



## Tube Thoracostomy Using 'Soft' Thoracoport, a Novel Technique in the Placement of Intercostal Drains (Original Article)

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### ABSTRACT

Tube thoracostomy refers to the placement of a drainage tube into the pleural cavity<sup>[1]</sup>. The procedure is commonly performed in an emergent and non emergent fashion, constituting a basic surgical bedside procedure that most practitioners are familiar with. Of paramount importance is, the fact that most thoracic injuries may be effectively treated with tube thoracostomy and simple fluid resuscitation<sup>[2, 3]</sup>. In this study we offer a novel technique for the insertion of chest tubes utilizing Thoracoport (thoracic port used for thoracoscopy) which may be far superior to the conventional method. Thoracoport has a trocar with a blunt tip and a cannula which can be easily administered and needs only minimal technical skill and expertise. The insertion is rapid without wasting undue amount of time dissecting the intercostals space as in the 'open' technique. There is literally no need of any assistance from a second person. The smaller incision and the absence of blunt dissection causes only minimal post procedure wound related complications.

**Keywords:** Thoracoport, chest tube, tube thoracostomy, intercostal drainage.

### INTRODUCTION

The procedure for the placement of a chest tube by the 'open' method, i.e. blunt dissection up to the pleura followed by tube insertion, is time tested and remains the method of choice for chest tube insertion. In this study a novel technique for the insertion of chest tubes utilizing Thoracoport which may be far superior to the conventional method. Thoracoport has a trocar with a blunt tip and a cannula.[Fig1]

### MATERIALS AND METHODS

This study was performed at a tertiary care hospital from January 2010 to December 2015. All patients presenting to casualty with a proven diagnosis of pneumothorax, pleural effusion, blunt trauma chest patients with respiratory difficulty were included in this study. Flail chest patients were excluded from this study.

### Indications for tube thoracostomy

Tube thoracostomies are drainage systems placed within the pleural cavity with the intent of draining noxious substances so as to facilitate proper pulmonary function. The indications for the placement of such a system are pneumothorax, hemothorax, hemopneumothorax, hydrothorax, chylothorax, empyema, pleural effusion, patients with penetrating chest wall injury who are intubated or about to be intubated, considered for those about to undergo air transport who are at risk for pneumothorax. The need for emergent thoracotomy is an absolute contraindication to tube thoracostomy. Relative contraindications are coagulopathy, pulmonary bullae, pulmonary, pleural, or thoracic adhesions, loculated pleural effusion or empyema, skin infection over the chest tube insertion site. Irrespective of the mode of insertion, tube thoracostomy is usually carried out within the triangle of safety, the region recommended for intercostal drainage insertion by the British thoracic society<sup>[4]</sup>. It's an arbitrary space defined so as to avoid vital thoracic structures and is bordered by: the lateral border of pectoralis major, a horizontal line inferior to the axilla, the anterior border of latissimus dorsi and a horizontal line superior to the nipple<sup>[5]</sup>.

### Tube thoracostomy utilizing disposable 'soft Thoracoport.

This method of insertion of intercostal tubes with soft thoracoports are commonly used for thoracoscopic surgeries. This is an exciting new alternative to the conventional blunt dissection technique. This technique was initially founded by the observation that blunt dissection by thoracoport placement was superior to both open blunt dissection and trocar placement techniques.<sup>[6,7]</sup> The idea further evolved from the observations that routine placement of thoracoports in thoracoscopic surgeries were relatively easy, safe and with less complications. The procedure of insertion of an intercostal drainage tube with this technique is similar to that of insertion of tubes during thoracoscopic procedures. The initial

positioning of the patient and preparation is identical to that of the blunt dissection technique. Thoracoport insertion requires a bare minimum of a thoracoport of size 11.5 mm, a no.15 surgical blade, the intercostal drainage system and instruments for anesthetizing and preparing the patient. The procedure begins by placing a small incision (1.2 cm) in the skin, far smaller than the incision required for the blunt technique, over the triangle of safety [Fig2]. Following this the thoracoport is inserted, [Fig3] the trocar is removed and the cannula is retained, Then the chest tube is inserted through the cannula of the thoracoport and the cannula is removed. [Fig4] The length of the tube to be kept inside the thoracic cavity should be planned early. Usually Thoracic catheter 28-32 F is used and the marking on the tube 8 can be kept at the wound level which will be sufficient for most of the patients. The tube is then anchored in the usual manner.

