MANAGEMENT OF RETAINED HAEMOTHORAX

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Retained Haemothorax

- **Definition:**

  Failure of adequate drainage of intra pleural blood

- **Diagnosis:**

  (1) Radiologically – failure of improvement of CXR on 2nd day after ICD insertion

  (2) On aspiration – bloody effusion with HCT > 50% of peripheral blood

Retained Haemothorax

- Incidence: 11-20%
- Associated with higher severity thoracic trauma
- Can result in:
  - Empyema.
  - Fibro-thorax.
  - Pneumonia

RHT

- Major source of morbidity.
- Increase length of hospital stay.
- Increase total cost

Retained Haemothorax

- Root cause – inadequate drainage
- Prevention:

(1) Large drain

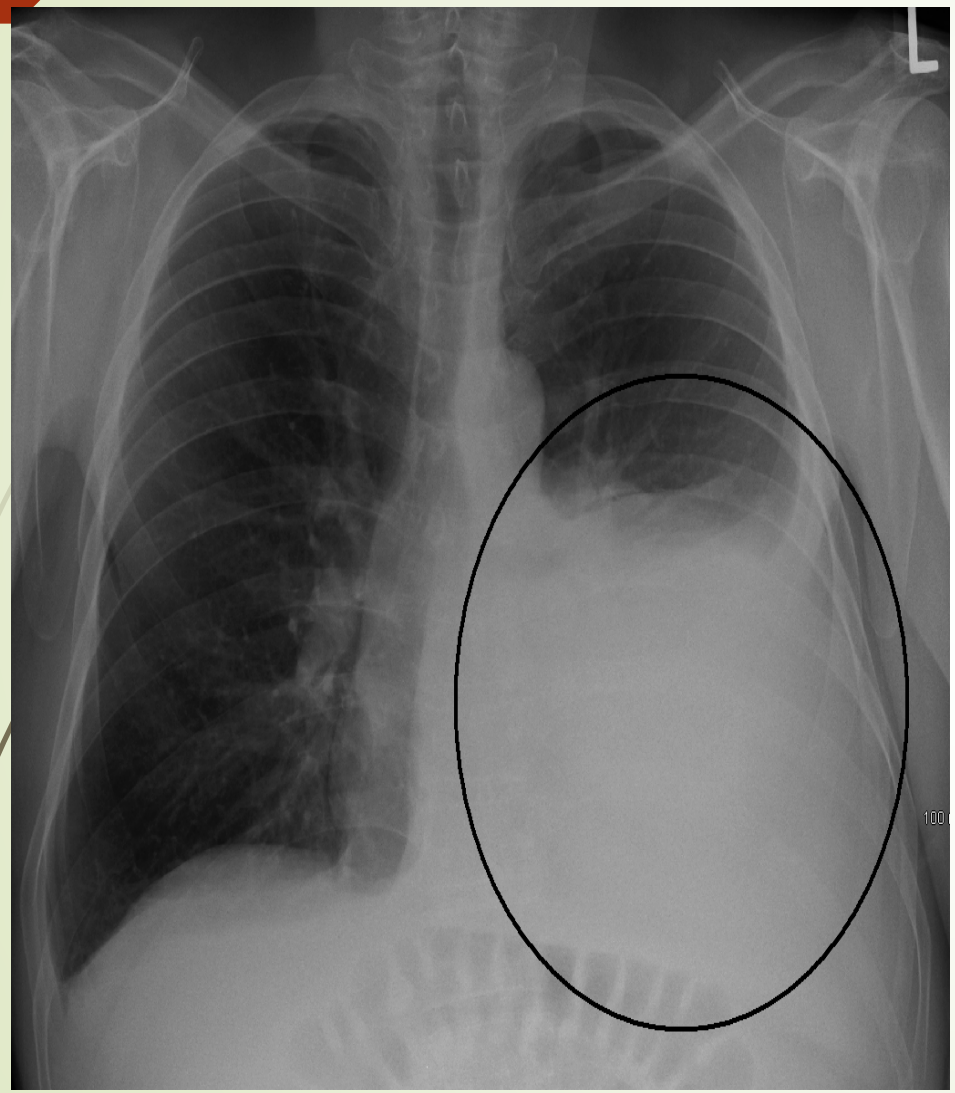
- 28°F to 36°F

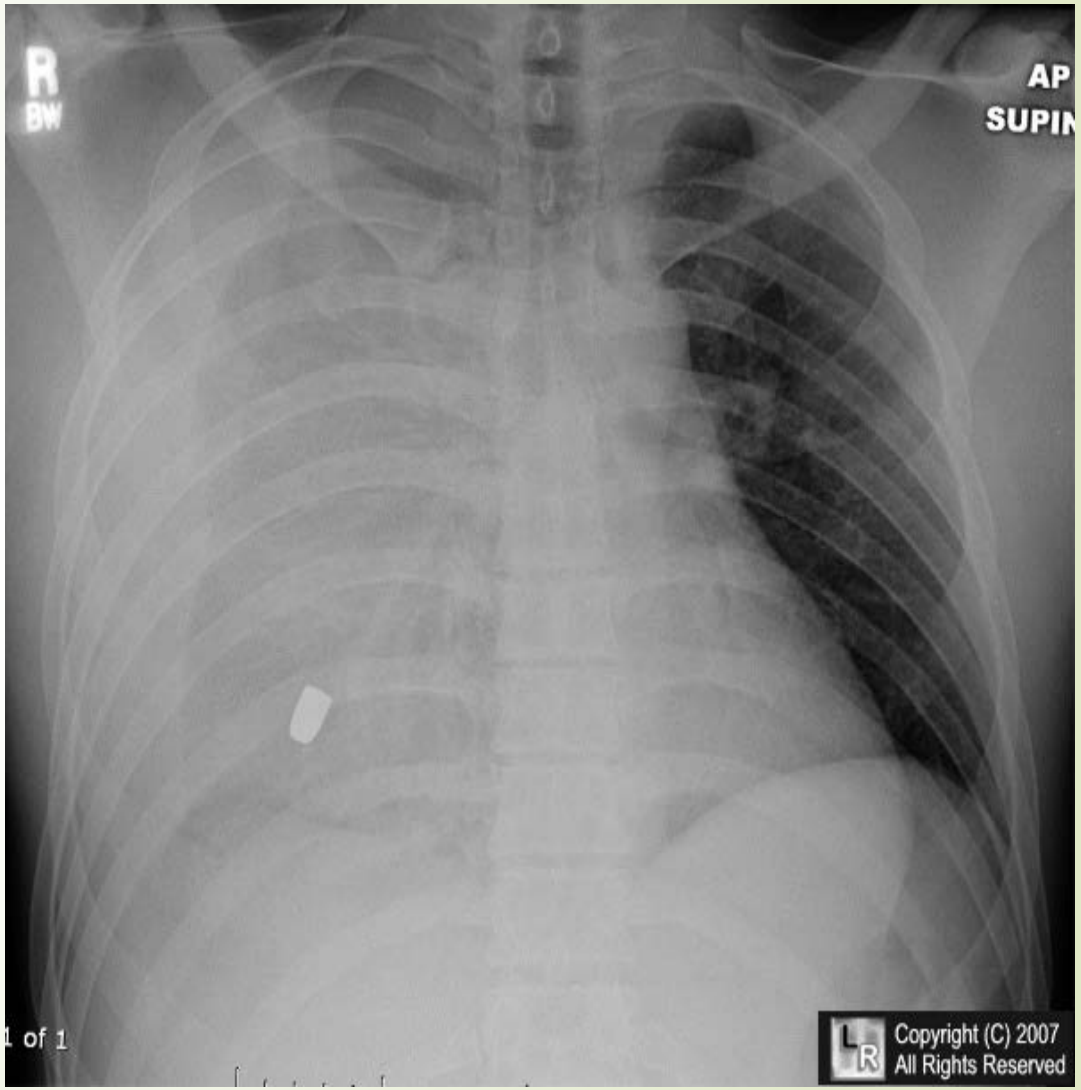
(2) After insertion:

- Monitor drainage
- Ensure tube not kinked
- Suction?
- Daily CXR

Retained Haemothorax

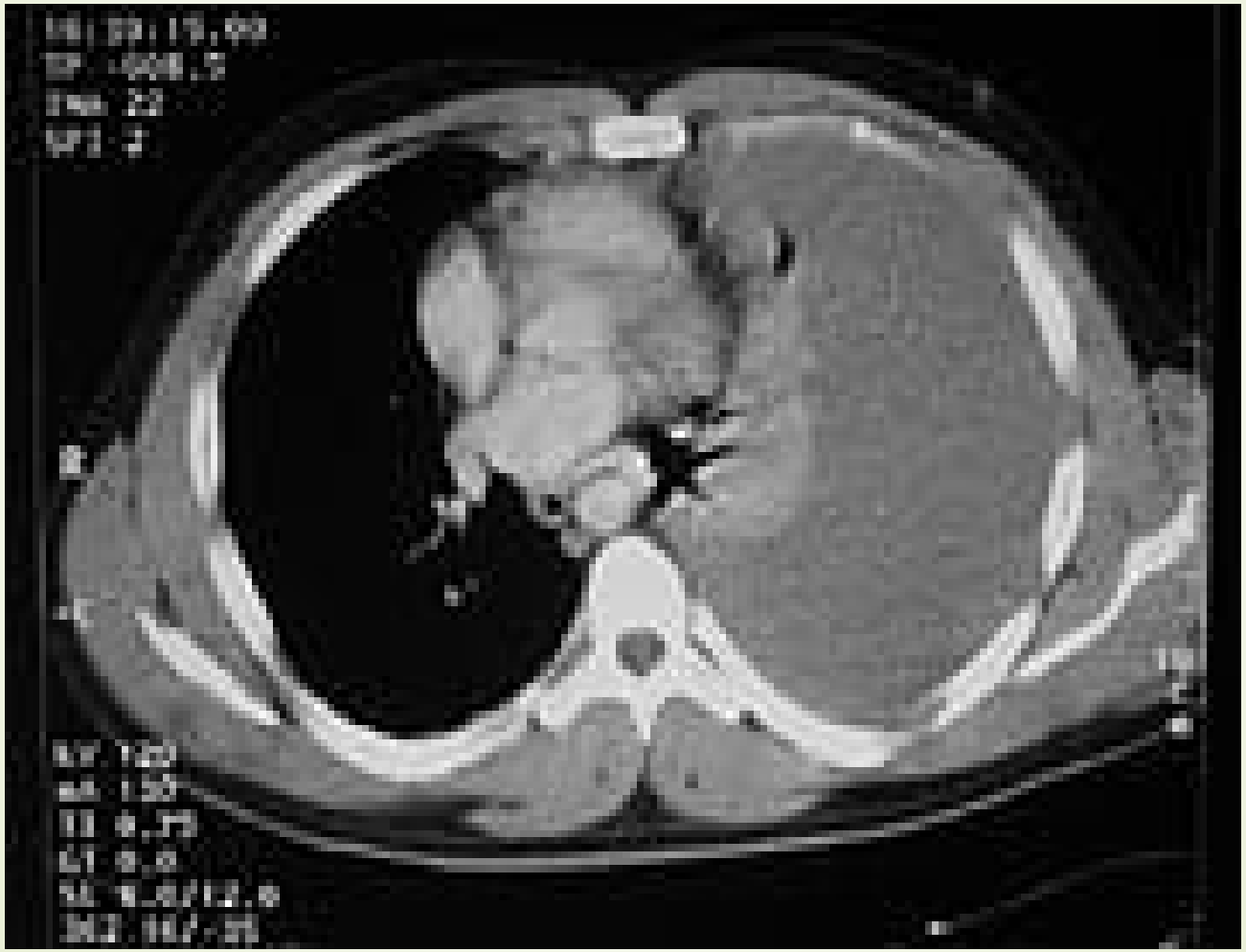
SPECIAL INVESTIGATION





Retained Haemothorax

CT SCAN



Pathology

- BURFOR (1945):
  - Recognised that intrapleural blood clots in early post injury phase.
  - Thin covering of pleural surface
    - > fibrin
    - > cellular elements
  - Becomes progressively thicker over visceral and parietal pleura
    - > at first loosely attached
    - > by D7 get angioblastic + fibroblastic proliferation
    - > organisation of coagulum
  - CLOT SHOULD THEREFORE BE EVACUATED WITHIN 7-10 DAYS OF INJURY

Management

- Therapeutic interventions include:

  - Observation
  - Additional ICD
  - Intrapleural thrombolysis
  - VATS
  - Thoracotomy

Observation

- Condon, RE (1968) –
  - Experimental observation that pleural blood absorbed spontaneously
- General consensus that small (less than 300mls) – collections can be observed. However
- Weigh up risk of intervention in every individual patient
- Recognise that each procedural approach increases risk of subsequent complications

Additional ICD

The placement of additional ICD has been advocated for the management of retained haemothorax.

Meyer et al (1997) Ann Thorac Surg

In random prospective trial compared use of 2nd ICD with VATS

VATS group:
- short duration of chest tube drainage
- shorter hospital stay
- reduced costs

- THE AAST STUDY SHOWED:
  - Additional ICD's were placed in 18.6% of patients with RHT
  - Showed 64% of patients who has a 2nd ICD required further management for RHT.

- The consensus is that an additional ICD is unlikely to be successful for retained or clotted haemothoraces.
- It also introduces the potential for infectious complications.

