

# Safe insertion of chest drains

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## Abstract

Chest drain placement is an essential skill for doctors in all acute specialties. Incorrect placement can lead to significant morbidity and even mortality. The most common error is wrong site of placement outside the safe triangle.

Dear Editor,

We wish to highlight the lack of experience and need for more supervision during chest drain insertion among junior doctors with the following case report.

## CASE REPORT

A 44 yr old male patient was admitted to the acute medical assessment unit with diabetic ketoacidosis and acute abdomen. He had a past history of diabetes and chronic alcohol excess. The patient received fluid resuscitation and was started on an insulin regime as per the hospital protocol. Surgical opinion was sought for the acute abdomen. CT scan of the abdomen was requested, which showed free gas & fluid in the abdomen suggestive of bowel perforation. Patient underwent emergency laparotomy and extensive small bowel resection for gangrenous small bowel. Postoperatively the patient was ventilated in the intensive care unit. Respiratory wean was complicated by pneumonia and bilateral pleural effusions. Chest drains were planned to help with the respiratory wean. The chest drain performed on the right side drained only blood clots. Attempt to pull out the chest drain resulted in large gush of blood from the chest drain. The resulting hypotension required fluid resuscitation and blood transfusion to correct sudden drop in haemoglobin levels. The chest drain was left in place and a radiology opinion sought to establish the site of the chest drain. The radiologist after reviewing the chest x-ray requested a CT-scan of chest and abdomen which showed the chest drain in the Liver. The case was discussed with the Liver unit in a tertiary hospital and consultant radiologist. It was decided to correct any coagulopathy first and then thrombose any feeding vessels around the ectopic chest drain under radiology guidance before removing the drain. Radio contrast injection via the chest drain in the radiology suite showed that the drain was very close but not in any portal

vasculature. The ectopic chest drain was pulled out without any further bleed in the radiology suite. The patient was successfully weaned from the ventilator and made an uneventful recovery.

## DISCUSSION

Chest drain placement is an essential skill for doctors in all acute specialties. A chest drain insertion as an emergency procedure may be required under a number of circumstances<sup>1</sup>. The most common are:

A traumatic haemothorax or haemopneumothorax  
Tension pneumothorax after immediate needle decompression via the second intercostal space in the mid-clavicular line  
Pneumothorax in a ventilated patient

Incorrect placement can lead to significant morbidity and even mortality<sup>2</sup>. A survey conducted among junior doctors following the above case revealed inadequate levels of supervision and lack of experience in performing chest drains.

A sound knowledge of the anatomy of the procedure avoids neurovascular damage in the chest wall and injury to underlying intrathoracic and even intra-abdominal viscera<sup>1</sup>. The most common error is wrong site of placement outside the safe triangle as recommended by the British Thoracic Society (BTS)<sup>12</sup>. The "safe triangle" as illustrated in figure: 1 is bordered by the anterior border of the latissimus dorsi, the lateral border of the pectoralis major muscle, a line superior to the horizontal level of the nipple, and an apex below the axilla.

### Figure 1

Figure 1: "Triangle of safety"



Before insertion of a chest drain, all operators should have been adequately trained and have completed this training appropriately. In all other circumstances, insertion should be supervised by an appropriate trainer<sup>3</sup>. This is part of the junior doctor core curriculum training process issued by the Royal College of Physicians and trainees should be expected to describe the indications and complications of chest drain insertion<sup>3</sup>. Trainees should ensure each procedure is documented in their log book and signed by the trainer. With adequate instruction, the risk of complications and patient pain and anxiety can be reduced<sup>3</sup>. A chest radiograph must be available at the time of drain insertion except in the case of tension pneumothorax. Immediately before the procedure the identity of the patient should be checked and the site and side for insertion of the chest tube confirmed by reviewing the clinical signs and the chest radiograph<sup>3</sup>. 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 and imaging should be used to select the appropriate site for chest tube placement<sup>3</sup>. The use of ultrasonography guided insertion is particularly useful for empyema and effusions as the diaphragm can be localised and the presence of loculations and pleural thickening defined. Complications of chest drain insertion can contribute to significant morbidity and mortality. "There is

no organ in the thoracic or abdominal cavity that has not been pierced by a chest drain."

#### Early complications

- Haemothorax
- Lung laceration
- Diaphragm and abdominal cavity penetration
- Bowel injury in the presence of unrecognised diaphragmatic hernia
- Tube placed subcutaneously
- Tube inserted too far
- Tube displaced

#### Late complications

- Blocked drain
- Retained haemothorax
- Empyema
- Pneumothorax after removal

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