

## STHFT Protocol For Chest Drain Insertion in Adults

### 1. Background

- a. Insertion of an intercostal drain, and other invasive manoeuvres employed in the diagnosis and treatment of suspected pleural effusion and pneumothorax, carries a potential significant risk to the patient and should only be performed by a competent practitioner.
- b. When this procedure is undertaken as part of training there must be appropriate education beforehand and close supervision of the trainee by a competent practitioner during the procedure.
- c. This protocol describes the process of managing a patient with suspected pleural effusion and /or pneumothorax both within and outside of normal working hours, and includes details of the technique to be used to insert a chest drain (appendix 1), as well the STHFT guidelines for the general management of pneumothorax and pleural effusion (appendices 2 and 3).
- d. Any patient in whom a chest drain has been inserted should be cared for on a ward with nursing staff trained in the care of chest drains and under the care (which may be joint) of a thoracic/cardiothoracic surgeon or chest physician.
- e. It is recognised that despite adherence there will always be the possibility of problems associated with these interventions though with strict adherence to these guidelines this risk will be reduced to a minimum.

### 2. Proposals

#### a. Pneumothorax

- i. **Following Trauma** the recognition of a possible pneumothorax is an indicator for the urgent involvement of a registrar in A&E or cardiothoracic surgery at the outset.
- ii. **In a ventilated patient** the presence of a pneumothorax is an indication for the urgent involvement of consultant staff clinically responsible for the patient in this area. All areas where patients are ventilated must be able to provide resident staff trained to ATLS standard, or who as on the Respiratory Support Unit have received appropriate training by the Respiratory Medicine practical procedures education team (led by Dr Steve Renshaw) and have subsequent recorded evidence of competence under clinical supervision.
- iii. **Within office hours and excluding patients in the A&E Department**, all patients with pneumothorax of a size sufficient for consideration of drainage should be referred either to a cardiothoracic team (surgical patients) or to a respiratory medicine team (medical patients) for an opinion and further management. In the A&E Department, competent practitioners will undertake initial emergency management in accordance with STHFT guidelines prior to referral.
- iv. **Outside of office hours and excluding patients in the A&E Department**, patients with pneumothorax of a size sufficient for consideration of drainage should be discussed either with the consultant physician on call (medical patients) or the on call cardiothoracic team (surgical patients) unless (a) the patient is severely compromised (e.g. tension pneumothorax), or (b) there is a history of recent trauma. This includes patients being treated at the Central (RHH) site. In the A&E Department, competent practitioners will undertake initial emergency management in accordance with STHFT guidelines prior to referral.
- v. **Chest drains should not be inserted unless** the operator has been trained and deemed competent in the procedure. Each Directorate will approach the issue of training

and competence in a fashion that reflects their specialty. In A&E operators will have received and been deemed competent in ATLS training. In medicine the operator will have received training by the Respiratory Medicine practical procedures education team (led by Dr Steve Renshaw) and been deemed competent by his/her supervising consultant. Other Directorates will make their own arrangements but must ensure that training has been provided, and that the operator has been formally assessed as being competent in the procedure, before being allowed to practice independently.

- vi. **The technique used** should be that described on the Trust website for pleural effusions (appendix).
- vii. **In an emergency situation** on the NGH site the duty medical registrar, or duty cardiothoracic surgery registrar should be summoned - who will be competent according to one of the above criteria. On the RHH site the duty medical registrar or anaesthetic registrar may be summoned for assistance. For tension pneumothorax, a venflon should be inserted anteriorly in the 2<sup>nd</sup> intercostals space in the mid-clavicular line. This will give time for appropriately qualified staff to arrive, and where this is delayed, a blood giving set can be used to fashion an underwater seal.
- viii. **For patients on HDU and ITU** in whom the pneumothorax is loculated, or is failing to expand after insertion of a chest drain, the duty radiology registrar may be contacted for consideration of a CT scan to localise the pneumothorax and assist with drain placement.
- ix. **Following tube insertion** the patient must be cared for in a facility where there are nursing staff trained to manage a chest drain. This includes the respiratory medicine wards, cardiothoracic wards, ITU, Neuro ITU, HDU, EAU, the Medical Admissions Ward (Huntsman 1), and the A&E Department.

