

## Original Article

# Thoracoscopy as a Useful Diagnostic And Therapeutic Procedure: An Experience From a General Hospital

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Kuwait Medical Journal 2002, 34 (3): 205-208

**ABSTRACT**

**Objectives:** To describe our experience and results of thoracoscopy in the diagnosis and management of common thoracic diseases in a general hospital.

**Design:** Retrospective study.

**Setting:** Amiri hospital, Kuwait.

**Patients:** A total of 28 patients with pleural effusion, pneumothorax or undiagnosed interstitial lung disease.

**Intervention:** Thoracoscopy and biopsy of the pleura, wedge excision and pleurodesis and lung biopsy.

**Main Outcome And Measures:** The indication for surgery, the operative time, duration of chest tube, hospital stay and complications.

**Results:** The indications for thoracoscopy were pleural effusion in 24 patients, recurrent spontaneous pneumothorax in two and interstitial lung disease in two. The mean operative time was 75.5 minutes. The mean duration of chest tube was 4.6 days. The mean hospital stay was 11.8 days. The overall complication rate was 3.57%. The diagnosis for the pleural effusion and interstitial lung disease was reached in 24/26 cases (92.3%).

**Conclusion:** Thoracoscopy is safe and effective in a variety of diagnostic and therapeutic procedures in a general hospital.

KEY WORDS: pleural effusion, pneumothorax, thoracoscopy

**INTRODUCTION**

Throscopy has a therapeutic and diagnostic role in the management of pleural and lung diseases. Video assisted thoracic surgery (VATS), implies using a rigid thoracoscope attached to a video camera. In the early days it was used as a collapse therapy for tuberculosis then it was been used in pleural effusions, pneumothorax and haemothorax. Since 1990s, after the success of the laparoscopy, thoracoscopists were encouraged to develop specially designed instruments and strategies. VATS has allowed surgeons to utilize the procedure not only for diagnosis, but also in a variety of therapeutic applications. The objective of this study is to present our experience in using VATS in a general hospital for the diagnosis and management of common thoracic diseases.

**MATERIALS AND METHODS**

VATS procedures were performed on 28 cases between January 1996-April 2001. All cases were done in a general hospital and were referred from the medical department. The indications for VATS were: pleural effusion in 24 patients, spontaneous pneumothorax in two and interstitial lung disease in two. All procedures were performed under general anesthesia in the operating room using a single

endotracheal tube. The patients were placed in the lateral position for all procedures, using visiport, or by open method, a 10-mm port was inserted at the auscultation triangle (below the tip of the scapula). CO<sub>2</sub> was insufflated up to a pressure of 6 mmHg. Another 5 mm port was inserted at the anterior axillary line, fourth intercostal space, for suction and biopsy purposes. In cases of pneumothorax or lung diseases an additional port was inserted for ENDO-GIA stapler. It was inserted at the sixth intercostal space and its position was decided according to thoracoscopic findings. Pleural biopsies were taken by biopsy forceps and specimens were sent for histopathology and acid-fast bacilli culture and sensitivity. Wedge excisions and lung biopsies were taken using a reloadable 35mm auto suture ENDO-GIA stapler. Pleurodesis was performed by a gauze swab to rub the pleura in different places in cases of pneumothorax. Following the procedure, a 28 F intercostal tube was inserted through the inferior incision in the pleural cavity.

**RESULTS**

There were 21 males and seven females with a mean age of 40.5 years (range 26-77). The duration of the procedure ranged between 30-165 with a mean of 75.5 minutes. The chest tube was kept

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between 1-23 days with a mean of 4.7 days. The hospital stay ranged between 3-33 with a mean of 11.86 days, postoperatively. The overall complication rate was 1/28 (3.57%). There was no mortality in this series. Our results were analyzed for specific procedure performed.

