Morbidity & Mortality
SUNY Downstate Medical Center
King’s County Hospital Center

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1. What are indications for VATS in penetrating chest traumas?

- A. management of retained hemothorax
- B. management of persistent pneumothorax
- C. evaluation of the diaphragm in penetrating thoraco-abdominal injuries and management
- D. management of infected pleural space collections
- E. all of the above
Questions

2. What is the optimal positioning for a patient undergoing right sided VATS?
   - A. supine
   - B. dorsal lithotomy
   - C. left lateral decubitus
   - D. right lateral decubitus
   - E. reverse Trendelenberg
3. The major contraindication to thoracoscopy in thoracic trauma is:

- A. concurrent abdominal injury
- B. hemodynamic instability
- C. blunt mechanism
- D. prior cardiothoracic surgery
- E. all of the above
Questions

- 4. Intent to treat with VATS has been shown to:
  - A. be tolerated better than open thoracotomy
  - B. have a favorable postoperative course
  - C. decrease hospital cost
  - D. decrease length of stay
  - E. all of the above
5. Pneumothorax after planned removal of a chest tube:

- Should prompt immediate thoracotomy
- Should prompt immediate VATS
- Should prompt CT scanning
- Can usually be managed by reinserting the chest tube
- All of the above
Case Presentation

- **HPI:** 20 year old male with multiple GSW brought in by EMS as Trauma Code to KCHC
  - Wound on right chest - anterior axillary line 6\(^{th}\) ICS
  - Wound on right chest – MCL 5\(^{th}\) ICS
  - Wound on back 2cm right of midline – T11
Case Presentation

- Vitals: BP 129/58   HR 95   RR 20
- GCS 4/5/6 -> deteriorated in ED requiring intubation
- Chest: decreased breath sounds on right chest, wound at right anterior axillary line, 4th ICS; wound on right chest at midclavicular line 5th ICS
- Back: wound on back 2 cm to right of midline with no exit (bullet overlying abdomen on AXR)
- Abd: soft, NT
Case Presentation

- CBC 8.97/15.5/46.4/225
- Chem 142/4.1/100/12/17/1.7/118, Ca 7.6
- LFTS wnl
- EtOH 165
- 7.321/29.5/81.7/16.9/95.7%/-10.1 (RA)
- Lactate 4.1
Case Presentation

Initial CXR in Trauma Bay
Case Presentation

- Right chest tube placed, 700cc blood return
- OR for management of abdominal injuries
- Intra-op and post-op desaturation, suspicion of collapse; bronch performed
Case Presentation

- Additional chest tubes placed and removed over the following two weeks for loculated pneumothoraces
- Multiple bronchoscopies attempting to resolve collapse
- Chest tubes eventually removed one by one
- Day 17: Final chest tube placed on water seal
- No PTX or air leak noted with chest tube off suction
- Tube pulled
Pneumothorax noted on follow-up CXR
Chest tube reinserted
Incomplete lung re-expansion
Chest CT obtained
Case Presentation

Contrast:
Gantry: 0°
FoV: 325 mm
Time: 600 ms
Slice: 2.5 mm
Pos: -85.75
FFS

F: STANDARD
MAS: 5
120 kV
Image no: 14
Image 14 of 127

8/6/2008, 9:04:55 AM
Case Presentation

Contrast:
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Slice: 2.5 mm
Pos: -98.25
FFS

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120 kV
Image no: 19
Image 19 of 127
8/6/2008, 9:04:57 AM
Case Presentation

Contrast:
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Slice: 2.5 mm
Pos: -108.25
FFS

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120 kV
Image no: 23
Image 23 of 127

8/6/2008, 9:04:58 AM
Case Presentation

Contrast:
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Slice: 2.5 mm
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FFS

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120 kV
Image no: 27
Image 27 of 127

8/6/2008, 9:04:59 AM
Case Presentation

Contrast:
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FFS

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120 kV
Image no: 31
Image 31 of 127
8/6/2008, 9:05:00 AM
Case Presentation

Contrast:
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Slice: 2.5 mm
Pos: -140.75
FFS

F: STANDARD
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120 kV
Image no: 36
Image 36 of 127
8/6/2008, 9:05:02 AM
Case Presentation
Case Presentation

- Contrast:
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- Slice: 2.5 mm
- Pos: -173.25
- FFS

- F: STANDARD
- MAS: 3
- 120 kV
- Image no: 49
- Image 49 of 127

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Case Presentation

Contrast:
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Slice: 2.5 mm
Pos: -185.75
FFS

F: STANDARD
MAS: 3
120 kV
Image no: 54
Image 54 of 127
8/6/2008, 9:04:56 AM
Case Presentation

Contrast:
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FoV: 325 mm
Time: 600 ms
Slice: 2.5 mm
Pos: -193.25
FFS