#### b. Pleural effusions

- i. **For all patients** with pleural effusion a diagnostic tap or therapeutic aspiration of the fluid must be undertaken prior to proceeding to insertion of a chest drain.
- ii. **In medical patients** it must be noted at the outset that pleural effusions usually take a long time to develop and that there is seldom urgency for these to be drained without time to obtain a specialist opinion from a respiratory medicine team.
- iii. **Following trauma** the situation is completely different and the recognition of a possible effusion/haemothorax in this context is an indicator for the urgent involvement of a registrar in A&E or cardiothoracic surgery at the outset.
- iv. **Within office hours** all patients with a pleural effusion of a size sufficient for consideration of drainage should be discussed with either to a cardiothoracic team (surgical patients) or to a respiratory medicine team (medical patients), or to a radiology team working in conjunction with a respiratory medicine team. This excludes patients with known malignant effusion at Weston Park Hospital who should be discussed with the relevant consultant (or deputy) prior to chest drain insertion, and patients with traumatic haemothorax in the A&E Department.
- v. **Outside of office hours**, there is virtually never a good indication for tube drainage of a pleural effusion. Symptomatic patients can be managed with therapeutic thoracocentesis. In the exceptional event that a drain is considered necessary, the case should be discussed with the consultant physician on call (medical patients), or cardiothoracic registrar (surgical patients) unless there is a history of recent trauma. This includes patients being treated at the Central (RHH) site. The exceptions to this would be (a) complicated parapneumonic effusion (Empyema), which requires drainage within 24 hours and (b) patients with known malignant effusion at Weston Park Hospital who should be discussed with the relevant consultant (or deputy). Out of hours tube drainage

must only be performed by competent personnel. At weekend this should be undertaken during daylight hours if possible.

- vi. **Chest drains should not be inserted unless** the operator has been trained and deemed competent in the procedure. Each Directorate will approach the issue of training and competence in a fashion that reflects their specialty. In A&E operators will have received and been deemed competent in ATLS training. In Acute Medicine the operator will have received training by the Respiratory Medicine practical procedures education team (led by Dr Steve Renshaw) and been deemed competent by his/her supervising consultant. Other Directorates will make their own arrangements but must ensure that training has been provided, and that the operator has been formally assessed as being competent in the procedure, before being allowed to practice independently.
- vii. **The technique used** should be that recommended by the British Thoracic Society which is described on the Trust website (appendix).
- viii. **In an emergency situation** either the duty medical registrar or duty cardiothoracic surgery registrar should be summoned - who will be competent according to one of the above criteria.
- ix. **Ultrasound** support may be of value, and the duty radiology registrar should be contacted in following situations:
  - Ø If there has been a failed pleural aspiration (diagnostic tap)
  - Ø If the patients is being treated with anticoagulants or has abnormal clotting (e.g. due to liver failure)
  - Ø If the effusion is loculated
  - Ø If the patient is morbidly overweight
- xi. **Following tube insertion** the patient must be cared for in a facility where there are nursing staff trained to manage a chest drain. This includes the respiratory medicine wards, cardiothoracic wards, ITU, Neuro ITU, HDU, EAU, the medical admissions ward (Huntsman 1), and the A&E Department.

