

Transabdominal assisted ICD insertion minimise the malposition of tubes our experience compared with standard technique

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Abstract

Background: Tube thoracostomy is widely used throughout the medical, surgical, and critical care specialities. It is generally used to drain pleural collections either as elective or emergency. Complications resulting from tube thoracostomy can occasionally be life threatening. Normally after the closure of abdomen ICD is inserted blindly in 4th or 5th intercostal space in safe triangle. Still the risk of lung injury or malplacement is possible. In modified technique ICD is inserted into pleural cavity before abdomen closed with transabdominal manipulation **Aim:** To compare the between the tube thoracostomy by standard technique and our assisted technique. **Materials and Methods:** we have operated 50 cases of carcinoma of the postericoid region since Jan 2012 to Dec 2016. They underwent laryngo-pharyngo-esophagectomy with gastric pullup. Random cases were selected for intercostals drain insertion either trans-abdominal assisted technique or by standard technique. **Results:** Total 50 cases of gastric pull-up were operated. In that 50% had ICD insertion by standard technique and other 50% by trans-abdominal assisted technique. Three patients (12%) had malposition of drains in standard technique which required reposition. None of the patients had malposition of ICD in modified technique. **Conclusion:** Tube thoracostomy, though commonly performed is not without risk. Assisted tube insertion technique has lower risk of complications and it can be recommended.


Key Words: ICD insertion, trans-abdominal assisted Technique.

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INTRODUCTION

A chest tube is a flexible plastic tube that is inserted through the chest wall and into the pleural space. As a life saving procedure, general surgeons, intensivists, emergency physicians, and respiratory physicians may at one time or the other is required to perform tube thoracostomy. The first documented description of a

closed tube drainage system for the drainage of empyema was by Hewett in 1867¹. However during the Second World War, the experience gained in military and civilian hospitals contributed to the development of tube thoracostomy in chest trauma management, and, at the time of the Vietnam war, it has become the standard of care for management of chest trauma². In 1992, Lilienthal reported the postoperative use of chest tube following lung resection for suppurative diseases of the lung³. Intercostals drains are inserted into pleural cavity in 4th or 5th intercostals space along the mid-axillary line in the “triangle of safety” (Fig-1).

MATERIALS AND METHODS

This prospective study was conducted at Kidwai Memorial Institute of Oncology, Bangalore, Karnataka, India from January 2012 to December 2016. We did 50 cases of laryngo-pharyngo-esophagectomy with gastric pull-up. In every patient intercostals drains were inserted

into pleural cavity either by standard technique or trans-abdominal assisted technique. We had 25 cases each technique at end of 5years.

Background

In standard technique ICD inserted in the safe triangle after the closure of abdomen and cervical incision. Through the blind dissection using the artery forceps pleural space entered and the ipsilateral lung is allowed to collapse to prevent injury to lung. It is a blind technique the risk of injury to lung, heart and vessels is high. In trans-abdominal assisted technique intercostals drains are inserted with protection of intra-abdominal hand, hence risk of injury to other structures is less.

Our Technique

This method is helpful in those pleural cavity is breeched who underwent laparotomy for esophagectomy or laryngopharyngo-esophagectomy with gastric pull up. Once the gastric conduit is mobilised and anastomosis is completed. We identify the 6 or 7th intercostals space along anterior axillary line. Skin incision is made over the lower rib and tunnelled to intercostal space just above that rib. Artery forceps is introduced and oblique tract is created. With other hand in the subdiaphragmatic region tip can be felt and manipulated posterior superior direction (fig-2). ICD is directed towards apex of lung with help of intra abdominal hand. With the help of left hand or right hand while inserting the tube it can be palpated through the diaphragm (fig-3). On table all ICD

were checked for air swing. In standard technique ICD marking were kept at 8 or 10 and in assisted technique 12 or 14 due to long course of ICD tract. Immediately in ICU check X-ray is taken asses the position of tubes. In case of kinking and malposition especially horizontally were reposition and check X-ray taken to confirm all patients

RESULTS

We have operated 50 cases of carcinoma of the postericoid region that underwent total laryngo-pharyngo-esophagectomy with gastric pullup during the period of Jan 2012 and Dec 2016. At the end of procedure, 25 patient underwent new technique of insertion and rest 25 with standard technique. Three patients had complication associated using standard technique, one had kinking and two had malposition with delayed absorption hydropneumothorax. None of the patient had any other major complication in both groups. In both groups ICD is removed on 3rd to 5th post operative day. Unintentional finding in the standard technique patients had more pain and sleep disturbance may due tube in midaxillary position constantly touching the arms. In modified technique the tubes are along the anterior axillary line hence the arm movements are not restricted and pain is less. ICD clogging were same in the both groups.



