Educational program for young surgeons in the Department of Surgery

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Abstract

Introduction: This article describes the training programs for medical students and young doctors in thoracic surgery.
Methods: The educational program targets medical students in clinical clerkships, junior residents, senior residents, and young doctors with less than 10 years of experience. Training content is structured in stages according to career level. As understanding and technical skills develop, participants engage in practical experience through hands-on seminars.
Clinical clerkship for medical students: Medical students take part in surgeries in the role of student doctors.
Junior residents: Junior residents participate in various surgical procedures as assistants. Additional hands-on training simulates the role of a thoracic surgeon.
Senior residents: Senior residents perform surgeries according to individual training level. Practical hands-on training is provided beyond what is offered to students and junior residents.
Young doctors with less than 10 years of experience: The program aims to prepare young surgeons to safely and consistently perform standard surgeries across varying levels of complexity.
Conclusion: Training programs aligned with the career stages of students and residents are essential in surgical education. Equally important, guidance must be tailored to the level of knowledge and expertise of each individual to support the development of competent surgeons.

Key words: Surgical education, thoracic surgery, clinical clerkship, resident training, hands-on learning

Introduction

The Department of Surgery at Kindai University Faculty of Medicine is a large surgical department comprising six divisions: Thoracic Surgery, Upper Gastrointestinal Surgery, Lower Gastrointestinal Surgery, Hepato-Biliary-Pancreatic Surgery, Breast and Endocrine Surgery, and Endoscopic Surgery. The department offers a unified educational program for all surgical divisions, along with a specialized training program for the Division of Thoracic Surgery. This article describes the training programs available to medical students and young doctors within the Department of Surgery, with a focus on the Division of Thoracic Surgery.

Methods

Target of education

The targets of surgical education include medical students in clinical clerkships, junior residents, senior residents, and young doctors with less than 10 years of experience.

Surgical training

The training curriculum is structured in stages based on the level of career development and is

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implemented progressively according to the level of knowledge, comprehension, and technical proficiency of each individual.

Educational outcomes

In the clinical clerkship for medical students, the educational outcomes for fifth-year students include understanding preoperative status and respiratory function assessment, selecting appropriate surgical procedures, and managing the postoperative course in thoracic surgical patients. Understanding is evaluated through presentations, charting, and oral examinations. In the sixth year, students receive further training in surgical knowledge, practical procedures, and thoracic drain removal through hands-on clinical experience.

For junior residents, the educational outcomes focus on acquiring basic surgical knowledge and clinical skills necessary for general medical practice. For senior residents, the outcomes emphasize developing medical skills required for surgical specialization and the ability to apply foundational surgical knowledge and techniques in real-world diagnosis and treatment.

Hands-on seminar

During the clinical clerkship for medical students, hands-on sessions primarily focus on ligation and suturing practice in a dry lab. Occasional surgical seminars are held in a wet lab, where students study lung anatomy and gain experience using surgical instruments. They also learn to perform lung resection using an automated suturing device.

In the wet lab for residents, training is conducted using a pig heart-lung block (EBM Corporation, Japan). The left lung of the pig is divided into two lobes, similar to human anatomy [1], making it useful in teaching the course of blood vessels and bronchi (Figure 1). Junior residents practice lung lobectomy using the pig heart-lung block placed on a table. For senior residents, the heart-lung block is placed within a thoracic model positioned laterally to simulate the lungs within the thoracic cavity (Figure 2). Lobectomy is then performed under varying conditions, including thoracotomy, hybrid video-assisted thoracoscopic surgery (VATS), and complete VATS (Figure 3). This