TJ Hendra  
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## **Appendix 1**

### **STHFT PRACTICAL GUIDANCE FOR INSERTION OF A CHEST DRAIN**

#### **Pre-drainage risk assessment**

- Risk of haemorrhage: where possible, any coagulopathy or platelet defect should be corrected prior to chest drain insertion but routine measurements of platelet count and/or prothrombin time should only be performed in patients with known risk factors. [C]
- The differential diagnosis between a pneumothorax and bullous disease requires careful radiological assessment. Similarly, it is important to differentiate between the presence of collapse and a pleural effusion when the chest radiograph shows a unilateral “whiteout”.
- Lung densely adherent to the chest wall throughout the hemithorax is a contraindication to chest drain insertion. [C]
- The drainage of a post pneumonectomy space should only be carried out by or after consultation with a cardiothoracic surgeon. [C]

#### **Consent and premedication**

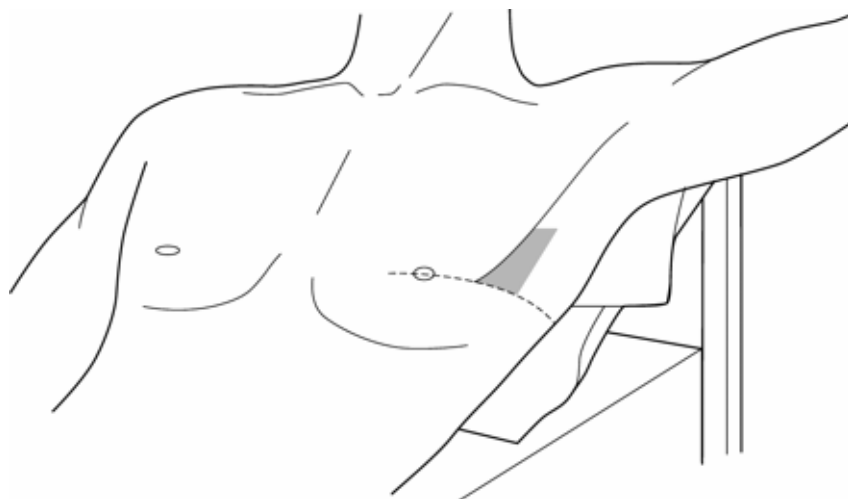
- Prior to commencing chest tube insertion the procedure should be explained fully to the patient and consent recorded in accordance with national guidelines. [C]
- Unless there are contraindications to its use, premedication (benzodiazepine or opioid) should be given to reduce patient distress. [B]

#### **Patient position**

- The preferred position for drain insertion is on the bed, slightly rotated, with the arm on the side of the lesion behind the patient’s head to expose the axillary area. An alternative is for the patient to sit upright leaning over an adjacent table with a pillow or in the lateral decubitus position.

#### **Site of drain insertion**

- Insertion should be in the “safe triangle” illustrated. This is the triangle bordered by the mid axillary line, the lateral border of the pectoralis major muscle, a line superior to the horizontal level of the nipple, and an apex below the axilla. For localised effusions, the safe triangle may not be appropriate. In these circumstances, it is expected that respiratory medicine advice and radiological assistance is sought.



*Figure to illustrate the safe triangle.*

- A chest tube should not be inserted without further image guidance if free air or fluid cannot be aspirated with a needle at the time of anaesthesia. [C]
- Imaging should be used to select the appropriate site for chest tube placement. [B]
- A chest radiograph must be available at the time of drain insertion except in the case of tension pneumothorax. [C]

#### **Drain size**

- Small bore drains are more comfortable for the patient than larger bore tubes, [B] but there is no evidence that either is therapeutically superior. Small bore (12F) Portex Seldinger chest drains are the drain of choice in this trust, unless advised otherwise by respiratory consultant or Cardiothoracic surgeon.
- Large bore drains are recommended for drainage of acute haemothorax to monitor further blood loss. [C]

#### **Equipment required.**

All the equipment required to insert a chest tube should be available before commencing the procedure and are listed below.

