

King Saud University

**COLLEGE OF MEDICINE
DEPARTMENT OF ANESTHESIA**

FELLOWSHIP PROGRAM IN THORACIC ANESTHESIA

1433-1434H

Table of contents

Sl.No.	Topic	Page No.
1.	Introduction	3
2.	Fellowship Goals and Objectives	3
3.	Eligibility and Admission Criteria	4
4.	Rotations	5
5.	Supervising Consultants	6
6.	Fellow Evaluation	6
7.	Structure and Contents	7
8.	Program theory	8
9.	Preoperative assessment	9
10.	Clinical activities	11
11.	Didactic Activities	11
12.	Evaluation	11
13.	Certification	12
14.	General Rules and Regulation	12
15.	Suggested References	12
16.	Evaluation form	13

I) Introduction

Thoracic anesthesia is one of the growing subspecialties in anesthesia. Thoracic surgery branch in Saudi Arabia and especially in Riyadh region became one of the most active branches in surgery; King Khalid University Hospital (KKUH), presents a referral centre for thoracic surgical cases in Riyadh region. Cooperation between thoracic anesthesia and surgical teams plays a determinant factor for the thoracic surgery patient's outcome. This level of cooperation requires the anesthetist to master the anesthetic techniques performed during the surgical procedures and to know in depth respiratory anatomy, physiology, pharmacology and patient's preoperative clinical assessment and optimization. It is important to understand the mechanisms of obstructive and restrictive lung diseases, diseases of the esophagus, mediastinal masses and tracheal stenoses and their possible implications to the anesthetic act. For most of the procedures one-lung ventilation is mandatory, requiring the knowledge of its technique, management and complications. Thoracic anesthesia also permits the fellow to perform specific invasive procedures, such as high thoracic epidural techniques and bronchofibroscopy. The early postoperative management of these patients can be complex, requiring full knowledge of the possible complications, mainly ventilatory, circulatory (mostly after pneumonectomy) and acute pain management.

Name of the Program

King Saud University Fellowship Program in Thoracic Anesthesia

II) Fellowship Goals and Objectives

It is expected at the end of the fellowship program that the candidate shows full proficiency in these areas:

- Establishing central IV access using different approaches and inserting arterial line.
- Placement of high thoracic epidural catheter.
- Lung isolation with double lumen tube and bronchial blockers.
- Formulate a plan for anesthetic management which anticipates potential problems that may occur intraoperatively. The fellow is expected to have a plan of management for problems should they occur.

- More involvement in the postoperative assessment and management of the patient is expected at the senior level.

III) Eligibility and Admission Criteria

Candidates must meet the following requirements:

- Medical Degree.
- Saudi Board-certified in anesthesia or equivalent degrees .Other credentials will be considered on a case-by-case basis.
- BLS and ACLS certified
- Full-time commitment to the program, during a two-year period.
- A letter of release and sponsorship from his base hospital for the complete period of training.
- Three referees recommendation letters.
- Pass successfully the interview.

Degree Requirements

-MBBS

- Saudi Board-certified in anesthesia or equivalent degrees

Duration of the program

The fellowship is for **24 months** (2 years)

Number of Positions:

The program will accept one candidate/2 years.

Place of Training:

King Khalid University Hospital

Program Rotations:

The program will run for **two years**, divided as follow:

- Thoracic anesthesia (16 months)
- Thoracic surgery (1 month)
- Pulmonary medicine including endoscopy suite (1 month)
- Pulmonary laboratory (PFTs) (1 month)
- Regional anesthesia including ultrasound techniques (1 month)
- Cardiac anesthesia (1 month)
- Echocardiography laboratory (1 month)
- ICU (1 month)
- Radiology (1 month)

Thoracic surgery rotation proposal:

- A. Ward round/daily 7:30-9:00 AM
- B. Journal club on Sunday 12:30-13:30
- C. Full days OR, Monday and Wednesday (rigid and flexible bronchoscopy, tracheotomy)
- D. Outpatient clinic, Saturday 9:00-11:00 and Monday 13:30-15:00

By the end of thoracic surgery rotation the candidate will **master:**

- Chest tube insertion
- Tracheostomy both open and PDT
- Fiberoptic bronchoscopy
- Research projects on post-thoracotomy pain.
- Attend emergency calls

