



The Endotracheal Tube Used As A Thoracic Trocar

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Thoracostomy using a large-bore tube is indicated in patients with pleural effusions of infectious etiology, hemothorax, and those with pneumothorax associated with an underlying lung pathology, especially if they are under mechanical ventilation or in a hemodynamically unstable situation. There are different techniques for the insertion of a chest tube, with blunt dissection being the most frequently used and recommended by researchers and guidelines [1-3]. However, despite guidelines recommending it no longer be used due to high rates of intrathoracic organ injuries [3], there is a group of experienced physicians who continue to perform insertion of the tube through a trocar for educational reasons. Arguments in their favor are that it is well tolerated by patients, can facilitate tube positioning, and requires only a very short insertion time. Furthermore, the insertion of chest tubes by use of a trocar provides an opening that is a better fit to the outside diameter of the tube. Perhaps they think that complications depend not so much on the technique itself as on the skill of the physician performing it. Hence, it may be important for the insertion of a trocar to be reserved for experienced physicians familiar with both the trocar's use and chest wall anatomy.

According to one survey, until a few decades ago, the use of the trocar was common practice in some specialties [4]. Despite the fact that a high risk of complications with the trocar technique had already been documented, there were centers where they did not observe a such increased risk [5]. At present, adherence to guidelines is still quite heterogeneous in some places, so it has been suggested that local policies be reviewed and improved with regard to training and supervision of chest tube placement [6-8]. Procedure training and scenario simulation, as well as video of insertion technique create the basis for improvement. A tool that allows the evaluation of chest tube insertion using the trocar technique (28Fr Argyle trocar tube) has recently been validated [9].

Collaboration between clinicians and surgeons to determine agreed local best practice in surgical techniques should also be encouraged. Further, the loss of prestige for the insertion of a chest tube through a trocar occurred during a time when modern ultrasound equipment was not widely available. Today, ultrasound is considered indispensable for the proper localization of an insertion site, as well as for the best definition of the pleural space to help avoid the need for digital exploration to exclude pulmonary adhesions.

There are some awkward situations with the usual technique of blunt dissection to access the pleural space. When inserting a chest tube using blunt dissection, once the tract through the tissues has been established, the tube is held with a Kelley clamp and inserted into the pleural cavity. However, similar to the insertion of a trocar, inserting the clamp requires force but apart from that there is resistance to opening the clamps imposed by the surrounding tissues which makes the maneuver difficult and painful. A modified combined technique was proposed by Dural et al with acceptable results [10]. It combines both tube insertion techniques, first dissecting with forceps and inserting one gloved finger into the pleural cavity to later introduce the tube through a trocar. The investigators used chest tubes fitted with a long (280mm), sharp-tipped trocars inside.

For those familiar with the use of the trocar, alternatively we suggest a simple technique of chest tube insertion using an improvised trocar with a modified endotracheal tube. Depending on the thickness of the chest wall, we use a 10 to 15 cm distal end of a 9.5 mm internal diameter (ID) endotracheal tube (Figure 1). This relatively short length prevents injury to major underlying structures, and its ID allows for the passage of 24Fr chest tubes. In a retrospective study where the outcomes of patients with traumatic pneumothorax or hemothorax were analyzed, tubes with this diameter have proven to be equally effective as those with a larger diameter [11]. The eccentric

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Figure 1. The 15 cm distal end of a 9.5 mm ID endotracheal tube with a 24Fr chest tube inside. In this example, the cuff of the endotracheal tube must be removed to facilitate insertion through the tissues of the chest wall.

tip of the endotracheal tube is very similar to some previously suggested chest tube designs, which facilitates penetration of the chest wall muscle using only moderate pressure [12]. In addition, its greater rigidity and curvature allows it to be redirected toward the indicated pleural space. The blunt-tipped characteristics of the endotracheal tube have allowed it to be used even as pleural drainage in prehospital settings [13], and this tip is the one recommended for thoracic trocars [14]. Depending on the particular case, special attention must be paid when introducing our trocar and passing the chest tube as soon as air or fluid is obtained.

Currently available thoracic trocars, such as the Monod and tube thoracostomy equipped with trocars, technically leave much to be desired. While the first type is dangerously sharp, the second type's long length can damage internal organs. The trocars available for endoscopic surgery offer an attractive alternative, but they are not readily available in all hospital centers.

In summary, with the technique described here we seek to present a simple and cost-effective way to retain the use of the trocar for insertion of a chest tube using materials that are readily available in most hospital settings, provided there are no pulmonary adhesions, so that the blunt dissection technique is considered safer.

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