- Sterile gloves and gown
- Skin antiseptic solution, e.g. iodine or chlorhexidine in alcohol
- Sterile drapes
- Gauze swabs
- A selection of syringes and needles (21–25 gauge)
- Local anaesthetic, e.g. lignocaine (lidocaine) 1% or 2%. (1% allows a larger area to be infiltrated (max vol.20mls) and is preferred)
- Scalpel and blade (included in Portex Seldinger Kit)
- Suture (e.g. “1” silk, or Ethilon 0 or 1, on a curved cutting needle)
- Instrument for blunt dissection (e.g. curved clamp), if large tube used. These are included in the Chest drain insertion pack from CCSD. One of these should always be available in areas where a large bore drain may be required.
- Guidewire with dilators (if small tube being used)
- Chest tube
- Connecting tubing
- Closed drainage system (including sterile water)
- Dressing

#### **Aseptic technique**

- Aseptic technique should be employed during catheter insertion. [C]
- Prophylactic antibiotics may be of value in trauma cases. [A]
- A diagnostic tap should be performed if the drain is for a pleural effusion

#### **Anaesthesia**

- Local anaesthetic should be infiltrated prior to insertion of the drain. [C]
- lignocaine (lidocaine) 1% or 2%. (1% allows a larger area to be infiltrated (max 20mls) and is preferred)

#### **Insertion of chest tube**

- Chest drain insertion should be performed without substantial force. [C]
- Insertion of a small bore drain under image guidance with a guidewire does not require blunt dissection.
- Blunt dissection into the pleural space must be performed before insertion of a large bore chest drain. [C]

#### **Technique for insertion of a Portex Seldinger Drain**

Lay all the equipment needed within easy reach in a sterile area, and prepare the guidewire so the end of the wire is just protruding from the blue tip.

Following path used with anaesthetic needle, pass graduated needle into pleural space, only as far as was required to aspirate air or fluid with green needle. Needle can be passed with solid core, or this can be removed, and needle passed with syringe aspiration (this is likely to be the safer technique).

Position should be checked by aspiration of air or fluid, then the needle advanced another 5mm, and aspiration repeated. Keeping the needle still, advance the guidewire until about 10-20cm remains – if there is resistance, stop, withdraw and check position. Do not force.

Remove the needle, holding the guidewire at all times.

Make an incision with the enclosed scalpel.

- The incision for insertion of the chest drain should be similar to the diameter of the tube being inserted. [C]

Hold the Blue dilator about 5cm from the tip. Insert over the guidewire, until the wire can be grasped. Holding the wire taught, insert the dilator with a pushing and twisting action to dilate the track. It is unlikely that more than 5cm of the dilator will be needed, and if more than this is inserted, potentially dangerous trauma to the underlying lung can occur.

Remove the dilator, holding the guidewire in position at the chest wall.

Pass the drain over the guidewire, with the curve facing in the required direction, holding the tip of the wire as you do so. There should be little resistance. Do not force. Insert up to the required depth, usually about to the 16cm mark.

Unlock the transparent locking cap by turning anticlockwise, and gripping the cap, the transparent stiffening insert and the guidewire together, remove all three, and occlude the end of the tube with your thumb.

Connect the underwater seal using the three way tap and the adapter included in the kit. Do not let go of the drain until it is sutured in place.

### Technique for insertion of a 'formal' Chest Drain

1. Identify the 'triangle of safety', whose surface markings are:
  - lateral border of pectoralis major
  - anterior border of latissimus dorsi
  - nipple level (5th intercostal space)
2. Prepare and drape the chest.
3. Remove the trocar from the chest drain and clamp the proximal end.
4. Anaesthetise the skin and deeper layers, to the level of rib periosteum.
5. Make a 2 - 3cm transverse incision, followed by blunt dissection with artery forceps, keeping just above the rib.
6. Penetrate the parietal pleura, and insert your little finger into the pleural cavity to confirm that there are no underlying organs or adherent lung tissue.
7. Using your finger, guide the chest drain into the pleural cavity. *Do not use a blind technique with a trocar.*
8. Connect the drain to the underwater-seal apparatus and remove the clamp.
9. Secure the tube in place and obtain a chest x-ray.

