VATS for thoracic diseases

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➢ introduction
➢ basic principles: access
➢ pneumothorax
➢ pleural diseases
➢ mediastinal diseases

VATS for thoracic diseases.
VATS for thoracic diseases

- introduction
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THORACOSCOPIC SURGERY

- H.C. Jacobaeus (1910)
  modified cystoscope
  intrapleural pneumonolysis
- after 1945: rapid decline
  diagnostic procedures
- from 1991: revival
  laparoscopy
  video-assisted techniques
  new instruments (endo-staplers)
  3D – robotic surgery

VATS for thoracic diseases.
Video-assisted thoracic surgery (VATS) is a minimally invasive technique used for major operative procedures with general anesthesia. It involves single lung ventilation (sometimes with CO₂ insufflation) using a double lumen tube or bronchial blocker. In cases where VATS cannot be performed, the procedure can be converted to thoracotomy or sternotomy.

**Theoretical advantages of VATS**:
- Smaller incisions
- Less muscle destruction
- No rib retraction
- Less pain
- Shorter hospital stay
- Reduced cost

*VATS for thoracic diseases.*
VATS Disadvantages

- less exposure
- less adequate operation
  limitations monitor, instruments, ribs
- loss of digital palpation
- single lung ventilation
- expensive equipment
- long-term results in lung cancer (selection bias) ?

VATS Different procedures
Pleural and mediastinal access

- mediastinoscopy (superior mediastinum, N2-3)
- pleuroscopy (local anesthesia)
- thoracoscopy, VATS
  small incisions (2 cm) « pure VATS »
  small utility thoracotomy (3-5 cm), no rib spreading
  minithoracotomy with rib retraction

VATS = approach

VATS for thoracic diseases.
VATS for Thoracic Diseases

- pleura: biopsy, effusion, pleurectomy
- lung: bullectomy, biopsy, lung resection
- mediastinum: biopsy, resection, staging
- esophagus: tumors, staging, myotomy
- pericardium: effusion, resection
- heart: PM, ICD
- autonomic disorders: sympathectomy
- thoracic outlet syndrome: 1st rib resection

Khraim FM. The wider scope of video-assisted thoracoscopic surgery. AORN J 2007; 85:1199-1208

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VATS for thoracic diseases.
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VATS
Thoracoports

- triangular configuration
- optimum angle optic – instruments: 30 – 60° (< 90°)
- no crossing of instruments or camera
- do not work towards yourself
- thoracoscope: central or posterior position

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VATS PORT INSERTION

- 2 – 2.5 cm incision (larger in fat patients)
- cautery subcutaneous fat
- divide or split muscle fibres
- cautery over top border of rib
- cut parietal pleura
- insert finger (adhesions)
- insert thoracoport, thoracoscope

VATS for thoracic diseases.
VATS for thoracic diseases.
VATS ACCESS THROUGH PORT SITE

• standard port: thoracoscope (to keep it clean)
• subsequent ports: under direct vision
• instruments: no ports necessary
• avoid excessive leverage, angulation
  (intercostal nerve damage)
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Pneumothorax: classification

- air entering pleural space
- loss of negative pressure, lung collapse

Classification

- spontaneous: primary, secondary
- traumatic: blunt, penetrating chest injury
- iatrogenic (subclavian vein puncture)

Pneumothorax: treatment options

- observation
- needle aspiration
- thoracic drain (tube thoracostomy)
  - water-seal, suction, Heimlich valve
- instillation of pleural irritant (chemical pleurodesis)
- VATS
- thoracotomy, sternotomy


VATS for thoracic diseases.
Indications for operative intervention

- 2nd ipsilateral pneumothorax
  - recurrence after 1st episode of SP treated with thoracic drainage 30%, after 2nd episode 50%, after 3rd episode 80%
- 1st contralateral pneumothorax
- bilateral spontaneous pneumothorax
- persistent air leak (> 5-7 days)
- no re-expansion after 3 to 5 days treatment
- combined spontaneous hemothorax
- profession at risk: divers, pilots, aircraft personnel,…

VATS for pneumothorax

- general anesthesia
- single lung ventilation
- lateral position of the patient
- three port approach 5th or 6th intercostal space
  1. anterior axillary line
  2. posterior axillary line
  3. subscapular
- intervention on pleura and lung

VATS for thoracic diseases.
VATS: treatment of the lung

- resection of apical bullae (90%)
- recurrence ↓ 20% → 1.5% with bullectomy
- use of endostaplers
- alternatives: endoloop, endoscopic suture, electrocoagulation of small bullae