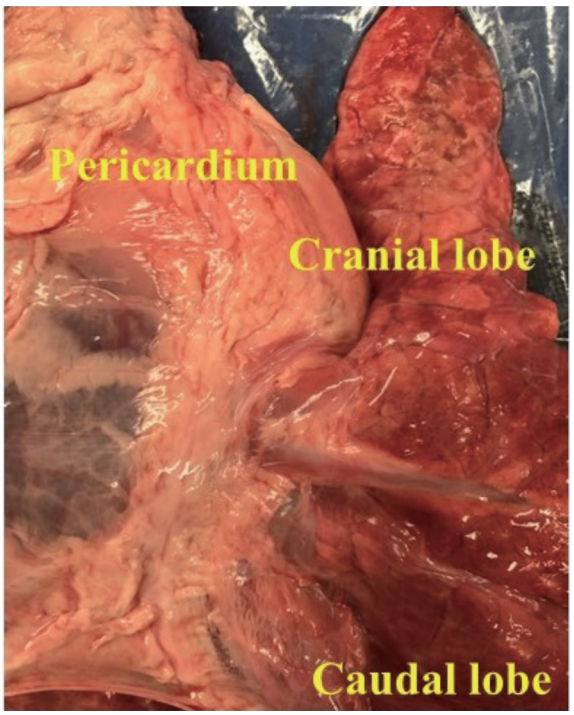

Figure 1. Pig heart-lung block used for training.

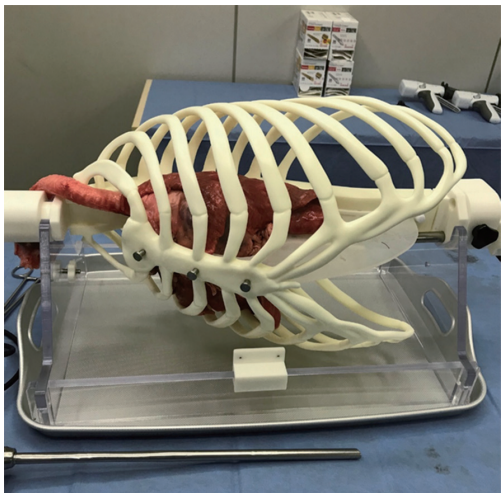

Figure 2. Pig heart-lung block placed in a thoracic model positioned laterally to simulate the lungs within the thoracic cavity.

Figure 3. Hands-on training.
A resident performs lobectomy under simulated surgical conditions, with a senior surgeon assisting.

practical training is recommended on a monthly basis, as repeated sessions are expected to enhance anatomical understanding and technical proficiency.

Clinical clerkship for medical students

At Kindai University, the compulsory clinical clerkship is conducted from November of the fourth year through October of the fifth year. Beginning in November of the fifth year and continuing until July of the sixth year, students participate in an elective clinical clerkship. During the compulsory phase, students rotate weekly through four surgical divisions of their choice, completing a total of four weeks of surgical training. In the elective phase, students train exclusively in one division of their choice for four weeks. Throughout the training, students receive instruction and are assessed on their understanding of surgical procedures for assigned cases, preoperative and postoperative examinations, and postoperative management, in alignment with the defined educational outcomes.

Fifth-year students who select thoracic surgery receive lectures on interpreting chest radiography and computed tomography scans for chest tumors, basic concepts of lung cancer, perioperative management including respiratory function assessment, and the structure and principles of chest drainage. Each student is then assigned a case and participates in surgery in the role of a student doctor. At the end of each week, students present their cases at conferences and join ward rounds with the thoracic surgery staff. At the bedside, they learn how to assess patient condition, including interpreting information from chest tubes and understanding the process leading up to tube removal.

Sixth-year students complete a one-month practical training program focused on the full course of thoracic surgical care, including preoperative preparation, surgery, and postoperative management, as part of a clinical participation training curriculum. In addition, hands-on training is provided based on the level of individual proficiency.

Junior residents

In the junior resident program at Kindai University, each resident selects a preferred division within the Department of Surgery. Clinical training in thoracic surgery is conducted as part of a team led by a senior surgeon, with residents participating in a wide range of tasks while developing their skills and working toward immediate clinical competence. After receiving instruction in basic ward duties, residents share responsibilities with their supervising physicians. Moreover, they participate in various surgical procedures as assistants.

In 2022, thoracic surgeries were performed using a variety of approaches, including 95 lobectomies, 81 segmentectomies, 80 uniportal VATS, and 51 robot-assisted thoracoscopic procedures. Given this variety, the full experience and satisfaction of performing thoracic surgery cannot be fully conveyed during a one-month training period.