### Position of tube tip

- The position of the tip of the chest tube should ideally be aimed apically for a pneumothorax or basally for fluid. However, any tube position can be effective at draining air or fluid and an effectively functioning drain should not be repositioned solely because of its radiographic position. [C]

### Securing the drain

- Large and medium bore chest drain incisions should be closed by a suture appropriate for a linear incision (see below). [C]
- "Purse string" sutures must not be used. [C]

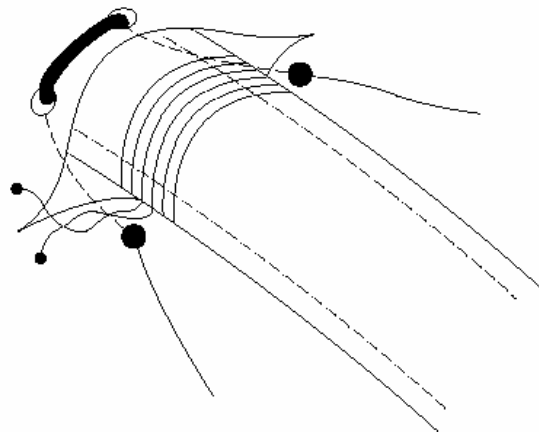


Figure showing example of stay and closing sutures.

### Clamping of chest drains

- A bubbling chest tube should never be clamped. [C]
- Drainage of a large pleural effusion should be controlled to prevent the potential complication of re-expansion pulmonary oedema. [C]
- In cases of pneumothorax, clamping of the chest tube should usually be avoided. [B]
- If a chest tube for pneumothorax is clamped, this should be under the supervision of a respiratory physician or thoracic surgeon, the patient should be managed in a specialist ward with experienced nursing staff, and the patient should not leave the ward environment. [C]
- If a patient with a clamped drain becomes breathless or develops subcutaneous emphysema, the drain must be immediately unclamped and medical advice sought. [C]

#### **Closed system drainage**

- All chest tubes should be connected to a single flow drainage system e.g. under water seal bottle or flutter valve. [C]
- Use of a flutter valve system allows earlier mobilisation and the potential for earlier discharge of patients with chest drains.

#### **Suction**

- When chest drain suction is required, a high volume/low pressure system should be used. [C]
- When suction is required, the patient must be nursed by appropriately trained staff. [C]

#### **Ward instructions**

- Patients with chest tubes should be managed on specialist wards by staff who are trained in chest drain management. [C]
- A chest radiograph should be performed after insertion of a chest drain. [C]

## **Appendix 2**

### **STHFT Management Guidelines For Management Of Pneumothorax**

These guidelines should be read in conjunction with the STHFT protocol for chest drain insertion which includes the techniques for this intervention.

#### **1. Important Principles:**

- i. Pneumothorax: air in the pleural cavity.
- ii. Outcome is dependent on the presence or absence of air leak at the time of presentation. In a Closed pneumothorax a volume of air enters pleural cavity, and by the time of presentation, the defect has closed. These patients can usually be managed by a single therapeutic aspiration. In an open pneumothorax the defects fails to close e.g. penetrating chest wound, bronchopleural fistula.
- iii. Differentiating primary and secondary pneumothorax is important in determining the treatment required, and relies on a careful examination of the history and the radiograph.
- iv. Tension pneumothorax: defects acts as a flutter valve, allowing air to enter but not escape. The increasing volume of air gives rise to respiratory distress, and impedes venous return leading to hypotension.