Pulmonary medicine rotation proposal:

- A. Ward round/daily 7:30-9:00 AM
- B. Journal club on Sunday 12:30-13:30
- C. Examination of patients with differential diagnosis
- D. Attending awake bronchoscopy in the endoscopy unit under moderate sedation
- E. Performing 10 awake bronchoscopy under supervision
- F. Performing 10 awake bronchoscopy independently
- G. Learn moderate sedation protocol in the endoscopy unit

Pulmonary laboratory (PFTs) rotation proposal:

- A. Examination of patients scheduled for spirometry
- B. Attending spirometry test
- C. Performing spirometry for 5 patients under supervision
- D. Performing spirometry test for 10 patients independently
- E. Interpretation of the spirometry results and writing the report

Regional anesthesia/US guided techniques rotation proposal:

- A. Attending daily in the block room from 08:00 till 04:30 PM
- B. Performing combined spinal/epidural technique
- C. Learning knobology of US machine
- D. Performing US guided blockade (upper/lower limbs) under supervision
- E. Learning US guided paravertebral block technique
- F. Performing US guided central venous and arterial cannulation

Cardiac anesthesia rotation proposal:

- A. Learning On bypass protocol
- B. Inserting Swan Ganz catheters
- C. Learning pharmacotherapy in cardiac anesthesia
- D. Learning Off bypass protocol
- E. Postoperative pain management

Echocardiography laboratory rotation proposal:

- A. Attending in the echo lab from 08:00-04:30 PM daily
- B. Preparation of patients for echocardiography
- C. Performing 10 procedures under supervision
- D. Performing 5 procedures independently
- E. Reporting and interpretation

ICU rotation proposal:

- A. Attending the daily morning/evening clinical round
- B. Learning different ventilation strategies in ICU patients
- C. Mastering sepsis campaign protocols
- D. Mastering use of invasive and noninvasive monitoring
- E. Attending MM meetings

Radiology suite rotation proposal:

- A. Learning how to read chest x ray
- B. Learning how to reach CT scans
- C. Mastering interpretation and reporting of x ray findings

Supervising Consultants

(The qualification of the supervising consultants and their scientific and clinical skills attach their short CV's as well)

Program Director: Prof. Abdelazeem Eldawlatly

Consultants College of Medicine, KCUH, King Saud University:

Ahmed Abdelmomen, Professor of Anesthesia and ICU, Chairman of ICU

Mohamed Bilal Delvi, Associate Professor of Anesthesia

Sami Alnassar, Assistant Professor of Thoracic Surgery

Fellow Evaluation

- a- A log book which details the procedures the fellow has either done by him/herself or assisted in the log book should be evaluated by the supervising consultant on monthly basis. The log book presents 20% of the evaluation process.
- b- The fellow is evaluated at the end of every 4 months using evaluation form (provided). The evaluation process will be done by the supervising consultant on each rotation and presents 80% of the evaluation process.

Equivalence of the Program to other Degrees:

At the end of the two years the candidate will obtain a fellowship certificate in thoracic anesthesia. This degree is equivalent to “**Senior Registrar**” as per King Saud University policy.

Structure and Contents:

1- Program outlines

The program is a two years clinical training in thoracic anesthesia. The fellow will be allowed 4 weeks holiday/year and one week/year for scientific meeting outside the Kingdom.

The fellow will be committed to the following duties:

- The fellow is expected to work five days per week, and part of this time may be spent on non-clinical activities (research/teaching). The most typical working day will be from 0730 AM to 1630, there will be 3 -5 night on calls/month (in house calls).
- The fellow will be responsible for the preoperative assessment, perioperative care and the immediate postoperative care at the PACU and give support to the postoperative care provided at the ICU suite, particularly issues concerning acute pain management.