With the increasing use of thoracoscopic techniques, opportunities to physically handle lung tissue have become limited. To address this, hands-on training sessions are provided during the rotation to simulate the role of a thoracic surgeon. After completing thoracic surgery training, residents are also encouraged to present their work at academic conferences.

Senior residents

The KINDAI program is designed for senior residents and is jointly developed by the Department of Surgery and the Department of Cardiovascular Surgery. Senior residents who choose to pursue surgery after completing their initial clinical training enter this three-year program. Most participants spend the first year training at the university hospital, followed by two years at affiliated specialty training centers. During the university-based year, residents rotate through each surgical division for 2–3 months, gaining the case experience required to obtain surgical specialty certification. In the Division of Thoracic Surgery, emphasis is placed on maximizing surgical experience based on the training level of each resident. Although located in a university hospital, the division performs a significant number of relatively straightforward procedures, such as partial lung resection for pneumothorax or metastatic tumors. When deemed competent, residents are assigned to perform these procedures under the supervision of senior surgeons.

A comprehensive training experience requires senior residents to develop not only surgical proficiency but also a deeper understanding of basic surgical techniques, appropriate surgical indications, perioperative management, and thoracic anatomy. The program offers more advanced, hands-on training than that provided to students and junior residents. Based on individual skill level, residents also undergo training in more complex procedures such as uniportal or complete VATS. By allowing

trainees to observe the outcomes of their work, the program fosters professional interest in thoracic surgery and supports its integration into long-term career development plans.

Young doctors with less than 10 years of experience

The program is designed to support diverse career development pathways following completion of residency. Most doctors choose to pursue graduate studies and engage in research. As graduate students, they step away from clinical duties to focus on basic research, often in areas such as molecular oncology. During this time, they gain foundational knowledge in research methodology, develop critical thinking skills, and learn to write scientific papers in English—skills that prepare them for future academic roles. After completing graduate school, they may choose to study abroad to further advance their careers or return to clinical practice. Alternatively, some doctors opt to continue their clinical training at affiliated institutions or university hospitals to strengthen their clinical expertise immediately after residency.

The program aims to ensure that young surgeons can safely and consistently perform standard surgeries across varying levels of complexity. Training begins with relatively simple procedures performed under the supervision of senior surgeons, progressing toward the ability to independently complete more complex standard surgeries using individually developed strategies. Case selection and the level of intraoperative instruction are tailored to match the skill level of each surgeon. In addition, in order for young surgeons to acquire technical skills as surgeons and to master the ability to plan strategies, they are encouraged to document the procedures they perform—whether as assistants or lead surgeons—accompanied by illustrations of key operative steps. This practice enables targeted feedback from senior surgeons, reinforces understanding of surgical workflows, and facilitates the application of this knowledge to future procedures.

Discussion

This report has described a surgical education program spanning from medical students to young surgeons with less than 10 years of post-graduate experience. To ensure effective training, the educational content must be flexibly adapted according to the knowledge level and technical proficiency of each individual.

The effectiveness of hands-on training in basic surgical education has been previously reported [2, 3]. In particular, hands-on training with a heart-lung block requires a detailed understanding of pulmonary anatomy, as residents must perform procedures under thoracic constraints where structures are not fully visible, cannot be repositioned, and cannot be cut freely. This environment helps residents learn how to adapt and complete surgeries successfully under the supervision of an experienced surgeon. Repeated practice aligned with the stage of training allows residents to develop skills in a way that closely simulates real surgical procedures.

Another essential element of effective instruction is the creation of an environment that promotes psychological safety. This concept, introduced by Amy Edmondson of Harvard University in 1999, emphasizes the importance of a team environment where individuals feel secure in speaking openly without fear of punishment [4]. Psychological safety has gained recognition in the medical field, and in recent years, many hospitals have taken steps to foster organizational cultures that support it. Promoting psychological safety is considered particularly important in educational settings when instructing students and residents [5]. Therefore, establishing an educational system that actively supports psychological safety is a critical component of effective teaching.

Conclusion

In surgical education, training programs aligned with the career stages of students and residents are essential. Equally important, guidance should be tailored to the level of knowledge and expertise of each individual to support the development of competent surgeons.

Conflict of interest:

The authors declare no conflicts of interest related to this work.

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