INTRAPLEURAL THROMBOLYTICS

- Is there a role for intrapleural thrombolytics in resolving haemothoraces following trauma
- Ian Hunt (2009) in Intraactive Cardiovascular & Thoracic Surgery
  - Identified 8 relevant papers
  - Majority had ICD post chest injury
  - Fibrinolytics used:
    - Streptokinase (SPH)
      - 250,000 units in 100mls/ N/S
      - Clamped 4 hours
    - Urokinase
      - 100 000 units
    - TPA
      - 50mq/200mls N/S

THROMBOLYTICS

- Most studies mentioned concerns about adverse effects
- Especially – potential adverse reactions
  - fevers
- In studies where complications mentioned:
  - no allergic reactions
  - no adverse outcomes e.g. coagulopathy in 6 studies
  - 2 patients disorientated
  - pain: local anaesthesia added
- Time interval – 0-30 days
  - average time in 2 studies 11 days
- Number of treatments – varied between 2 – 10
  - average 5 over 5 days

THROMBOLYTICS

- **EFFICACY:**
- MEASURED:
  - Clinically – patient symptoms
    – drainage
  - Radiographically – resolution of pleural collection
    – expansion of lung
  - Avoidance of surgery
- All studies – increase of fluid drainage
- 6 studies – complete response
- 20% - 30% partial responders
- Overall 10% were taken to surgery (VATS, Thoracotomy)
- Oguzkaza (2005)
  - VATS compared with SPK
  - Significant differences in favour of VATS

THROMBOLYTICS

- 2 further studies in the literature tPA
- Jerges-sanchez et al
  - 23 patients
  - 1 patient required decortication
- Inci et al (1998)
  - 24 patients,
  - 15 had complete response
  - 7 partial response
  - 2 needed decortication
- There is a role for the use of thrombolytics in delayed presentation and those patients who have significant co-morbidities.

VATS

- Effectivity in draining haemothoraces demonstrated over past decade and preferred surgical route worldwide

Advantages:

- Less invasive
- Excellent visualization
- Less pain

VATS

EFFICACY

Management of post-traumatic retained hemothorax: A prospective, observational, multicenter AAST study

Joseph DuBose, MD, Kenji Inaba, MD, Demetrios Demetriades, MD, PhD, Thomas M. Scalea, MD, James O'Connor, MD, Jay Menaker, MD, Carlos Morales, MD,
Agathoklis Konstantinidis, MD, Anthony Shiflett, MD,
Ben Copwood, MD, and the AAST Retained Hemothorax Study Group

AAST Continuing Medical Education Article

- Study of 328 patients concluded that VATS should be the treatment for RHT if the volume of retained haemo is more than 300mls.
  - Patients managed by VATS required no further treatment in 70% of cases.

- Oguzkaya (2015)

  Navasaria (2004)

- Report efficacy rate of 80-100% in their series.

VATS

Timing:

Q? = what is optimal time for VATS intervention

Review

Surgical Endoscopy
Ultrasound and
Interventional Techniques

Surg Endosc (1999) 13:3-9

Springer-Verlag New York Inc. 1999

Analysis of thoracoscopy in trauma

R.T. Villavicencio, [1]J.A. Aucar, [2]M.J. Wall, Jr. [2]

1 Department of Surgery, 497 Scaife Hall, University of Pittsburgh, Pittsburgh, PA 15261, USA
2 Department of Surgery, Baylor College of Medicine and The Ben Taub General Hospital, Houston, TX, USA
Received: 28 March 1998/Accepted: 29 May 1998

- Review of 28 studies
  500 patients
- VATS 90% effective in evacuating RHT
- 86% effective in evacuating empyemas
- In series reviewed VATS done * < 3days
  * some D4-10
- >10 days – clot organize

Meyer DM, Jessen ME, Wait MA, Estrera AS.

Early evacuation of traumatic retained hemothoraces using thoracoscopy: a prospective, randomized trial.

***Ann Thorac Surg.* 1997;64: 1396-1400; *discussion* 1400-1401**

- Prospective study:
- VATS within 3 days – better outcomes

- H sing-lin (2014)

  Showed VATS < 6 days:

  - Reduce LOS in hospital & ICU
  - Reduce ventilator UR
  - Post-op clinical outcomes

BASIC REQUIREMENTS FOR USE OF VATS

- Specialised equipment
- Basic thoracoscopic skills
- Can convert to thoracotomy
- Familiar with:
  - Reported risks
  - Indications for VATS
  - The limitations of thoracoscopy

THORACOTOMY

SUMMARY

There is a direct linear relationship between the severity of thoracic trauma and the incidence of RHT. There should therefore be a heightened awareness for the development of RHT in patients with a higher degree of thoracic trauma.

Early complete drainage of the pleural collection is cardinal. Once a RHT has developed, VATS is the preferred method for evacuation and should be done early preferably before 3 days.

The use of intra pleural thrombolytics is gaining momentum as a safe, effective and cost-effective method of treating RHT and should be included in the armamentarium for treating RHT especially in high risk surgical patients.