Letter to the Editor

The need for structured thoracic robotic training: the perspective of an American Association for Thoracic Surgery surgical robotic fellow

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Introduction

Since the initial experiences with robotic platforms in thoracic surgery (1), the number of procedures performed with this technique have continued to increase (2). Not only have newer trainees demonstrated interest in the field, but former open and VATS surgeons have also become aware of the advantages that the robotic platform provides (1,3). However, although some authors have implemented robotic thoracic surgery safely (4,5) others still consider it inefficient, citing the increased operative time (related to the learning curve), the initial instrument cost, and the lack of appropriate directed training (3).

In order to facilitate the training of cardiothoracic surgeons in robotic surgery, the American Association for Thoracic Surgery (AATS) Foundation created the Surgical Robotics Fellowship, which, based on the experiences of experts on the field, provides awardees with an exceptional opportunity to be trained in all the aspects of the daVinci® Surgical platform, from basic to advanced procedures, including support at the initial phases of their practice (6). In its current format, it has trained 76 fellows since 2016. Here we present the highlights of the program, as well as other important training aspects and future directions.

The importance of mentorship

Mentors play an essential role as figures to emulate and they become sponsors, advisors and models (7).

The fellowship promotes mentoring by encouraging the fellows to attend with their faculty mentor. Furthermore, networking and sharing experiences with other attending surgeons and robotic fellows during the program provides the candidates with a unique opportunity for sharing motivations, trips and tricks to develop a successful robotic practice.

Basic technology training

Usually the manufacturer or its distributors are in charge of the initial simulation training that is readily available and standardized. This phase of training assures that the surgeon understands the equipment and technology he or she is going to work with, especially the different types of energy available and the coordination required by simultaneous foot and wrist movements.

Technical skills training

This includes:

Figure 1 Simulator training.

Figure 2 Bedside training.

(I) Simulation exercises based on virtual reality and dry lab versions of every exercise: Although the type, number and scores of simulation exercises has not yet been the subject of investigation, it is recommended to complete 19 of the 30 simulation exercises with a score higher than 80% (5) (*Figure 1*);

(II) Bedside training: the robot docking procedure itself is relatively simple, but requires specific and standardized knowledge of the port placement, arm function and very clear communication between the person moving the robot and the bedside surgeon. Knowing how to position the robot and how to dock the ports in an efficient manner are necessary skills for every robotic surgeon (8) (*Figure 2*);

Figure 3 Dual console training.

(III) Dual-console training: dual console training has shown to shorten learning curves by improving operative times and efficiency, without compromising patient safety of procedure quality (9) (*Figure 3*);

(IV) Solo training: An important aspect of this early training experience is the standardization of the technique, which will assist with reducing the learning curve, decreasing operative time and also decreasing the likelihood of intraoperative adverse events (10);

(V) Troubleshooting in thoracic surgery: adopting new technology goes beyond its availability, as surgeons will need to develop a whole new skillset. Despite knowing the operative technique, they will need to learn tips and tricks to solve the possibly encountered challenging situations and to solve adverse events (4,10).

Specifics of the AATS surgical robotics fellowship

Description of the program

The AATS Foundation Surgical Robotics Fellowship provides the opportunity for cardiothoracic surgery residents and fellows and their attending surgeon or robotic mentor to spend two days at Intuitive Surgical's facilities.

The training starts with the TR-200 training course. This course consists of two days - day one is spent in the porcine lab, practicing basic robotic maneuvers and day two is based on the cadaveric lab, with emphasis in patient positioning, port placement, docking and simple surgical skills.

Applicants who take part in a long-standing high-volume robotic surgery program may be eligible for the Equivalency Training Pathway. Instead of taking part in the TR-200 course, those fellows can complete similar training at their home institution.

After both the standard and the equivalency training pathways are completed, AATS fellows should complete seven surgeries as primary operating surgeon in order to qualify for the Advanced Lobectomy Course.

In this course, attention is focused on the operative steps for pulmonary lobectomy, use of specific energy devices, dissection techniques and bronchial/vascular/parenchymal stapling in the cadaveric lab.

After the advanced lobectomy course, the fellows are requested to complete another four robotic pulmonary lobectomies prior to certification.

Improvements of the program when compared with other stablished training programs

Current training programs are mostly industry-led. They include an on-line basic technology training and evaluation, an on-site technology review, the TR-200 course for thoracic surgeons and a different number of proctored cases based on surgeon's confidence.

The AATS Foundation Surgical Robotics Fellowship goes beyond those steps to focus on mentorship and long term-development of a robotic thoracic surgical practice. Furthermore, with its requirements of a minimum load of different complexity cases, it promotes quality assurance and safety thorough all the learning process.

Highlights of the program

The AATS Foundation Surgical Robotics Fellowship is the first society-led training program that integrates all the important aspects of robotic surgery training. Through an established pathway, it assures not only training in basic skills but also the development of mentorship relationships between the attending robotic thoracic surgeon and the AATS fellow. By training directly on the robotic console, it also assures the fellow acquires the necessary abilities and skills specific to robotic thoracic surgery.

Comment on future directions

At this time, there are no universal or society-driven guidelines of how best a thoracic surgeon should acquire robotic skills. Although there are multiple expert opinions, our specialty still lacks a standardized universal training curriculum in thoracic robotic surgery.

Future consensus should be established to promote safe implementation of thoracic robotic surgical procedures, as well as to assure certification and quality of all the surgeons and the hospitals performing them. The involvement of national and international societies in these certification remains a challenge, however their role in future education and training, outcomes studies and quality assurance would be one of the main steps forward for the definite expansion and consolidation of robotic thoracic surgery.

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Footnote

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