#### **B. Clinical features**

- i. Symptoms
  - Dyspnoea - may be slight
  - Chest pain – usually unilateral and may radiate to shoulder
  - Cough
- ii. Signs
  - Reduced chest movement, hyper-resonance, and reduced breath sounds on the affected side.
  - Note that signs may be very subtle or non-existent: tracheal deviation is rare

#### **C. Investigation**

- i. A single inspiratory chest x-ray is adequate for diagnosing the vast majority of pneumothoraces.
- ii. Careful scrutiny for a free edge of lung is essential if small pneumothoraces are not to be missed. The diagnosis of a pneumothorax on a supine chest x-ray is notoriously difficult; obtain an erect x-ray if possible.
- iii. In patients with underlying lung disease a CXR may significantly underestimate the extent of the pneumothorax due to asymmetrical collapse. In difficult cases a CT of the thorax will define the size more accurately.
- iv. In patients with chronic lung disease a pneumothorax must be differentiated from a large bulla. When there is doubt request a specialist opinion, and obtain old films for comparison.

#### **D. Treatment**

- i. Treatment depends on the degree of collapse, the patient's symptoms and the presence of underlying lung disease.
- ii. The following notes are adapted from the British Thoracic Society 2003 guidelines.

*Primary Pneumothorax (Normal underlying lungs):*

- Aspirate only if still breathless when assessed, or if rim of air around lung > 2cm

- If not breathless and rim of air <2cm consider for discharge.
- Drain only if aspiration unsuccessful

*Secondary Pneumothorax (Chronic underlying lung disease e.g. cystic, fibrotic, bullous or emphysematous lung disease):*

- Compared with a 'simple' pneumothorax
  - Ø respiratory compromise is more common
  - Ø drainage procedures are less successful
  - Ø referral to respiratory physician or surgeon is more likely
- If no longer symptomatic, observe in hospital 24h, with high flow O<sub>2</sub>
- If symptomatic requires intervention:
- Aspirate only if minimally breathless, age<50, and rim of air <2cm, otherwise will require chest drain insertion.

iii. Simple aspiration

- Prepare the equipment - connect a 50ml syringe (luer lock) and a 3 way tap to an exit tube. Feed exit tube under water to ensure correct direction of air flow.
- Infiltrate local anaesthetic down to the pleura in the 5th intercostal space within triangle of safety. The cannula should be Fg 16 or less and at least 3cm long. Having entered the pleural cavity, withdraw the needle.
- Aspiration should be discontinued if:
  - Ø resistance is felt, or
  - Ø the patient experiences excessive coughing, or
  - Ø more than 3.5 litres (i.e. 50 x 50ml) have been aspirated.
- If the pneumothorax is now significantly smaller, or resolved, the procedure has probably been successful, but large pneumothoraces may appear better even the presence of a persistent air leak, and should be observed.
- If unsuccessful, repeated aspiration is suggested for primary pneumothorax where volume aspirated is less than 2.5 litres. In other situations, intercostal drainage is necessary.
- NB. failure to aspirate all air may result from kinking or inadvertent withdrawal of the cannula.

## E. Following Initial Treatment

- i. All patients with secondary spontaneous pneumothorax should be admitted and receive respiratory review prior to discharge.
- ii. Patients with primary spontaneous pneumothorax with no breathlessness and a rim of air <2cm can be discharged
- iii. Patients with primary spontaneous pneumothorax who have been treated successfully by aspiration based on post aspiration X-ray may be suitable for discharge. D/W senior first. It should be noted that in patients with large pneumothoraces they are more likely to have on-going air leaks and have an increased risk of recollapse.
- iv. All patients failing simple aspiration require admission and specialist respiratory review.
- v. Following discharge, make a written referral to the chest clinic, and arrange review in the A&E clinic within 3 to 5 days with a repeat CXR on arrival. Advise immediate return to A&E if any deterioration.
- vi. The same follow up may also be suitable for certain patients who have had successful aspiration- d/w senior first.
- vii. Other patients (including all with chronic lung disease) should be admitted.