#### **Pleural Effusion:**

There were 24 cases of pleural effusion, which underwent diagnostic thoracoscopy. The effusion was on the right side in 15 cases and on the left in nine. Preoperative aspiration was done in all the cases except one. Cytology of the fluid was done for all the cases except one case and the result was inconclusive. None of the cases had bronchoscopy but one case had CT scan chest preoperatively. The duration of the procedure ranged between 30-135 minutes with a mean of 67.7 minutes. The final diagnosis was established in 22 cases including 16 cases of tuberculosis, two lung adenocarcinoma, mesothelioma, empyema, tropical eosinophilia and pneumonia one in each. The diagnosis was not established in two cases. Chest tube was fixed for all the cases and was kept between 2-5 days postoperatively except for three cases, which was kept for a longer time, for drainage of the pleural effusion. The hospital stay ranged between 3-33 days with a mean of 12.4 days. The length of the hospital stay was determined by the treating physician and was not related to the procedure. There was a single complication of tension pneumothorax, which developed in the recovery room, related to lung injury due to adhesions.

#### **Pneumothorax:**

There were two cases of pneumothorax. The first was a case of recurrent left spontaneous pneumothorax. Chest tube was fixed preoperatively. VATS reported apical bleb, which was excised using ENDO-GIA stapler and gauze pleurodesis was done. The procedure lasted for 165 minutes and the chest tube was kept for five days. The patient was discharged on the eight day postoperatively. The second case was a known case of sarcoidosis, presented with recurrent right pneumothorax. VATS reported a small apical bleb, which was excised using ENDO-GIA stapler and pleurodesis was done. The procedure lasted for 135 minutes and chest tube was left for three days. The patient stayed five days postoperatively. Both patients on follow up showed no evidence of recurrence.

#### **Interstitial Lung Diseases**

There were two cases of interstitial lung diseases, which needed thoracoscopy and lung biopsy. The first case presented with shortness of

breath and pleuritic chest pain. CXR showed lung fibrosis. CT scan chest suggested a picture of sarcoidosis. Thoracoscopy was done and the findings were a stiff lung with many adhesions, lung biopsy was taken. The chest tube was removed on the second day, the procedure lasted for 135 minutes and the patient was discharged on the tenth day postoperatively. The result of the lung biopsy was sarcoidosis.

The second case presented with progressive shortness of breath. CT scan chest and bronchoscopy were suspicious of sarcoidosis. The thoracoscopic findings were multiple pleural nodules. The biopsy result was metastatic adenocarcinoma. The procedure duration was 60 minutes and chest tube was kept for one day. She left the hospital 11 days postoperatively.

#### **DISCUSSION**

The application of VATS in thoracic surgery is becoming an accepted modality. VATS is useful for the diagnosis and treatment of pleural effusion, for biopsy of diffuse pulmonary infiltrate, treatment of recurrent or persistent spontaneous pneumothorax and results in safe and effective sympathectomy. In our case series, the indication for VAT was pleural effusion in 24 patients, recurrent spontaneous pneumothorax in two patients, and biopsy of interstitial lung disease in two patients.

VATS has many advantages over other modalities of managing pleural and lung diseases, it is less invasive than thoracotomy, allows access to the thoracic cavity, and more tissue can be obtained for histopathology with a less morbid approach. It causes less postoperative pain and pulmonary dysfunction, the hospital stay is shortened and the patient can go back to work early. Therapeutic measures that can be done through the thoracoscopy such as breaking adhesions, drainage of loculated effusion, limited decortication for full expansion of the lung, pleurodesis and excision of bullae and blebs. It has a disadvantage of being expensive<sup>[1,2]</sup>.

Contraindications to VATS are: extensive pleural adhesions, extensive inflammatory process (in such cases there is no space to perform the thoracoscopy and so there is a higher risk of injury to underlying structures) coagulopathy, haemodynamic instability and ongoing myocardial ischaemia<sup>[3]</sup>.

Cytology of the pleural effusion fluid was done for all our cases but the results were inconclusive especially in malignant effusion. The diagnostic yield of the cytology, in general, and especially in malignant effusion, is variable, in the literature it varies between 30-80%<sup>[4-6]</sup>. None of our patients underwent closed pleural biopsy because

percutaneous blind pleural aspiration and biopsy is usually not diagnostic, especially in malignancy. This is because the pleural metastases are located at sites that are not accessible to the blind approach, such as costophrenic angle and diaphragmatic surfaces. Emad and Rezaian reported that pleuroscopy is significantly superior to closed pleural biopsy in patients above 52 years of age<sup>[7]</sup>.

