



## Teaching robotic surgery: Making progress

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In this issue of the *Journal*, the University of Alabama Birmingham group has contributed the first report attempting to demonstrate the ability to teach robotic lobectomy to various levels of trainees in a series of 520 consecutive patients.<sup>1</sup> The procedure was divided into 19 distinct steps with allotted time limits. Teaching was achieved through real-time feedback, postprocedure debrief, and instructor video review. The overall percentage of learners completing each step was recorded for distinct phases throughout the study period. Successful teaching was demonstrated by an increasing percentage of success. Strengths of the article include clear delineation of the steps of the procedure and definitions of successful completion, the careful measurement of the proportion of trainees completing each step, and the large number of cases involved reflecting the experience and dedication of the senior author. The next steps clearly need to include tracking of individual learners longitudinally over time, identification of essential steps that require mastery to complete an operation independently, and determination of the role of simulation in improving trainee performance.

In the current environment, surgeons are tasked with achieving excellent outcomes while teaching residents who work fewer hours in fewer years of training than ever before. Although minimally invasive surgery (MIS) approaches clearly allow perioperative improvement in outcomes,<sup>2,3</sup> the possibility for robotic surgery to further reduce incision size and number and to allow more surgeons to transition from traditional open to MIS approaches is real but controversial.<sup>4</sup> As robotic technology increasingly is being applied to MIS, there is a clear need to develop sound methods to teach index procedures to fellows, residents, and medical students. The current study demonstrates improvements across each of these groups and shows that this type of teaching program can benefit learners at varied levels of experience. Future studies also should include attending surgeons and varied institutions to document individual surgeon learning curve and safe acquisition of skills in different environments.



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### Central Message

Robotic surgery is becoming more prevalent. Establishing effective methods to teach it will be of paramount importance.

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Simulation has been demonstrated to improve performance in minimally invasive lobectomy<sup>5</sup> and clearly will play a key role in the future of surgical training. The simulation experience of the learners in the current study was variable, and future efforts likely should include a more uniform simulation component. Although not procedure-specific, the da Vinci robotic simulator (Intuitive Surgical, Inc, Sunnyvale, Calif) allows objective assessment of learner skills across a series of maneuvers. In cardiac surgery, the addition of a wet laboratory to virtual reality training significantly improved learner performance.<sup>6</sup> Likewise, given the ease with which MIS procedures are recorded, mandatory video review, ideally by trainee and teacher, should be incorporated in future training paradigms.

Clearly, several important questions remain to be answered regarding increased implementation of robotic technology for MIS lobectomy: What are the advantages of using robotic systems for lobectomy compared with conventional MIS or open techniques and do these justify the additional resources required? Given that robotic technology seems “here to stay,” how do we most effectively and safely teach complex procedures to learners of all types? What is the optimal role of simulation and video review in helping learners achieve proficiency? How do we define proficiency sufficient to allow implementation in patients? The current study is an initial attempt to address some of these questions. We must strive for better

answers to these questions as new robotic platforms enter the market.

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