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# Single incision laparoscopic proficiency correlates with residency training level



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## ABSTRACT

**Background:** With experience, certain psychomotor skills should translate from standard laparoscopy to single-incision laparoscopy (SIL). We proposed to compare all surgical postgraduate year (PGY) levels and determine if experience translated to improved SIL skills.

**Methods:** Surgical residents of all PGY levels (1-5) at our institution were included. Baseline surveys were obtained to determine resident level of exposure to both SIL and standard laparoscopic cases. Participants performed the following tasks: running of the bowel, endloop placement, extracorporeal suture tying, and intracorporeal suture tying. Tasks were performed on a commercially provided simulated inanimate organ model. Participants were given 5 min to complete each task. Data were collected and analyzed by an impartial-certified Fundamentals of Laparoscopic Surgery proctor.

**Results:** A total of 31 residents participated in the study. Overall, there was minimal SIL exposure among all residents. As expected, PGY level correlated with increased ability to complete assigned tasks within the allotted time. There was a statistically significant difference in the number of individuals able to complete a task based on PGY level for all given tasks ( $P = 0.005$ ). With increased difficulty, the percentage of higher level residents able to complete the task decreased (100% PGY5 completed running of bowel versus 0% intracorporeal knot tying).

**Conclusions:** Certain psychomotor skills did appear to translate to SIL skills. However, further dedicated SIL training may help to better develop certain laparoscopic skills devoted to SIL.

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## Introduction

Minimally invasive surgery has become the standard of care for a variety of surgical diseases. As time has passed we have migrated from multiport laparoscopy to single-incision

laparoscopy (SIL) for some surgical pathology.<sup>1-3</sup> In an effort to “teach a standard set of cognitive and psychomotor skills to practitioners of laparoscopic surgery” the Society of American Gastrointestinal Endoscopic Surgery tasked a committee to develop the Fundamentals of Laparoscopic Surgery (FLS)

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program.<sup>4</sup> With this program, surgeons are provided with the tools needed for cognitive knowledge, technical skills, and clinical judgment related to basic laparoscopic surgery.<sup>4</sup> This program has been shown to be a reliable marker of performance in the operating room when compared to the performance in simulation. However, since the development of this program, SIL has been shown to be both safe and feasible for a wide variety of surgical diseases.

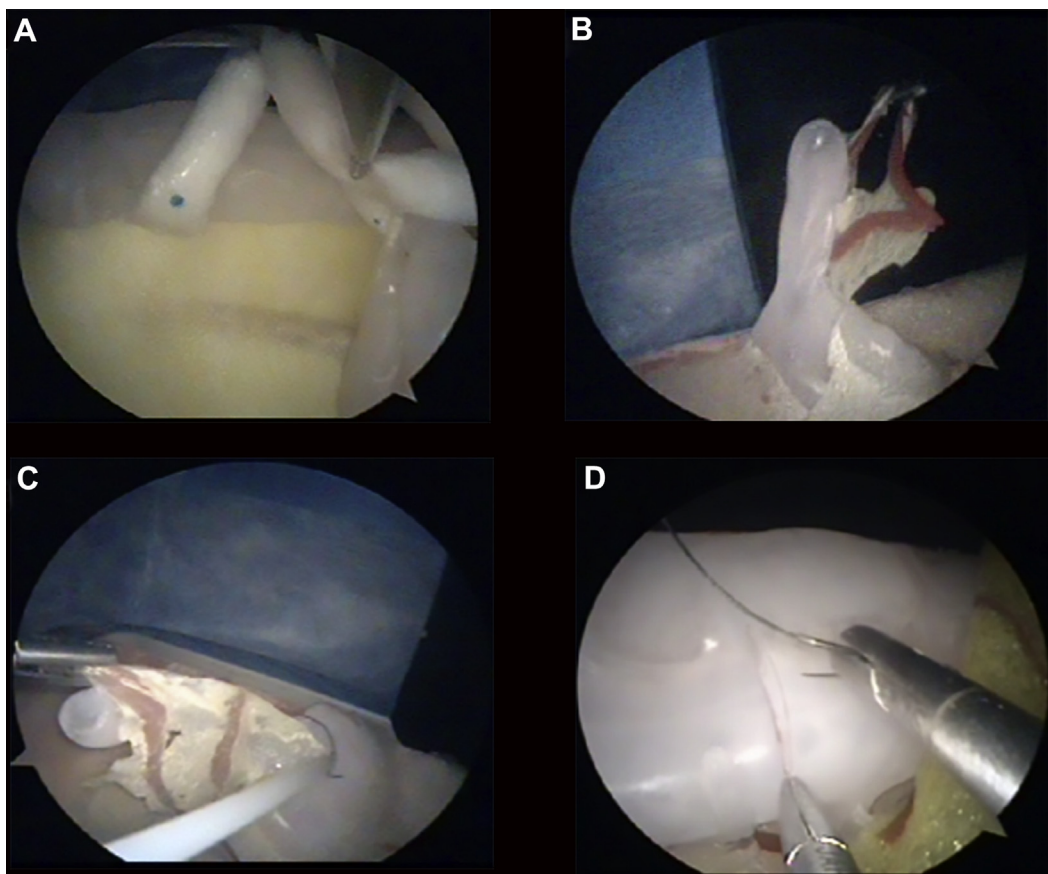
The principles of SIL differ from standard multiport laparoscopy, and SIL has been shown to be more technically challenging.<sup>5</sup> Despite the increased complexity of SIL, no validated program exists to evaluate associated skills and test proficiency. In addition, with increased regulation on duty hours, more emphasis is being placed on simulation for surgical training,<sup>6</sup> as seen with Surgery Residency Review Committee milestones requisites for simulation-based education, FLS certification requirements and now the new incorporation of the Fundamentals of Endoscopic Surgery program. This raises the question as to whether an SIL program similar to FLS and the Fundamentals of Endoscopic Surgery should be incorporated into the surgical curriculum. Therefore, through this work we proposed comparing laparoscopic skills in all surgical postgraduate year (PGY) levels in several tasks and determine if experience translated to improved SIL skills using an inanimate organ models.

## Methods

Surgical residents of all PGY levels at our institution were recruited to participate in this study. After the Institutional Review Board approval, all residents were consented to participate in the study. A baseline survey was given to collect the following data: PGY level, hand dominance, number of basic laparoscopic cases performed (i.e. appendectomy, cholecystectomy, diagnostic laparoscopy and feeding tube), number of advanced laparoscopic cases performed (i.e. colectomy, lysis of adhesions, gastric bypass and inguinal hernia), number of basic SIL cases performed, number of advanced SIL cases performed, number of SIL cases assisted and FLS certification status. The residents had to have completed at least 80% of the operation to count the case as completed.

## Tasks

The residents were tested on four different surgical tasks consecutively in the following order: 1) running the bowel, 2) endoloop on appendix, 3) intracorporeal suture with extracorporeal knot tying and 4) intracorporeal suture with intracorporeal knot tying. The tasks were all performed on a commercially supplied inanimate organ model provided by



**Figure** – Inanimate organ model demonstrating the tasks. (A) Running the bowel with a tattooed area. (B-C) Dissection of the appendix and placement of the endoloop. (D) Intracorporeal suture of colotomy. (Color version of figure is available online.)

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