Figure 1: Diagram to illustrate the “safe triangle”

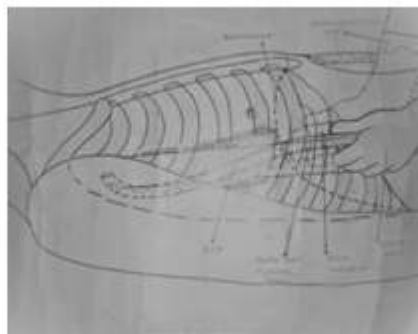


Figure 2: Diagram showing how the tube is manipulated. (longitudinal view)

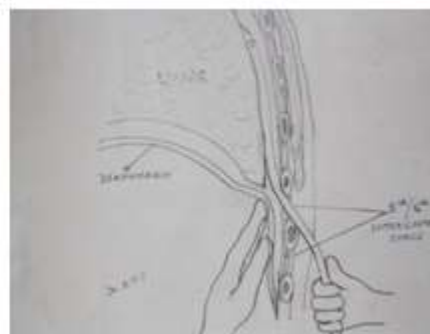


Figure 3: Diagram showing how the intra-abdominal hand can feel and guide the tube

DISCUSSION

ICD insertion is a life saving procedure. It has to done by an expert to minimise the complication. Appropriate placement of ICD and it function is most important. Kinking or malposition of tube leads to delayed drainage of fluid or air and lung expansion. Sound knowledge of the anatomy of the thorax is important to avoid some complications of tube thoracostomy. To avoid the neurovascular bundle, it is normally advocated that the drain be located in the interspace just superior to the rib.

However, puncture done as close as possible to the superior margin of the inferior rib may lead to laceration of the collateral intercostals artery⁴. Recent study has shown that the ideal spot should be 50–70% of the way down the interspace⁵. Injury to this neurovascular bundles remain possible complication of the procedure. British Thoracic Society has recommended the triangle of safety as the site for insertion for intercostal drain⁶. This area is bordered by the anterior border of the latissimus dorsi, the lateral border of the pectoralis major muscle, a line

superior to the horizontal level of the nipple, and an apex below the axilla (Figure 2). A survey of junior residents on the anatomical landmarks when inserting an intercostal drain revealed that 45% were placed outside the safe area of chest drain insertion with the most common error (20%) being a choice of insertion too low⁷. The midaxillary line is the most commonly advocated position for tube thoracostomy; the innermost layer of intercostal muscle being poorly developed at this point, and comprising thin intracostals, which blend with the internal intercostal layer except where separated by neurovascular bundles⁸. A more anterior position will lead to injury to the muscles and breast tissue while a more posterior position is more uncomfortable and has risk of drain leakage. In assisted technique it is placed along the anterior axillary line in sixth or seventh intercostals space with injuring the breast or diaphragm under finger guidance. The long thoracic nerve lies behind the midaxillary line on the surface of serratus anterior and deep to the fascia and segmentally supplies this muscle. In full expiration, the two domes rise as high as the 4th dorsal intervertebral space on the right and 5th space on the left; hence, when a chest tube is placed too low, there is a high probability of abdominal placement. Inferior placement of chest tubes will not only perforate the diaphragm but will also damage intra-abdominal organ⁸. Chest tubes placed laterally in the fifth, sixth or seventh intercostal space will enter the chest near the oblique fissure and if directed centrally can enter the fissure⁹. Both the lung parenchyma and the fissures are thus potential sites of tube malposition. The advantage of assisted technique is anterior placement of chest tube along the anterior axillary line under intra-abdominal hand guidance and protection. With the intra-abdominal manipulation tube can be directed along the chest wall towards the apex which allow both air and fluids drain out comfortably in sitting and lying down position respectively. No risk of injury to diaphragm or intra-abdominal organs. Since it is placed anteriorly the pain is relatively less and patient able move his arms comfortably, which is difficult in higher up and midaxillary line tubes.

CONCLUSION

Tube thoracostomy is not without risk. Blunt dissection technique has lower risk of complications and is hence recommended. Assisted technique reduces further complication and can be recommended. Most of these complications are preventable and when they occur, they must be adequately and correctly managed.

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