2-Program – Theory & Practice

Anatomy and Physiology

1. Anatomy and innervations of the upper and lower airway
2. Bronchoscopic anatomy of the lung lobes & segments
3. Basic interpretation of chest X-ray, PA and lateral and of chest CT
4. Lung distribution of ventilation and perfusion and their determinants
5. Respiratory mechanics: compliance and resistance of the respiratory system and its components (lung tissue and chest wall), surface tension (La Place's Law, role of surfactant) and time constants of the alveolar units
6. Dead space (anatomic, physiologic, Bohr's equation) and shunt, factors affecting both.
7. Control of ventilation (chemoreceptor, central and peripheral)
8. Oxygen and carbon dioxide transport – oxy-hemoglobin dissociation curve (shape, P50, variables affecting)
9. Hypoxic pulmonary vasoconstriction (mechanism, limits, factors affecting)
10. Flow volume loops (normal and pathologic) - dynamic hyperinflation
Oxygen toxicity (limits, mechanisms, "hypoxic drive")
11. Respiratory muscle mechanics (diaphragm, intercostals, accessory, effect of preoperative conditioning)
12. Modalities of mechanical ventilation

Pharmacology

1. Premedication - benzodiazepines (effect on respiration)
2. Induction agents & opioids (effect on respiration, CO₂ response curve, chemoreceptor)
3. Bronchodilators - (beta 2 agonists & anticholinergics) mechanism of action, drugs, doses, side effects
4. Steroids: mechanism of action, drugs, administration & doses, side effects
5. Phosphodiesterase inhibitors (amrinone, theophylline): mechanism of action, indications, doses, side effects
6. Mucolytics (N acetyl cysteine): mechanism of action, indications, doses, side effects
7. Epidural local anesthetics & opioids: mechanism of action, agents, doses, side and toxic effects
8. Perioperative intravascular replacement and hemodynamic control
9. Nitric oxide: mechanism of action, indications, doses, side effects

Preoperative Assessment

1. Chest X-ray, CT, MRI
2. Pulmonary function testing (spirometry, MMEFR, DLCO, flow volume loops, split lung function tests and risk assessment)
3. Arterial blood gases (ABGs). Blood workout and coagulation studies (INR/PTT)
4. Risk assessment (e.g. echo, stress testing, angiography Persantine-thallium, PA data) and exercise testing
5. Understand the “**E**nhanced **R**ecovery **A**fter **S**urgery” protocols

Technical Skills

1. Placement of a left sided double lumen tube and R and L Univent tubes for lung isolation. Placement of wire endobronchial blockers (Arndt and Cohen) and checking of its proper position using fiberoptic bronchoscope. Placement of EZ blocker.
2. Positioning for thoracotomy – potential complications
3. Indicating and securing a central venous access via internal jugular and subclavian approaches using sterile technique
4. Placement of an epidural catheter at the thoracic and lumbar level (median/paramedian)
5. Criteria for extubating the trachea in OR - changing the endobronchial tube for a single tube at completion of surgery.

Disease States

Fellow must be able to discuss the common diseases found in thoracic surgical patients. Stress must be made in the assessment of the risk factors for postoperative respiratory cardiovascular complications and outcome.

A list of the most important entities is:

1. Obstructive lung disease (bronchitis, emphysema, bronchiectasis, cystic fibrosis)
2. Restrictive lung disease (pulmonary fibrosis, pneumoconiosis, chest wall deformity)
3. Lung cancer & tumors of the mediastinum. Criteria for pulmonary resection (ABG's, PFT's, exercise tolerance/functional status)
4. Esophageal cancer and reflux disease

Anesthesia Techniques

Fellow must be able to indicate and manage a safe anesthetic technique for bronchoscopy (flexible and rigid) and mediastinoscopy, addressing the following issues:

1. Preoperative co morbidities & current drug therapies
2. Monitoring required
3. Securing the airway
4. Patient positioning
5. Drugs to be used and potential intra-operative complications
6. Extubation and recovery concerning lung resections, particularly pneumonectomy, the fellow shall concentrate attention to the following issues:
 - a. Coexisting diseases and preoperative medications
 - b. Risk assessment and level of monitoring to be used
 - c. Determining the lung isolation technique and one-lung ventilation mode
 - d. High thoracic epidural techniques and complications. Alternative postoperative analgesia techniques. Induction period drugs used and complications
 - e. Postoperative pain, circulatory complications and ventilatory management

Mediastinal Mass

The management of the patient with an anterior mediastinal mass will require the fellow to master the following questions:

1. Assessment of airway by clinical and image signs and flow-volume curve
2. Superior cava vein involvement anesthetic implications

3. Premedication and induction period. Positioning and airway complications
4. Extubation of the trachea and recovery with their potential problems

Esophageal Diseases

They encompass cancer, achalasia, anatomical abnormalities (webs, rings) and chronic reflux. The fellow must be able to evaluate and manage this population focusing on the following items:

1. Assessment of the nutritional status, coexisting disease and appropriate premedication
2. Level of monitoring indicated
3. Risks of the induction period and airway securing
4. One lung ventilation and hemodynamic changes
5. Emergence and extubation

I) Clinical Activities

The Division of Thoracic Surgery at KCUH performs an average of 6-8 thoracic (non-cardiac) surgical procedures each week. It is expected that by the end of the fellowship, the fellow would have performed anesthesia for a variety of thoracic (non-cardiac) surgical procedures including:

- Video-Assisted Thoracoscopy
- Lobectomy and Pneumonectomy
- Repair of Broncho-Pleural Fistula
- Thymectomy
- Tracheo-Bronchial Reconstruction
- Anterior Mediastinal Mass
- Tracheo-Esophageal Fistula
- Esophago-gastrectomy
- GERD procedures

II) Didactic Activities

- Fellows are expected to attend and supervise preoperative assessment.
- Perioperative discussions with the attending consultant.
- Pre-announced lectures discussing essential concepts in Thoracic Anesthesia, according to the Department of Anesthesia's schedule.
- Attending Saturday journal club meeting.
- Attending the monthly morbidity& mortality meeting.
- Fellow will take regular calls as per policy of the department
- Fellow will take calls for thoracic emergency cases
- Fellow will be actively participated in elective thoracic anesthesia outside thoracic anesthesia suite

III) Evaluations

A log book which details the procedures the fellow has either done by him/herself or assisted in the **log book** should be evaluated by the supervising consultant on monthly basis. The log book presents **20%** of the evaluation process. The fellow is evaluated at the end of every 4 months using evaluation form (provided). The evaluation process will be done by the supervising consultant on each rotation and presents **80%** of the evaluation process.

IV) Certification

King Saud University Fellowship in Thoracic Anesthesia

V) General Rules and Regulation

1. **Registration**

The candidates have to register as a fellow – postgraduate student in KSU as per the requirements of Postgraduate Medical Education.

2. **Interruptions**

Interruption of training should not be for more than 6 month with acceptable reasons and should be compensated for at end for training.

3. **Withdrawal**

Candidates can withdraw by providing a justified written request at least 3 months before the end of the training year.

4. **Maximum period of training**

Maximum period of training in the program should not exceed 24 months.

5. **Disciplinary actions**

Candidates that break the regulations of KSU fellowship programs would be questioned and the necessary action would be taken

6. **Dismissal**

- a. Actions concerned with training like absence from duties or negligence should be dealt with by training committee.
- b. Misbehavior or action affecting ethics should be dealt by a Committee formed by the Postgraduate Medical Education Director. the committee can recommend one of the following :
 1. A warning letter.
 2. Warning and the fellow will be under probation for 3 months
 3. Decision to dismiss the fellow.

Decision 1, 2 should be approved by the training committee and decision 3 should be approved by the Postgraduate Director.

7. Re – registration

Candidates dismissed or those that withdrew from the program cannot be re-registered.

8. Training committee

A training board should be formed from tutors in the participating hospitals with experience in thoracic anesthesia and post graduate training education.

VI) Suggested References

a) Books

- Anesthesia, Miller RD (ed), 5th edition
- Benumof JL, Alfrey DD. Thoracic Anesthesia
- Nunn J. Respiratory Physiology
- Benumof. Thoracic Anesthesia
- Kaplan and Slinger. Thoracic Anesthesia

b) Journals

- Anesthesiology
- Journal of Cardiothoracic Vascular Anesthesia
- Anesthesia Analgesia
- Anaesthesia
- British J Anaesthesia
- Seminars in Thoracic Cardiovascular Surgery
- Journal Thoracic Cardiovascular Surgery
- Saudi J Anaesthesia
- International Journal of Ultrasound and Applied Technologies in Perioperative Care