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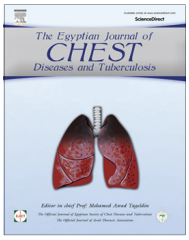

REVIEW

Chest tube care in critically ill patient: A comprehensive review

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KEYWORDS

Chest tube;
Chest drainage unit;
Parietal pleurae;
Visceral pleurae

Abstract Breathing is automatic. We don't usually think too much about it unless we develop a problem. Lack of adequate ventilation and impairment of our respiratory system can quickly become life-threatening. There are many clinical conditions that may necessitate the use of chest tubes. When there is an accumulation of positive pressure in the chest cavity (where it should normally be negative pressure between pleurae), a patient will require chest drainage. Chest tubes may be inserted to drain body fluids or to facilitate the re-expansion of a lung. It is important for the clinician to determine the most appropriate tube size to use prior to intubation. The position of the chest tube is related to the function that the chest tube performs. When managing the care of patients who have chest tubes it is important to fully understand what to do in case problems arise. It is also important to be able to assess when the chest tube is ready to be discontinued. Nurses and other healthcare professionals who are responsible for the safe delivery of care should be knowledgeable about respiratory pathophysiology, signs of respiratory compromise, and the care and management of interventions that may be utilized to ensure adequate respiration.

Contents

Abbreviation: CDU, chest drainage unit

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Introduction

Breathing is automatic. We don't usually think too much about it unless we develop a problem. Lack of adequate ventilation and impairment of our respiratory system can quickly become life-threatening [1]. It is important that the healthcare professional understands the risks associated with chest tube insertion and drainage. Healthcare professionals also need to know how to assist with the preparation of the chest drainage unit, perform ongoing patient assessments, document appropriately, and troubleshoot possible problems related to the use of a chest tube [2].

It's all about negativity

Chest tubes aren't placed in the lungs but in the pleural space—a potential rather than actual space between the parietal and visceral pleurae. The parietal (outer) pleura covers the chest wall and diaphragm. It contains a small amount (about 50 mL) of serous fluid that coats the opposing surfaces, allowing the visceral and parietal pleurae to glide over each other without friction while enabling the pleural surfaces to adhere to each other. The ability to adhere creates negative pressure within the pleural space, which becomes more negative as the visceral and parietal pleurae are pulled in opposite directions during inspiration. The negative intrapleural (and thus intrapulmonary) pressure generated causes air to flow from positive (atmospheric) pressure into the lungs [3]. Expiration increases intrapleural and intrapulmonary pressures to the point where they exceed atmospheric pressure, creating an opposite pressure differential and causing air to flow out of the lungs into the surrounding atmosphere. A breach in pleural integrity creates a separation between the parietal and visceral pleurae, allowing air or fluid to fill this potential space. The visceral pleura collapses inward along with the lungs, while the parietal pleura recoils outward along with the chest wall (Fig. 1) [4,5].

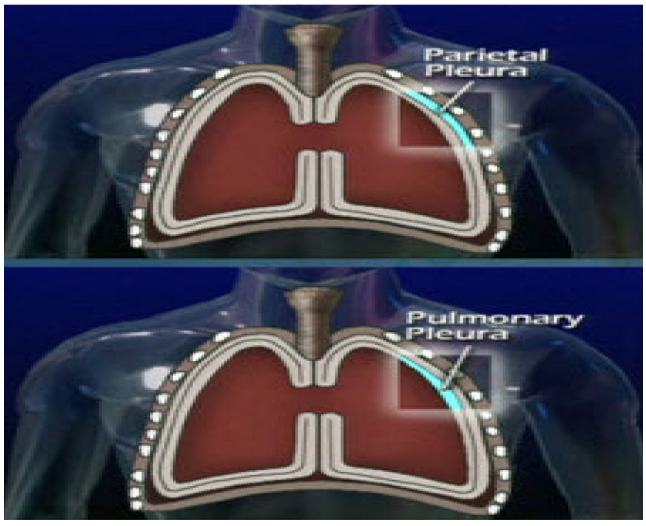

Figure 1 The negative pressure in the parietal and pulmonary pleura.

Use of chest tubes

There are many clinical conditions that may necessitate the use of chest tubes. When there is an accumulation of positive pressure in the chest cavity (where it should normally be negative pressure between pleurae), a patient will require chest drainage. Chest tubes may be inserted to drain body fluids or to facilitate the re-expansion of a lung. No matter what the reason or underlying cause, chest tubes help to resolve the problems associated with large volumes of air or fluid that have collected in the pleural space. When air or fluid enters the pleural space, the lung cannot expand properly. In some cases, chest tubes can also be used for certain therapy-related patient management as well [6].

Indications for chest tubes

There are various reasons for excess air and/or fluid in the pleural space. Specific common indications for chest tubes include [2,5,6]:

- Pneumothorax (open and closed).
- Tension pneumothorax.
- Hemothorax.
- Hemopneumothorax.
- Pleural effusions.
- Chylothorax (a type of pleural effusion that results from lymphatic fluid (chyle) accumulating in the pleural cavity).
- Penetrating chest trauma.
- Pleural empyema (collection of purulent material in the lungs).

Other indications include

- Excess air and/or fluid accumulation in the pleural space. For example, chest tubes are often placed after cardiac surgery to drain blood associated with the surgery.