



**ICAR**

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**International Commission for Alpine Rescue**

**Commission for Mountain Emergency Medicine**

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**Thoracostomy at the Scene of an Accident in the Mountains**

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Intended for Emergency Physicians

## ***Preamble***

Intubation and ventilation of a seriously injured patient in the field is now an accepted and frequently used procedure. In case of a patient with chest trauma, this procedure can lead to a life-threatening tension pneumothorax.

In this case, thoracostomy of the injured side of the chest is mandatory to provide ventilation without causing a pneumothorax. It does not make any sense, however, to do without a vital measure only because the doctor on emergency call is not capable of performing a thoracostomy. Therefore we require that all mountain rescue doctors should be able to do this procedure.

The following are the only indications for a thoracostomy at the scene of an accident in the mountains:

- to ventilate a patient with serious chest trauma and decreased or absent breath sounds (hemo- or pneumothorax)
- tension pneumothorax

Often there is a long time between the accident and the arrival of the doctor, then we have to deal with advanced shock and respiratory failure. So in spite of difficult conditions (terrain, weather) there are more liberal indications for intubation and also for thoracostomy at the scene. A long transport also supports the decision to perform a thoracostomy.

## ***Thoracostomy Site***

**There are two usual sites for thoracostomy.**

1. Thoracostomy in the second intercostal space (ICS) in the mid-clavicular line is only feasible with a pneumothorax with clear clinical indications and when an x-ray can be used to confirm the position of the tube. In an emergency situation however, we have to expect a hemothorax. For anatomical reasons this site is also difficult due to the ease of slipping off the ribs in this area. It is also more dangerous, since the mammary artery might be injured, which can be fatal.
2. Thoracostomy in the fourth or fifth ICS in the mid-axillary line (at the level of the nipple) on the other hand, is ideal for our purpose. It is anatomically easier, less dangerous, suitable for a hemothorax as well and allows an easy posterior placing of the tube.

## ***Technique***

We do not recommend thoracostomy through a stab incision using a stiff trochar especially under field conditions there is great risk of injury to organs like the lung, the diaphragme the stomach, the liver, or the spleen. These injuries are caused by the sharp tip of the trochar or by rib fragments being pushed forward. With the trochar method, positioning of the tube cannot be controlled. Also catheter-through-needle devices should not be used .

Catheter-over-needle devices in which the needle is removed after placement (such as Venflon) can be used for short flight distances or dangerous scenes. Such devices must have a catheter diameter of 14 gauge or larger.

## ***We Recommend the Following Procedure:***

1. Make a 5 centimeter incision parallel to the ribs in the 4th or 5th ICS in the mid-axillary line.
2. Spread the subcutaneous tissue with dissection scissors.
3. Open the pleural space on top of the rib with closed scissors.
4. Spread and palpate with a finger.
5. Insert and direct the tube using a finger.
6. Close the skin and secure the tube.

Only a few instruments are necessary for this procedure: a scalpel, scissors with a rounded, slim tip (Metzenbaum), a toothed forceps and a needle holder. We use a large thoracostomy tube 20-28 French (Ch.) in order to prevent clogging. If there is no thoracostomy tube available, one can use an endotracheal tube without inflating the cuff. A Heimlich valve can be added but is not absolutely necessary