## F. Traumatic pneumothorax

- i. Traumatic pneumothoraces are more likely to develop tension than spontaneous pneumothoraces.

**G. Tension pneumothorax**

- i. Patients with a tension pneumothorax will have respiratory distress (i.e. respiratory rate  $> 30$  /min), and will be shocked. Signs of a pneumothorax and tracheal deviation may or may not be evident. The situation is rapidly progressive and will be fatal unless the tension is relieved immediately. Insert a grey cannula into the second intercostal space, midclavicular line).

## **Appendix 3**

### **STHFT Guidelines for the Management of Pleural Effusion.**

These guidelines should be read in conjunction with the STHFT protocol for chest drain insertion which includes the techniques for this intervention.

#### ***Making a Diagnosis***

- 1) A thorough history and examination is indispensable. In particular be alert for features of asbestos exposure, LV impairment, hypoalbuminaemia, pulmonary embolus, hypothyroidism. Be aware of drugs which can cause pleural effusions (eg. Amiodarone, phenytoin, Methotrexate)
- 2) ECG, CXR, FBC, ESR, U&E's, LFT's, Glc, LDH, CRP, TFT's
- 3) If a transudate is likely clinically at this point (e.g. bilateral effusions in the context of clinical heart failure), further investigation is not needed unless there are atypical features or clinical progress is atypical.
- 4) Otherwise a pleural aspirate should be performed.

a) Pleural aspirate should be performed by an experienced operator using aseptic technique, with a green (21G) needle and a 50ml syringe. A Long green needle may be required in some subjects. Local anaesthesia (lignocaine 1-2%) is often preferred by patients and should be offered. Where possible, 10mls should be instilled into each of a pair of blood culture bottles, using a sterile needle for each, then the remainder divided into 3 sterile universals, and 1-2mls aspirated into a blood gas syringe for pH assessment (expelling the heparin first, as for a blood specimen). Do not send frank pus for pH assessment.

b) A blind attempt is usually acceptable, but ultrasound guidance is preferred for effusions which are small, loculated, or difficult to characterise clinically. Where ultrasound is requested, the laboratory request forms should be completed by the requesting team prior to the ultrasound examination and sent down with the patient.

c) The pleural aspiration should be documented in the notes, together with a comment on the colour and odour of any fluid withdrawn.

d) These samples should be sent for 1) Chemistry: Protein, Glucose, LDH, pH 2) Microbiology: MC&S +/-AFB/TB culture 3) Cytology. Samples should be clearly marked "Pleural Fluid", and Pathology samples should carry information on smoking status, asbestos exposure, known malignancy etc. (Other tests will rarely be required: haematocrit for suspected haemothorax, amylase for oesophageal rupture/pancreatitis, triglyceride levels for chylous effusion, creatinine for urinothorax, complement for Rheumatoid arthritis)

5) Protein <25 is usually a transudate, protein >35 is usually an exudate. Lights criteria are more sensitive and specific: the pleural fluid is an exudate if one or more of the following criteria are met: Pleural fluid protein divided by serum protein >0.5, Pleural fluid LDH divided by serum LDH >0.6, Pleural fluid LDH more than two-thirds the upper limits of normal serum LDH.

6) A transudate requires treatment of the underlying condition. Drainage in these circumstances carries many risks, and is rarely indicated. An exudate will usually require further investigation, Unless it is an uncomplicated parapneumonic effusion (pH>7.2) or associated with pulmonary embolism.

7) CT scanning and pleural biopsy are often recommended for the further investigation of pleural effusion. CT scanning prior to drainage gives better images of the pleura. The optimal management strategy should be discussed with a respiratory physician and a respiratory radiologist. For suspected malignancy, this is best done in the context of the lung MDT. Please contact the respiratory SpR on call who can arrange review on the ward and/or discussion in one of the respiratory X-ray meetings. Pleural biopsies should not be performed by non-specialists.

