

DERLEMELER

THE ROLE OF VATS IN THORACIC TRAUMA (OUR INITIAL CLINICAL EXPERIENCE)

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Gülhane Tıp Dergisi 45 (2) : 218 - 220 (2003)

ÖZET

Toraks Travmalarında VATS'ın Rolü (Klinik Deneyimlerimiz)

Toraks travmaları acil girişim gerektiren en sık sebeplerden birisi olmaya devam etmektedir. Toraks travmalarının tedavisindeki yenilikler, teknoloji, tanı yöntemleri ve sistem ekipmanlarındaki gelişmelerle yakından ilgilidir. Son zamanlarda video yardımcı göğüs cerrahisi (VATS) travma ile ilgilenen göğüs cerrahları arasında geniş ilgi görmeye başlamıştır. VATS seçilmiş toraks travmalı olgularda güvenilir ve kullanışlı bir yöntem olarak görülmektedir.

Bu makalede VATS'ın toraks travmalarındaki yeri gözden geçirilmiş ve torasik travma nedeniyle VATS uyguladığımız 11 olguya ait ilk klinik deneyimlerimiz sunulmuştur.

Anahtar Kelimeler: Toraks Travması, Video Yardımlı Göğüs Cerrahisi (VATS).

SUMMARY

Thoracic traumas continue to be one of the most common reasons for patients to seek emergency medical care. Many of the significant advances in the management of thoracic trauma are linked to technology, diagnostics and system developments.

Recently VATS (Video Assisted Thoracic Surgery) has aroused much interest among surgeons involved with thoracic trauma. VATS seems to be a safe, accurate and useful approach in selected patients with thoracic trauma. We presented our initial clinical experience with 11 traumatized patients underwent a VATS procedure and reviewed role of VATS in thoracic trauma.

Key Words: Thoracic Trauma, Video-Assisted Thoracic Surgery (VATS).

INTRODUCTION

Thoracic trauma represents a major diagnostic and therapeutic challenge to surgeons. Accurate assessment and prompt treatment require detailed

knowledge of the protean manifestations resulting from thoracic injuries. The trauma is known to be a leading cause of death in the first four decade of life. The approach to diagnosis and treatment of injuries to the chest depends on greatly on the mechanism of injury and the evidence and type of the associated injury.

In the vast majority of traumatized patients, the traumatic force is applied to and through the chest wall, making trauma to the ribs and sternum the most common of all thoracic injuries and therefore a subject of considerable importance.

The majority of chest trauma does not require major operations and tube thoracostomy remains the basis of the treatment. Rapid improvements in endoscopic surgical technique and instrumentation expanded the indications of videothoracoscopy both diagnosis and treatment of chest traumas.

Hans Christian Jacobeauss, in 1910, performed first thoracoscopy in human (1). JMC Branco first described its use in trauma patients in 1946 (2). In the past decade alternative to open thoracotomy for a variety of thoracic trauma conditions such as evaluation and management of diaphragmatic injuries, evaluation of retained thoracic collections and, diagnosis and treatment of intrathoracic hemorrhage (3).

SURGICAL TECHNIQUE

There are some modifications from case to case. All procedures are performed with the patient under general anesthesia with double lumen endotracheal intubation. Pulse oximetry, electrocardiography, blood pressure and end tidal CO₂ are monitored continuously. Patients are positioned and draped as for standard open procedure. A 2 cm incision is made over the seventh intercostal space at midaxillary line. The chest is entered carefully through a stab incision. Digital palpation determined the presence of adhesions, and bleedings from the wound are checked meticulously. If none are present a 11mm trocar is inserted through which the thoracoscope is introduced. The entire thoracic cavity was then carefully explored by means of projected images on the video monitor. Depending on the site of lesion and the type of operation, one or two additional stab incisions (2cm) are made to allow for the introduction of

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Kabul Tarihi : 4.4.2003

instruments into the chest. The procedures are usually carried out with three incisions in a triangular configuration on the chest. At the end of the procedure a chest tube is placed through the seventh intercostal incision. All incisions are inspected from within the chest for bleeding before the procedure is completed and should be carefully closed.

Indications for operative videothoracoscopy in thoracoabdominal trauma

With the advent of video thoracoscopic technology there has been increased interest in video assisted thoracoscopic surgery (VATS). Indications of VATS are shown in table-I.

TABLE - I
Indications of VATS

1. Control of ongoing intrapleural bleeding
2. Early removal of clotted hemothorax
3. Evaluation and repair of diaphragmatic injuries
4. Treatment of marked air leakage
5. Removal of intrathoracic foreign bodies
6. Suturing of selected lung injuries
7. Treatment of posttraumatic empyema and chylothorax

Contraindications for VATS

Inspite of its expanding indications, there are some contraindications for VATS.

Contraindications of VATS are shown in table - II.

