

CHEST TUBE GUIDELINES

Introduction

These are updated guidelines for chest tube management initially developed in 2006 to achieve a more uniform practice management. These guidelines are based on the surgical literature and our Shock Trauma experience; the goals are reducing chest tube related complications, chest tube days and hospital length of stay.

They are not intended to be a rigid protocol but guidelines. Individualization of patient care and the provider's clinical judgement takes precedence.

1. Chest Tube Insertion

In an effort to decrease complications such as parenchymal injury, tube malposition and empyema we developed a video, for residents and fellows, demonstrating the appropriate technique for chest tube insertion. This has contributed to a decreased rate of empyema. Placement of a non-emergent chest tube requires strict adherence to sterile technique including caps, mask, sterile gown and gloves; widely prepping the chest and full draping are essential. Based on the available literature, the efficacy of a single dose of antibiotic given prior to chest tube insertion, while not definitively proven to lower infections complications, appears to be beneficial. Therefore, a single IV dose of a first generation cephalosporin, if not contraindicated, should be administered just prior chest tube insertion.

Chest tubes should remain on suction until the air leak resolves. If the air leak persists more than three days, a thoracic surgery consult should be obtained. A chest tube on suction with no air leak should be placed on water seal and a chest x-ray obtained. Chest tubes on water seal can be safely removed when draining less than 200 ml in 24 hours. A chest x-ray should be obtained 4 to 6 hours post removal. The literature has demonstrated there is no difference in complications when chest tubes are removed draining 200 ml or 100 ml in the prior 24 hours. Ventilated patients with persistent air leak are a special subset. The vast majority of air leaks resolve once off positive pressure ventilation.

2. Management of Chest Tubes During Transport

In general, patients with air leak should be transported with chest tubes on suction. If an air leak is present the diagnostic utility of a chest CT is decreased when the scan is performed off suction. If a pneumothorax is seen on CT, it is unclear whether the patient was on or off suction at the time of the study. This confounds clinical decision-making. Occasionally it is safe to transport the patient to CT off suction if so determined by the critical care or trauma attending. However, once the patient is in the scanner, chest tubes should be placed back on suction. The same principles apply to all transports including the operating room.

3. Retained Hemothorax

Several studies reported the incidence of retained hemothorax between 1 and 20 % following chest trauma, and early VATS is the modality of choice. The placement of a well-positioned chest tube for a traumatic hemothorax should result in a clear CXR. On the day following chest tube insertion, if there is opacity extending beyond the costophrenic angle, a chest CT should be performed. CXR does not reliably assess the size of the hemothorax and is generally inadequate to determine if VATS is indicated. A retained hemothorax of more than 500ml or opacity of 1/3 the hemithorax are among the accepted indications for VATS.

The optimal timing of VATS has been studied with contradictory results. Several studies reporting higher success rates when VATS was performed 3 to 5 days post injury. The only randomized, prospective study (only 39 patients), reported decreased length of stay, chest tube duration and cost when comparing early VATS to additional chest tube placement for retained hemothorax. Although a recent AAST multi-institutional study failed to duplicate these results, the consensus favors early VATS. A similar study by the same AAST investigators demonstrated over 25% of retained traumatic hemothoraces will develop empyema. Therefore, early VATS is advisable to reduce the risk of empyema.

4. Persistent Pneumothorax and Air Leaks

Few studies have addressed the persistent pneumothorax, air leaks or bronchopleural fistula following thoracic trauma. There are several reports examining spontaneous or recurrent PTX in the non-trauma population. The only prospective evaluation of early VATS versus conventional non-operative management demonstrated fewer chest tube days and decreased length of stay in the VATS group. One study on post-traumatic air leaks reported almost 75% of air leaks present on the third day persisted until day 10. This should prompt a thoracic surgery consult for an air leak lasting more than 3 days.

Recommendations:

1. Strict sterile technique when inserting a chest tube and single dose of antibiotics.
2. Remove chest tube when draining less than 200 ml a day (unless clinically not indicated e.g., empyema tube).
3. Place to water seal if there is initially no air leak or when the air leak resolves.
4. If the chest tube was on suction, keep it on suction during CT scan.
5. Obtain a thoracic surgery consult for an air leak lasting more than 3 days or a residual hemothorax the day following chest tube insertion.

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Developed by:

James V. O'Connor, MD, FACS, FCCP
Professor of Surgery
University of Maryland School of Medicine
Chief, Thoracic and Vascular Trauma
R Adams Cowley Shock Trauma Center
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