#### ***Treatments***

##### **Symptom relief:**

- 1) Simple aspiration through a large bore venflon, using a 3 way tap is well tolerated by the patient, limits the amount of fluid withdrawn, and can be repeated as necessary. This is recommended for patients with short life expectancy.
- 2) For malignant effusions, further management should be discussed at the lung cancer MDT.

3) A chest drain will not produce better relief of symptoms unless pleurodesis is performed, and is not recommended without attempted pleurodesis.

4) Large effusions drained quickly can produce re-expansion pulmonary oedema, which can be fatal. Controlled drainage should always be performed, and drainage paused after 1.5 litres has been drained, or if the patient develops chest discomfort, persistent cough or vasovagal symptoms. BTS guidelines recommend a maximum of 1.5 litres at a time, or 500mls/hr. In the absence of infection or excessive drainage, or planned pleurodesis the tube should be removed within 12-72 hours, and probably the next day.

Pleurodesis: Ensure radiological re-expansion and adequate analgesia prior to procedure, instill 20mls 1% lignocaine 15 mins before pleurodesis. Instill Talc (5g dose, available via pharmacy, 24h notice usually required). Close 3 way tap for at least 1 hour, then open tap and leave to drain. The drain can usually be removed the next day.

### **Pleural Infection.**

1) Pleural effusions in association with sepsis or pneumonic illness require sampling (within 24h), by USS guidance if necessary (for failed aspirates, small or loculated effusions), unless <1cm in depth on USS (will need serial assessment).

2) The following features are indicative of a poor outcome and should be treated by prompt chest tube drainage: Turbid/cloudy fluid on aspirate, pH<7.20, Gram/culture +ve, loculated effusions, failure of antibiotic treatment. Aspiration or chest tube drainage may be indicated for relief of symptoms.

3) Patients requiring pleural drainage should have a respiratory physician or thoracic surgeon involved in their care, who can advise on duration of drainage, use of thrombolytic treatments etc. In some cases (eg. highly complex effusions in otherwise fit patients) referral direct to surgery may be appropriate rather than chest tube drainage. This is often best achieved by liaison with a respiratory physician, who can liaise with a surgeon as necessary.

4) Antibiotic therapy should be instituted, guided by sensitivities and microbiological advice.

5) Small bore drains (12F) should be flushed with 30mls sterile saline 3 times daily.

6) Failure of antibiotics and chest tube drainage will prompt discussion with a thoracic surgeon.

Fibrinolytic therapy has recently been shown to be ineffective in pleural infections in general, and should not be routinely used. However, there may be circumstances in which it is beneficial, and it should only be used on the advice of a respiratory physician or a thoracic surgeon. In these circumstances, streptokinase 250,000 units bd for 3 days or Urokinase 100,000 units od for 3 days can be given.

### **Technical Issues**

1) 12F are sufficient for most indications, and are preferred by patients. If pleural fluid can be aspirated, then it is usually safe to insert a 12F seldinger drain without US guidance. Where there is any doubt (esp. loculated effusions, on anticoagulants etc.) seek advice from a respiratory physician or a radiologist.

2) All drains should be attached to a 3 way tap and an underwater seal. There is an adapter in the seldinger kit, and radiologically placed pigtail drains can be connected via an adapter. Advice can be sought from the respiratory wards, or from the respiratory SpR on call.

3) Each day the function of the chest drain should be recorded. This includes amount drained, whether the drain is bubbling and whether it is swinging (best assessed during coughing.)

4) Tension pneumothorax with "clamped" drains (or drains with closed 3 way taps) is now very rare. However, patients with clamped drains should be nursed on a specialist ward, and not permitted to leave the ward with the drain clamped. Clinical deterioration should prompt "unclamping" or opening of the 3 way tap, and urgent medical assessment.

Source:

British Thoracic Society guidelines 2003. Available from [www.brit-thoracic.org.uk](http://www.brit-thoracic.org.uk)