Residents' Compliance and Reflection

Pieter J. van Empel, MD,* Mathilde G. E. Verdam, MSc,[†] Magnus Strypet, MD,*
Lennart B. van Rijssen,* Judith A. Huirne, MD, PhD,* Fedde Scheele, MD, PhD,[‡]
H. Jaap Bonjer, MD, PhD,[§] and W. Jeroen Meijerink, MD, PhD*

*Department of Surgery, VU University Medical Centre, Amsterdam, The Netherlands; [†]Department of Obstetrics and Gynecology, Sint Lucas Andreas Hospital, Amsterdam, The Netherlands; [§]Department of Obstetrics, Gynecology, VU University Medical Center, Amsterdam, The Netherlands; and [‡]Department of Psychology, University of Amsterdam, Amsterdam, The Netherlands

BACKGROUND: Knot tying and suturing skills in minimally invasive surgery (MIS) differ markedly from those in open surgery. Appropriate MIS training is mandatory before implementation into practice. The Advanced Suturing Course (ASC) is a structured simulator based training course that includes a 6-week autonomous training period at home on a traditional laparoscopic box trainer. Previous research did not demonstrate a significant progress in laparoscopic skills after this training period. This study aims to identify factors determining autonomous training on a laparoscopic box trainer at home.

METHODS: Residents (n = 97) attending 1 of 7 ASC courses between January 2009 and June 2011 were consecutively included. After 6 weeks of autonomous, training a questionnaire was completed. A random subgroup of 30 residents was requested to keep a time log. All residents received an online survey after attending the ASC. We performed outcome comparison to examine the accuracy of individual responses.

RESULTS: Out of 97 residents, the main motives for noncompliant autonomous training included a lack of (training) time after working hours (n = 80, 83.3%), preferred practice time during working hours (n = 76, 31.6%), or another surgical interest than MIS (n = 79, 15.2%). Previously set training goals would encourage autonomous training according to 27.8% (n = 18) of residents. Thirty participants submitted a time log and reported an average 76.5-minute weekly training time. All residents confirmed that autonomous home practice on a laparoscopic box trainer is valuable.

CONCLUSIONS: Autonomous practice should be structured and inclusive of adequate and sufficient feedback

points. A minimally required practice time should be set. An obligatory assessment, including corresponding consequence should be conducted. Compliance herewith may result in increased voluntary (autonomous) simulator based (laparoscopic) training by residents. (J Surg 69:564-570. © 2012 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: laparoscopic surgery, voluntary training, course, program, education, minimally invasive surgery

COMPETENCIES: Practice Based Training and Improvement, Minimal Invasive Skills, Patient Care

INTRODUCTION

Minimally invasive surgery (MIS) is an increasingly popular approach in surgical, urologic, and gynecologic surgery. MIS has demonstrated to reduce blood loss and postoperative pain, improve cosmetic results, decrease hospital stay, and accelerate postoperative recovery.^{1,2} Current residency curricula mandate all residents to be able to adequately perform basic laparoscopic procedures. An increasing number of studies indicate that prior experience in open surgery only displays minor correlation with laparoscopic performance.³⁻⁵

MIS skills differ markedly from those in open surgery. Distinct psychomotor skills, altered depth perception, video-eye-hand coordination, and diminished tactile feedback characterize MIS.⁶ Furthermore, rigid operating room (OR) schedules, condensed surgical training curricula, and an increasing awareness of patient safety have made the OR undesirable as a primary teaching environment for the acquisition of surgical (MIS) skills.⁶⁻¹³

Various simulation-based educational methods have therefore been developed, including virtual reality (VR)- and augmented reality (AR)-simulators, box trainers, and training on

Correspondence: Inquiries to Pieter J. van Empel, MD, Department of Surgery, VU University Medical Center, PO Box 7057, 1007 MB Amsterdam, The Netherlands; fax: 0031 20 4444559; e-mail: p.vanempel@vumc.nl

cadaveric or animal models. Skills acquired outside the OR have shown to be transferable to the OR.¹⁴⁻¹⁶ Unfortunately, training in MIS has shown to be inadequate at times. Particularly, voluntary autonomous training by residents during working hours is disappointing.^{17,18} Training on a voluntary basis may address this problem, additionally conforming to decreasing working hours. Furthermore, and voluntary autonomous training may result in increased skill retention.¹⁹

To educate and stimulate training in basic laparoscopic procedures, the general surgery and gynecology departments at our hospital introduced the Advanced Suturing Course (ASC) in Belgium and The Netherlands. The ASC consists of 2 training days in laparoscopic with a 6-week autonomous training period between. Multiple studies have demonstrated distributed interval training preferable above continuous “mass” training.²⁰⁻²³ The ASC makes use of standard laparoscopic box trainers, which several studies have found to be favorable above VR simulators.²⁴⁻²⁶ To our knowledge, this is the only course providing a complete box trainer setup at home. Previous research demonstrated no significant improvement of MIS skills after 6 weeks autonomous training.²⁷ The aim of this study is to identify factors determining autonomous training on a laparoscopic box trainer at home and explore possible solutions to address encountered issues.

MATERIALS AND METHODS

Participants

Participating residents in general surgery, urology, and gynecology at 7 Advanced Suturing Course (ASC) courses between January 2009 and June 2011 at 3 different academic centers and 2 large regional training hospitals in The Netherlands and Belgium were voluntarily enrolled. Residents at any postgraduate year may attend the ASC as basic laparoscopic and open skills trainings programs have been completed.

Training

The ASC consists of 2 training days with a 6-week interval between. Training day 1 focuses on laparoscopic knot tying skills under the supervision of senior surgeons.²⁸ The laparoscopic box trainer simulates the abdomen by an aluminum frame and includes a built-in light source and camera coupled to a monitor. Three apertures in a removable cover are used to introduce traditional trocars and instruments and camera (Lapstar; Camtronics BV, Son, The Netherlands) (Fig. 1). After the first training day, the box trainer is taken home for 6 weeks of autonomous training. At day 2, laparoscopic knot tying techniques are repeated and evaluated, and practice takes place on porcine stomachs and intestines.

Reflection

Participants completed a questionnaire involving 10 questions regarding voluntary autonomous (home) practice. Questions



FIGURE 1. The laparoscopic box trainer.

were presented as multiple-choice (MC) answers on a 5-point scale with the opportunity to elaborate on answers. A value of 1, “totally disagree”/“very bad,” to a value of 5, “totally agree”/“very good” was assigned. We categorized scores of 1 or 2 as “disagree,” 3 as “neutral” and 4 or 5 as “agree.” Participants were also asked to report on their autonomous practice time. To test the accuracy of reported practice time, 30 participants were randomly allocated to keep a time log.

After the second training day, all participants were invited by e-mail to complete an online 3-question survey to explore in more depth problems involving voluntary autonomous home training on the laparoscopic box trainer and possible improvements to encourage voluntary practice at home. The answers to the 3 open questions about problems involving voluntary autonomous home training were categorized into different areas of conflict and were reported as the problems that were encountered by the resident personally and the problems that the resident thought might be encountered by other residents. The answers to the question about possible improvements to encourage voluntary practice at home in the future were categorized into 5 different areas of focus (Fig. 2).

Statistics

Statistical package for the social sciences, SPSS ver. 15.0.0 (SPSS Inc., Chicago, IL) was used for statistical analyses. Given the normal distribution, a Student’s *t*-test was used to compare practiced time vs. desired practice time. Data were graphically illustrated using pie diagrams (Fig. 3). Answers to the questions were presented as frequencies and percentages.

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