**OUR CURRENT PRACTICE:**
Resection blebs or bullae with endostaplers

VATS: treatment of parietal pleura

- pleurectomy (partial / total) *versus* mechanical pleurodesis (electrocoagulation / abrasion / laser)
- no randomized studies

**OUR CURRENT PRACTICE:**
partial apical pleurectomy + abrasion
*The thoracic cavity remains accessible for other procedures in the future*
A 37-year-old patient with bilateral bullous emphysema

♂ 27/06/1971

History

• smoker: cigarettes, cannabis
• perforation gastric ulcer
• pneumothorax R
• dyspnea on exertion

Admission general hospital 08/08

• pain R hemithorax, fever
• bilateral bullous emphysema
• infected bulla

VATS for thoracic diseases.
A 37-year-old patient with bilateral bullous emphysema

- IV antibiotics: resolution of infection
- normal lung function
- referred for bullectomy:
  - history of pneumothorax
  - symptomatic: risk of recurrent infection
- VATS approach 011208: bullectomy, apical pleurectomy, volume reduction

VATS for thoracic diseases.
A 37-year-old patient with bilateral bullous emphysema

VATS for thoracic diseases.
Cannabis and bullous emphysema

- retrospective case series 17 pts period of 30 mos
- median age 27 years (range 19-43) 16 ♂
- bullous lung emphysema + 2ary spontaneous pneumothorax
- all regular marijuana smokers
- subjectively a∑ only 2 pts ↓ FEV1 and 1 pt ↓ VC
- all but 2 treated by VATS to prevent recurrence
- medical, financial, ethical impact; lungTx candidates?

Beshay M. Eur J Cardiothorac Surg 2007; 32:834-8

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VATS for Pleural Diseases

Indications

- pleural effusion
- malignancy: primary, metastatic
- empyema: fibrinopurulent stage
- pneumothorax: treatment of pleura
- hemothorax (thoracic trauma < 2 weeks)
- chylothorax

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VATS for thoracic diseases.
VATS for Pleural Diseases

Procedures

• pleural biopsy

• drainage procedures
  - effusion
  - loculated fluid collection
  - removal of debris
  - irrigation

• exploration for hemothorax

VATS for Pleural Diseases

Procedures

• pleurodesis
  - mechanical abrasion
  - talc poudrage
  - other chemical pleurodesis
  - argon beam coagulation

• pleurectomy (partial / total)
• ligation of thoracic duct
  - staples, clips, ligature

VATS for thoracic diseases.
64-year-old ♂
recurrent pleural effusion
thoracentesis: atypical cells?

VATS for thoracic diseases.
65-year-old ♂
history: prostate cancer
dyspnea - recurrent pleural effusion

VATS for thoracic diseases.
INTRODUCTION

Basic Principles: Access
Pneumothorax
Pleural Diseases
Mediastinal Diseases

VATS for Thoracic Diseases.
VATS for Mediastinal Diseases

- mediastinal cysts and tumors: biopsy, resection
- esophagus: tumors, staging, myotomy
- thymus: cyst, thymectomy
- pericardium: effusion, resection
- heart: PM, ICD
- autonomic disorders: sympathectomy
- thoracic outlet syndrome: 1st rib resection

VATS for Mediastinal Diseases

Thoracic sympathectomy

- indications:
  - hyperhidrosis: palmar (T2-T3), axillary (T4-T5)
  - facial flushing
  - digital ulcerations (vasospastic disorders)
- controversies:
  - local versus general anesthesia
  - 1, 2 or 3 ports
  - technique of sympathectomy: excision, cautery, division, communicating branches (Wittmoser's technique)
  - extent of sympathectomy
- complications:
  - compensatory hyperhidrosis
  - Horner’s syndrome (stellate ganglion)

VATS for thoracic diseases.
VATS for Mediastinal Diseases

VIDEO

VATS for Mediastinal Diseases

Thymectomy

- thymic hyperplasia (myasthenia gravis)
- thymoma ? (small lesions)
- 3D : da Vinci robotic system
- controversies :
  - approach : R or L side, R+L, combined with cervical incision
  - extent of resection : complete, radical

VATS for thoracic diseases.
VATS Conclusions

- **indications**: variety of pulmonary, pleural and mediastinal diseases
  pneumothorax: treatment of lung + pleura

- **advantages**: minimally invasive technique
  superb visualization (difficult regions)

- **disadvantages**: technical possibilities ≠ open technique
  cost

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VATS Conclusions

- **position**: as lateral thoracotomy for most procedures
- **anesthesia**: double lumen tube (single lung ventilation)
  epidural catheter
- **technique**: 3 - 4 thoracoports
- **future**: 3D robotic systems
  remote, superb handling of instruments

**VATS for thoracic diseases.**