F: STANDARD
MAS: 3
120 kV
Image no: 57
Image 57 of 127

8/6/2008, 9:04:57 AM
Case Presentation

Contrast:
Gantry: 0°
FoV: 325 mm
Time: 600 ms
Slice: 2.5 mm
Pos: -225.75
FFS

F: STANDARD
MAS: 2
120 kV
Image no: 70
Image 70 of 127

8/6/2008, 9:05:01 AM
Case Presentation

Contrast:
Gantry: 0°
FoV: 325 mm
Time: 600 ms
Slice: 2.5 mm
Pos: -250.75
FFS

F: STANDARD
MAS: 2
120 kV
Image no: 80
Image 80 of 127

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Case Presentation

- Taken to OR
- Bronch: Large mucous plug removed from RUL
- VATS, lysis of adhesions, pleurodesis
- Post-op CXR: Resolution of collapse and PTX
- POD #2: CT removed successfully
- POD #7: Discharged to rehab
VIDEO ASSISTED THORACOSCOPIC SURGERY IN THE ROLE OF RECURRENT PNEUMOTHORAX
Background

- 1910: technique first described by Jacobeus, a Swedish physician
  - used cystoscope to examine pleural space
  - initially used for diagnosis -> then performed for therapeutic procedures
- 1930’s – 40’s: used to lyse intrapleural adhesions in tuberculosis collapse therapy
- 1950’s: fell out of favor in US due to TB chemo
- 1970’s – 80’s: small revival in US
- 1991: video technology introduced
Indications/Contraindications

Diagnostic indications:
- Undiagnosed pleural effusion
- Indeterminate pulmonary nodule
- Undiagnosed interstitial lung disease
- Pulmonary infection in the immunosuppressed patient
- To define cell type in known thoracic malignancy
- To define extent of a primary thoracic tumor
- Nodal staging of a primary thoracic tumor
- Diagnosis of intrathoracic pathology to stage a primary extrathoracic tumor
- Evaluation of intrapleural infection
Indications/Contraindications

- **Therapeutic indications:**
  - Spontaneous pneumothorax
  - Bullous disease
  - Lung volume reduction
  - Persistent parenchymal air leak
  - Benign pulmonary nodule
  - Resection of pulmonary metastases (in highly selected cases)
  - Resection of a primary lung tumor (in highly selected cases)
  - Drainage of a multiloculated effusion
  - Drainage of an early empyema
  - Pleurodesis
Contraindications:
- Extensive intrapleural adhesions
- Inability to sustain single-lung ventilation
- Extensive involvement of hilar structures
- Preoperative induction chemotherapy or chemoradiotherapy
- Severe coagulopathy
Basic Operative Technique

- Left lateral decubitus
  - Best exposure
  - Easy conversion to thoracotomy
- Single-lung ventilation using double-lumen ETT
- Thoracoscopic camera at lower incision (between MAL & PAL, 7th-8th ICS), others (AAL, 5th ICS; 5th space 2cm away from posterior border of scapula) facilitate instruments
**Elective VATS in Trauma**

- Majority of patients managed with resuscitation and placement of chest tubes
- Complications and missed injuries require further intervention
- Specific indications in the trauma patient:
  1. management of retained hemothorax
  2. management of persistent pneumothorax
  3. evaluation of the diaphragm in penetrating thoraco-abdominal injuries and management
  4. management of infected pleural space collections
  5. diagnosis and management of on-going bleeding in hemodynamically stable patients


Managing Posttraumatic Persistent Pneumothorax (PPP) with VATS

  Retrospective single-institution review
- N=11 patients with PPP underwent VATS
  - Prior to VATS, all patients had undergone multiple non-operative attempts to resolve PPP
  - Hospital stay before VATS 4-14 days

Managing Posttraumatic Persistent Pneumothorax (PPP) with VATS

- Cause of PPP was identified in 10 patients and corrected
- Source of air leak not identified in 1 patient
  - Chemical pleurodesis performed with resolution of air leak
- All chest tubes d/c’d within 48 hours of VATS
- 9 patients discharged home within 72 hours of VATS
- CT useful in 2 patients
- Bronchoscopy did not disclose any major airway injury

Abolhoda, et al (1997): Retrospective, single institution review, Level I Trauma Center

N=16 patients s/p VATS following chest trauma between 1991 and 1994 (15 penetrating, 1 blunt)

All patients initially treated with tube thoracostomy

VATS performed 0-20 days post-injury

- 75% success rate (3 – diaphragmatic injury excluded, 9 – successful evacuation of clotted hemothoraces)
- 25% converted to standard thoracotomy

VATS in Chest Trauma

- Intent to treat with early VATS decreases:
  - Duration of tube drainage
  - Length of hospital stay
  - Hospital cost

- Fabbrucci et al (2007) propose VATS be performed 48 hours from the traumatic event in all cases of uncontrolled air and/or blood loss
Conclusions

- The contents of the thoracic cavity are usually resilient enough to recover from even substantial traumatic injury with decompression as the sole intervention.
- However, a “simple” chest injury can become considerably less so when persistent leakage of air or blood arises, or loculations develop.
- Under those circumstances, VATS can effectively alleviate patient discomfort and reduce length of stay without subjecting the patient to either multiple lesser procedures or a full thoracotomy.
References