Development of a tension pneumothorax despite intercostal drain insertion

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DESCRIPTION

A 21-year-old man presented to a trauma department in Johannesburg with two sucking stab wounds on each side of his posterior thorax. The patient was in respiratory distress with oxygen saturation of 91% on 15 L O₂. Blood pressure was 105/72 mm Hg, pulse 112/min and blood gas analysis demonstrated a mixed metabolic and respiratory acidosis.

A left haemopneumothorax was detected clinically although there was no evidence of tensioning. The stab wounds were covered with damp, three-sided dressings and an intercostal drain (ICD) was inserted into the left hemithorax, draining ~500 ml of blood. A radiograph (figure 1) confirmed correct ICD placement but also showed a right-sided pneumothorax. Another ICD was therefore inserted and a radiograph (figure 2) was obtained to check location. We were surprised to see enlargement of the pneumothorax and significant left shift of the mediastinum suggesting the development of a right tension pneumothorax.

We considered that the ICD might not be functioning, however, this seemed unlikely as the water level was swinging with respiration and bubbles were observed on coughing. A large, unidirectional air-leak into the hemithorax could exceed the drainage capacity of the ICD at low intrathoracic pressure. This would allow a degree of air accumulation and an increase in intrathoracic pressure (until equilibrium was reached) sufficient to cause mediastinal shift. The three-sided dressings should have prevented continued external air-leak but they may not have stuck properly or could have become dislodged. In support of this theory, wound closure in two layers resulted in resolution of the pneumothorax.

Figure 1 A correctly located intercostal drain (ICD) is visible in the left hemithorax in addition to a central venous catheter in the left subclavian vein. A pneumothorax is also visible on the right, but there is no evidence of tensioning.

Figure 2 Following insertion of a second intercostal drain (ICD) into the right hemithorax, the pneumothorax can be seen to have enlarged and the thoracic vertebrae are prominent as the mediastinum has shifted left. The patient has developed a tension pneumothorax despite the presence of a functioning ICD.

Learning points

- ▶ Posteroinferior placement of intercostal drains allows drainage of any dependent fluid *and* air, as the latter will distribute evenly throughout the pleural cavity.
- ▶ It is possible for tension pneumothorax to develop even in the presence of a correctly inserted, functioning intercostal drain.
- ▶ If a pneumothorax persists with a drain in situ, consider failure of the drain or the presence of an on-going air-leak—either internally or externally.

Competing interests None.

Patient consent Obtained.

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