

Chest-tube insertion management in intensive care unit

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Abbreviations: CT, chest tube; ICU, intensive care unit

Editorial

Critically ill patients who undergo chest intubation or tube thoracostomy have approximately 10% risk of complications that are directly associate with the operator's experience and the size of the tube used (the larger the tube, the more severe the complications). The most proper chest tube (CT) sizes are as the following: 1) 8 FR-12 FR for infants and young children; 2) 16 FR-20 FR for children and young adults; 3) 24 FR-32 FR are the most popular sizes for adults; and 4) 36 FR-40 FR are larger adult sizes. A CT is commonly inserted at the midaxillary line between the fourth and fifth ribs on a line lateral to the nipple. CT placement is often indicated for the treatment of pleural effusion (44% of patients), pneumothorax (44% of patients) or hemothorax (10% of patients) following traumatic injury or thoracic surgery. Other indications are chylothorax and pleural empyema (empyema thoracis), need for pleurodesis, and chemotherapy administration. Around 41% of patients admitted to intensive care unit (ICU) demonstrate some degrees of pleural effusion, while approximately 20% of them will develop pleural effusion during their stay in the ICU. There is little consensus on the subsequent management of CTs once placed, nevertheless, management practices are often based on institution and physician-specific training and preferences developed from anecdotal experience. Approximately, 71% of CTs are inserted by Specialty Residents and 12% of CTs are inserted by Radiologists.

The ideal CT management algorithm has yet to develop. The recommendations for CT management are as the following: 1) Level 1: CT drainage should be less or equal to 2 ml/kg/day before CT removal; 2) Level 2 : CTs can be removed equally safety at end-inspiration or end-expiration, CTs may be safety removed on suction, a brief trial of water-seal prior to CT removal may allow occult air leaks to become clinically apparent and reduce the need for CT reinsertion due to pneumothorax, after pulmonary resection, small air leaks will resolve significantly more rapidly if the CT is placed to water-seal, in the setting of penetrating chest trauma, a single dose of antibiotic should be intravenously administered prior to chest intubation; and Level 3: In mechanically ventilated patients, a chest radiograph obtained between one and three hours after a CT removal is sufficient to detect a recurrent pneumothorax, a daily chest radiograph is not indicated to monitor CTs in the ICU. Routine monitoring and patient care will detect the need for chest radiograph based on clinical

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necessity. Documentation of a pulmonary assessment should be performed at least every 2 hours, including arterial oxyhaemoglobin saturation measured by pulse oximeter (SpO₂), breath sound, work of breathing, and respiratory rate, whereas documentation of the amount of CT drainage should be performed at least every 8 hours. Lung ultrasonography is frequently used to evaluate and estimate the amount of pleural effusion. Other indications for CT removal include: 1) Improved respiratory status; 2) Symmetrical rise and fall of the chest; 3) Bilateral breath sounds; 4) Absence of bubbling in the water-seal chamber during expiration; and 5) Improved chest radiographic findings. Potential complications of CT insertion include subcutaneous emphysema, re-expansion of pulmonary edema, bleeding, recurrent pneumothorax, tension pneumothorax, local infection, organ perforation, and intercostal neuralgia. There are no definite contraindications to a CT insertion particularly when a patient experiences respiratory discomfort. In conclusion, subsequent CT management must be individualized to patient, whether the patient has had pulmonary resection, and whether the patient is mechanically ventilated. Unnecessary delays in CT removal as well as premature CT removal, contributes to increased hospital stays.

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