During anesthesia a single or double lumen endotracheal tube can be used. Single lumen ETT or two-lung ventilation is simple, quick and inexpensive. CO<sub>2</sub> insufflation causes positive pleural pressure, which causes the collapse of the ipsilateral lung, so the cessation of the insufflation causes a decrease in the intrapleural pressure and rapid reinflation and obstruction of the surgical field. A double lumen tube has a larger external diameter and has curvatures in two different planes, hence, fast and accurate placement requires knowledge and experience<sup>[3]</sup>. We have used single lumen ETT because of better lung aeration postoperatively and less complications i.e., collapse in the postoperative period.

Enk and Vskum reported that only 4% of their patients needed a chest tube postoperatively and was kept in for 1.2 days<sup>[8]</sup>. Hucker et al. and Mack et al. had inserted chest tube for all the patients and they were kept in for 4-8 and 1-14 days, respectively<sup>[4,9]</sup>. In the majority of our patients, the chest tube was removed on the second day postoperatively, but in selected patients, the treating physician kept the tube in longer, for drainage purposes. The main disadvantages of the chest tube are patient discomfort, risk of intrapleural infection and it lengthen the hospital stay<sup>[4]</sup>.

In our series, final diagnosis was established in 91.67% of the cases with pleural effusion. In the literature, the diagnostic accuracy has been reported to vary between 80-90%<sup>[4,5]</sup>. Menzes et al reported that between 20-27% of pleural effusions remain undiagnosed, 50% of which will be malignant and the rest idiopathic<sup>[4,5]</sup>. Boutine et al also reported that 20% of pleural effusions remain undiagnosed<sup>[10]</sup>.

In literature, 50% of all pleural effusions are malignant, which results from the increased production of fluid from pleural metastasis and decreased absorption due to lymphatic obstruction<sup>[1]</sup>. In our cases, 82% of the diagnosed cases were tuberculosis, which can be attributed to the fact that tuberculosis is more common in this part of the world.

Recurrent spontaneous pneumothorax is the main indication for VATS<sup>[11]</sup>. Naunheim reported that 65% of the patient in his series had stapling of

the identified bleb in the lung<sup>[11]</sup>. The recurrence rate ranges between 3-8%<sup>[11,12]</sup> in literature and it is mainly due to the failure to identify and ablate the bleb during surgery<sup>[11]</sup>. The advantage of thoracoscopy over minithoracotomy in the diagnosis of interstitial lung disease is not clear. Miller et al. did not demonstrate any difference in postoperative pain and duration of procedure while McKenna reported that thoracoscopy has lower complications, shorter duration of the procedure and hospital stay<sup>[13,14]</sup>.

In our cases, we have chosen to insert the chest tube for all the patients because we felt that it was safer and it did not affect the hospital stay. However, in cases of pleural effusion, it was kept in longer by the treating physicians for drainage purposes. The duration of the procedure was longer in cases of pneumothorax and interstitial lung disease compared to the cases of pleural effusion, but generally, it was getting shorter due to improvements in the technique and experience. The hospital stay was also prolonged in some cases to monitor the effect of treatment, especially in cases of tuberculosis.

Complication rates of thoracoscopy are low. Mortality rate have varied between 0.09-1.9%<sup>[10,15]</sup>. It occurs only in patients with malignancy due to the progression of their disease. The reported complications are wound infection, leaking of pleural effusion fluid through the port site (usually stop spontaneously), air leak, bleeding from the port site, subcutaneous emphysema, metastasis to the port site, benign arrhythmia including atrial fibrillation, brief hypotension and brief hypothermia<sup>[4,5,15,16]</sup>.

## CONCLUSION

Thoracoscopy has an important role in the diagnosis and the treatment of many thoracic diseases. Procedures like pleural biopsy, lung biopsies, and the treatment of spontaneous pneumothorax can be done safely in a general hospital by a general surgeon.

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