Usage of central venous catheter for delayed traumatic pneumothorax

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ABSTRACT

Pneumothorax, whether spontaneous, iatrogenic or traumatic, frequently requires drainage, especially in the face of positive pressure ventilation or general anesthesia. The traditional approach with large-bore, rigid chest tube is associated with significant pain and various complications. Recently, less invasive modalities such as pigtail catheter or fine-needle aspiration have been used in selected patients. We report a case of delay-onset pneumothorax after trauma and the patient was treated successfully with the easily available central venous catheter for drainage.

Key words: thoracic injury, delayed traumatic pneumothorax, central venous catheter, thoracotomy

Introduction

Traumatic pneumothorax is a cause of preventable death. It has been reported to be present in 2–55% of patients suffering blunt thoracic trauma. (1-5) In recent studies, delayed traumatic pneumothorax has ranged from 2-5.42% and patients sustaining blunt thoracic trauma with rib fractures should be admitted for close observation. (6,7) Pneumothorax, whether spontaneous, iatrogenic or traumatic, frequently requires drainage, especially in the face of positive pressure ventilation or general anesthesia. The traditional approach, with a large-bore, rigid chest tube, is associated with significant pain and various complications. Recently, less invasive modalities such as a pigtail catheter or fine-needle aspiration have been used in selected patients. (8-11) However, their usefulness in the small number of occurrences of delayed traumatic pneumothorax has not been well established. To our knowledge, there has been no report about delayed traumatic pneumothorax treated by central venous catheter drainage. Herein, we report a patient who needed surgical treatment for a delayed-onset traumatic pneumothorax and who was treated safely and successfully with a central venous catheter.

Case report

A 48-year-old female was brought to our emergency department (ED) after having had a motorcycle traffic acci-
dent and thereby sustaining a left thoracic contusion injury. She had no head injury and no loss of consciousness at the scene. She was surveyed following the protocol of ATLS (advanced traumatic life support). On physical examination, vital signs were within normal range, and bilateral breath sounds were clear. There was tenderness over her left shoulder area and she had difficulty lifting her forearm. Neither obvious ecchymosis nor tenderness points over her anterior chest wall were noted. Chest radiography showed a left mid-clavicular fracture, but no evidence of rib fractures, pneumothorax or hemopthorax (figure 1A). A left shoulder sling was used and she was scheduled for open reduction with internal fixation (ORIF) of the clavicular fracture the following day. However, the X-ray taken on the following morning revealed a small amount of delayed pneumothorax (figure 1B). She did not have respiratory distress. Considering the self-limiting nature of the pneumothorax and the fact that she was about to undergo an operation under general anesthesia, a small caliber central venous catheter was used for drainage.

Discussion
The treatment of a small traumatic pneumothorax in the absence of respiratory manifestations has been controversial. However, if the patient has comorbid diseases which require surgery, in the face of positive pressure ventilation or general anesthesia, simple interventions such as percutaneous tube thoracostomy might be important. These procedures may be associated with significant morbidity when managed by personnel without appropriate training in trauma care. (13) In this situation, the catheter-based approach may be an alternative choice for chest tube or pigtail drainage.

Modified central venous catheters for pneumothorax have been reported and these authors considered the procedure to be effective, safe, easy to perform, portable, reliable and less painful. (10,11) Anterior axillary line, 3rd or 4th intercostal space was chosen for most patients and the midclavicular line, 3rd intercostal space was used in obese patients. After central venous cathete-
ter insertion, the catheter was fixed to the skin at 15-20cm. We followed the rules and the procedure was performed smoothly. These authors also suggested creating extra drainage holes in the central venous catheters to decrease the failure rate. However, we didn’t cut extra holes due to the possibility of the tube breaking in the pleural space, and our patient had a good prognosis without any complications.

Our experience with this technique is encouraging. The placement of a central venous catheter is almost painless after administering local analgesia, and no intravenous sedation or analgesia is required. Moreover, it is less discomforting when the catheter is indwelling. The patient may only feel slight discomfort when the catheter is inserted into the pleural space. Negative pressure can be applied via the appropriate connection of catheter to the chest bottle. It functions effectively to drain the pneumothorax. Finally, removal of the catheter doesn’t require any suturing. However, the technique has some limitations. First, our patient only had a simple pneumothorax. If a hemothorax presented, the blood might occlude the catheter and the drainage system may lose function. Second, due to the less invasive procedure, unlike traditional thoracotomy, we couldn’t use our finger to dissect the pleural space and the sharp needle inserted during the procedure might have injured the lung without noticing. Therefore, slow insertion into the pleural space is indicated. Moreover, failure rate and the possibility of breaking the tube inside the pleural space may need further evaluation and be further determined.

In conclusion, a central venous catheter may be used to drain small, delayed traumatic pneumothoraces as an alternative to chest tube or pigtail drainage, especially when positive pressure ventilation is indicated. It is effective and safe, easy to perform, and is less painful.

REFERENCES


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