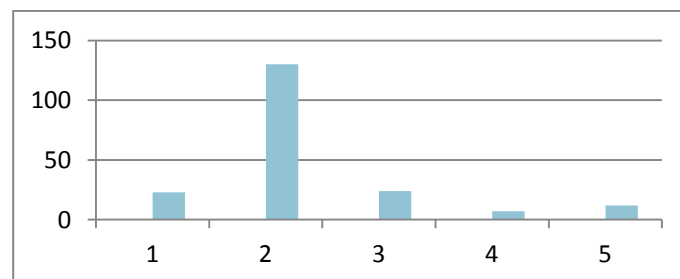
### RESULTS

A total of one hundred and ninety six cases were included in this study.

There was one hundred and eighty four unilateral and twelve bilateral chest tube insertions. So a total of  $184 + 12 + 12 = 208$  chest tubes were inserted altogether.

The breakup of the cases are as follows

1. Pneumothorax = 23 (11.7%)
2. Hemothorax. = 130 (66.3%)
3. Hemopneumothorax = 24 (12.2%)
4. Surgical emphysema. = 07 (3.5%)
5. Bilateral hemothorax = 12 (6.12%)



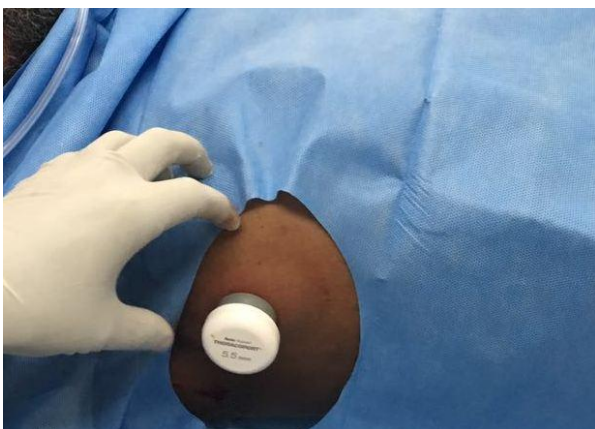
The assistance by a second person was not needed in these cases as there is no need for tissue retraction and insertion of thoracoport induces only minimal trauma to the patient.



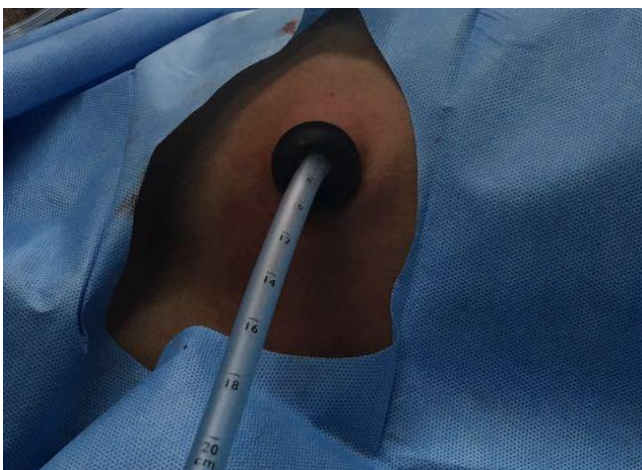
**Figure 1** Thoracoport



**Figure 2** Thoracoport insertion



**Figure 3** Thoracoport with trocar in situ



**Figure 4** Intercostal drainage insertion through Thoracoport

## DISCUSSION

The advantages of this technique are numerous. Owing to the relative easiness of this procedure the technical skill and expertise needed is minimal. The insertion is rapid without wasting undue amount of time dissecting the intercostals space as in the 'open' technique. There is literally no need of any assistance from a second person. The smaller incision and the absence of blunt dissection causes only minimal post procedure wound related complications. In our study only three patients had wound infection and only 27 patients complained of post procedural pain which required additional analgesic administration (tramadol 50 mg IM) apart from our routine administration of diclofenac sodium injections.

The rapidity of insertion makes the patient far more compliant, life threatening crisis may be rapidly dealt and also prevents undue exposure of pleura to the outside environment which may lead to contamination of the pleural space by potential pathogens. Most laparoscopic trocars are specifically designed with 'hoods' to prevent contamination by extraneous particles which thereby further ensure the sterility of this procedure. The importance of aseptic precautions in thoracic procedures is exemplified in the age old aphorism 'one may spit within the peritoneum, but one shall not breathe into the pleura'.

The potential disadvantages seem to be the cost factor, however counting in the potential disastrous complications of pleural contamination and the associated morbidity with the blunt technique, the thoracoscopic trocar technique may be truly more cost effective in the long run.

Also the smaller incision precludes the adequate exploration of the pleural cavity for adhesions and therefore it may be prudent to avoid this technique in patients who are likely to have adhesions due to previous or underlying lung pathologies

## CONCLUSION

The technique of inserting intercostal drains via the placement of a soft thoracic trocar system maybe not be currently in vogue, but after careful

analysis of the potential advantages of this method, it is in the authors recommendation that this method should be incorporated into the treatment protocols of thoracic ailments requiring intercostals drainage

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