TABLE - II
Contraindications of VATS

1. Hemodynamic instability and indication for emergency thoracotomy
2. Visceral and parietal pleural symphysis secondary to empyema, granulomatous infection, pleurodesis, or thoracotomy
3. Inability to tolerate single lung ventilation or lateral decubitus position secondary to contralateral pulmonary resection
4. Acute or chronic severe respiratory insufficiency, high level of mechanical ventilation
5. Bleeding diathesis

Diagnostic and Therapeutic VATS for thoracic traumas

I. Diaphragmatic injuries

Injuries to the diaphragm is notoriously difficult to diagnose in the immediate post injury period. The incidence of diaphragmatic injury from penetrating trauma is 10 to 15 %. For anterior injuries below the nipples, this increases to 30%. Also, 90 % of strangulated diaphragmatic injuries are posttraumatic (4).

Identifying a diaphragmatic injury after chest trauma remains a challenge for the surgeon, as evidenced by the large number of investigative techniques used for this purpose. Noninvasive methods, such as chest radiography and computed tomography, have mean accuracy rates of less than 50 %. Contrast radiography and radioisotopic scintigraphy can be of value in recognizing chronic diaphragmatic injuries, but their usefulness in the acute setting has become limited. Invasive diagnostic methods including iatrogenic pneumoperitoneum, diagnostic peritoneal lavage and pleuroperitoneal lavage. However all of these techniques are associated with excessive false negative rates when used to identify diaphragmatic injuries (5). VATS was first reported as a method of recognizing diaphragmatic injuries by Ochsner and co-authors.

VATS is used most commonly to evaluate diaphragmatic injuries, particularly caused by penetrating trauma. If diaphragmatic injury is demonstrated during the evaluation of lower chest wounds. It is necessary to rule out intraperitoneal injuries. VATS has been shown to improve the sensitivity, specificity, and accuracy of identifying diaphragmatic injuries after trauma. Repair of diaphragmatic injuries could be performed by way of thoracoscopy easily.

II. Persistent air leak due to trauma

Air leak after trauma can be due to parenchymal injury caused by direct lung puncture, lacerations caused by shear injury, and alveolar disruption caused by crush injury or marked increase in intrathoracic pressure. Persistent air leak and recurrent pneumothorax occur in 4 % to 23% of injured patients (6). Persistent air leak in both spontaneous and traumatic pneumothorax has been associated with incomplete expansion of the lung. VATS reduces chest tube days and length of stay when used to treat persistent posttraumatic air leak. Suturing of selected lung injuries with intracorporeal knot tying and pleural abrasion could be chosen for treatment of air leak.

III. Persistent hemorrhage and early removal of clotted hemothorax

In hemodynamically stable patient with slow-rate persistent bleeding (100-150 ml/hour), VATS is useful to find out the localization, and they can be often controlled with diathermy, endoclips or endosutures (3).

VATS helps to decide the type of collection and to completely drain thoracic collections. Helling et al found that 18 % of patients with hemothorax initial-

ly treated with tube thoracostomy developed a clotted hemothorax, and about 39 % of these patients eventually required decortication (7). Early evacuation of hemothorax is of paramount importance in the prevention of empyema and fibrothorax.

IV. Bronchopleural fistulas

VATS can be beneficial in patients when other endoscopic modalities such as bronchoscopy have failed. The use of continuous positive airway pressure can help to identify the site of air leak

V. Cardiac and mediastinal structures

VATS provides an excellent view of all mediastinal structures including esophagus, trachea great vessels and heart with pericardial rupture or tamponade. Pericardiectomy should be done if the pericardial tear is a size to results delayed cardiac herniation (3).

Our clinical experience

In last two years, 11 traumatized patients underwent a VATS procedure for diagnosis and treatment. All of the patients were male. The median age is 23 years (21 to 28). All patients are hemodynamically stable. VATS has been used for control of ongoing intrapleural bleeding in 3, early removal of clotted hemothorax in 2, evaluation and repair of diaphragmatic injuries in 2, and suturing for lacerated lung parenchyma in 4 patients. Hospital stay is changing between 3 to 8 days and median hospital stay was 5 days. Patients treated with VATS are shown in table-III.

TABLE - III
Patients Treated with VATS

Indications of VATS	No of patients
Control of ongoing intrapleural bleeding	3
Early removal of clotted hemothorax	2
Evaluation and repair of diaphragmatic injuries	2
Suturing for lacerated lung parenchyma	4

CONCLUSION

Thoracotomy is a major operation with associated risk of morbidity and mortality. Because the morbidity from VATS is much lower, it can be implemented with a lower degree of suspicion and thus allow earlier direct inspection of the intrathoracic organs and chest wall. Emergency VATS removes both the

uncertainly and waiting period before definitive treatment by allowing direct inspection of the intrathoracic organs and chest wall. VATS also proved to be a definite therapy for many of the patients who continued to bleed after volume resuscitation.

VATS allows complete visualization of the diaphragm, thoracic cavity, mediastinum and pericardium. VATS facilitates identification and evaluation of residual hemothorax and empyema. Repair of diaphragmatic injuries are easy with thorascopic approach.

Direct evaluation of thoracic cavity by VATS in early period, may have reduced the incidence of complications after hemothorax. VATS also prevents extensive surgery and its complications and reduces the morbidity to minimum due to minimally invasive nature of this procedure (8).

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