



It is Time to End “Blind” Needle Thoracostomy in Trauma?

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The technique of needle thoracostomy is a mainstay in the immediate treatment of tension pneumothorax. The technique is taught in the Advanced Trauma Life Support Course as a part of the lecture material and in a hands on skills station.¹ The technique is discussed and described in every trauma, emergency medicine and critical care textbook. Descriptions of the benefits of the procedure have found their way into prehospital training and protocols. Performance of needle thoracostomy involves the placement of a large caliber needle or catheter into the pleural cavity via the second intercostal space. Presumably, this provides a point of efflux and relieves the “tension” component of the pneumothorax.

Indications for performance of needle thoracostomy have evolved. Performance of this technique should be based on clinical indications of tension pneumothorax (respiratory distress, tachycardia, hypotension, contralateral tracheal deviation, unilateral absence of breath sounds, jugular vein distention). Currently, performance of “blind” (bilateral) needle thoracostomy in essentially any injured patient who presents in extremis has become standard practice in the prehospital setting, the trauma bay, the operating room and in the intensive care unit. This technique is not free of complications and must routinely be followed by the placement of a tube thoracotomy. Recent literature suggests strongly that the practice of blind needle thoracostomy is not routinely helpful and may be harmful in many instances by delaying effective therapy.

When placed without clinical indications, needle thoracostomy is rarely successful in improving the hemodynamic status of the injured patient. Cullinane et al, reviewed the experience of a Level 1 trauma center in caring for 19 patients that received needle thoracostomy in the prehospital setting for suspected tension pneumothorax during a 9-month period.² Five patients arrived in cardiopulmonary arrest and all of these patients expired. In the remaining 14 patients, only 2 had indications of tension pneumothorax and needle decompression failed in one of these patients. Six of 14 patients that arrived with vital signs had no evidence of pneumothorax on chest radiographs. This group concluded that many of the needles placed did not actually penetrate the pleura. Cullinane et al, concluded that prehospital needle thoracostomy procedures were frequently attempted in patients without indications of tension pneumothorax, and were both overused and ineffective.²

Martin et al, assessed the effectiveness of needle thoracostomy in a porcine model of tension pneumothorax.³ This group found that needle thoracostomy catheters frequently became malpositioned (26%) within 5 minutes of placement and failed to relieve tension physiology in 43% for an overall failure rate of 58%.

Relevant Information for Treating the Traumatically Injured

In a cadaver study, Inaba et al determined that the traditional anatomic landmarks utilized for placement of needle thoracostomy were not uniformly successful.⁴ In this well designed study, only 58% of needle catheters placed in the second intercostal space at the midclavicular line actually entered the pleural cavity.

Needles of equal (5 cm, 14 gauge) dimensions entered the pleural cavity 100% of the time when a fifth intercostal space, midaxillary line position was used. Therefore, the standard anatomic location used for needle thoracostomy placement is ineffective.⁴

The need to blindly place a needle thoracostomy in the trauma bay is not supported by recent literature regarding ultrasound assessment of injured patients. Dulchavsky et al, and Knudson et al, in separate studies performed at different Level 1 trauma centers have conclusively demonstrated that a 1 minute ultrasound examination performed as a component of the extended Focused Assessment with Sonography for Trauma (EFAST) rules out the presence of a pneumothorax with high accuracy, sensitivity and specificity.^{5,6} Therefore, blind needle thoracostomy should very rarely be indicated in any emergency department with sonographic capability.

In summary, needle thoracostomy appears to be overused and is frequently performed in patients without tension pneumothorax. Even when this technique is performed in the presence of a tension pneumothorax, the majority of patients are unlikely to benefit due to technical factors. Ultrasound, which is immediately available in the majority of contemporary emergency departments, can conclusively rule out the presence of a pneumothorax. Ergo, “blind” needle thoracostomy should be used rarely, if at all.

References

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