Original Article

Video Assisted Thoracoscopic Surgery Pak Armed Forces Med J 2013; 63 (2): 254-259

VIDEO ASSISTED THORACOSCOPIC SURGERY (VATS); TWO YEARS EXPERIENCE AT THORACIC SURGERY DEPARTMENT, COMBINED MILITARY HOSPITAL RAWALPINDI

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ABSTRACT

Objective: To review the experience of video-assisted thoracoscopic surgery (VATS) with 202 different cases focusing on indications, operative procedures, side effects and complications.

Study Design: Descriptive Study.

***Place and Duration of Study*:** Department of Thoracic Surgery, Combined Military Hospital, Rawalpindi, for 2 years from January 2009 till January 2011.

Patients and Methods: Two hundred and two video-assisted thoracoscopic surgeries (VATS) were performed over 2 years. There were 131 (64.9%) males and 71(35.1%) female patients.

Results: Total two hundred and two patients were selected who were divided into two groups: diagnostic and therapeutic group. The mean age of the patients was 40.25 years (SD ± 12.58) with an age range of 13-77 years. There were 131 males (64.9%) and 71 (35.1%) females. The main indications of video-assisted thoracoscopic surgery were diagnostic in 118 patients and therapeutic in 84 patients. Sixty one patients underwent VATS for indeterminate pleural effusion and a definitive diagnosis was made in 90.2% patients. Definitive diagnosis was made in all sixty six patients who underwent VATS for wedge resection/forceps biopsy of pulmonary nodules, mediastinal masses and interstitial lung disease. VATS thymectomy was performed on 13 patients while 3 patients underwent VATS sympathectomy. Conversion to thoracotomy was required in 8.4% (17/202) of the patients. Adhesions were the most common indication of conversion. There was no operative mortality. The overall median duration of chest tube drainage was 4 days and median postoperative hospital stay was 5 days. Postoperative complications were encountered in 5.9% patients (12/202 patients). No perioperative mortality was encountered in either group.

Conclusions: This review indicates that VATS can be performed with minimal morbidity for therapeutic purposes as a current approach for thoracic surgery. It is a safe procedure in many intrathoracic diseases and is associated with less postoperative pain and hospital stay than open thoracotomy.

Keywords: Video assisted thoracoscopic surgery (VATS); Thoracoscopy.

INTRODUCTION

Thoracoscopy was first described by Jacoboeaus, a Swedish physician, in 1910. He applied a pipe like thoracoscope to make an artificial pneumothorax for collapse therapy of pulmonary tuberculosis. Since then, thoracoscopy has been used mainly for the diagnosis and limitedly for the treatment of pleural disease[1]. The development of micro cameras and endoscopic equipment during the early 1980s, has expanded the application of this minimal invasive surgery. VATS is gradually being accepted by physicians and thoracic surgeons as it allows a unique method of diagnosis, examination and treatment with a clear video image. Within a relatively short time VATS has become a widely used technique of many intrathoracic conditions[2,3]. VATS has rapidly developed and widely extended its indications from surgery on the pleural surface, for example, bullae of the lung, mediastinal cyst, biopsy of the lung and resection of the sympathetic nerve, to more difficult and complex procedures like lobectomy, pneumonectomy, resection of esophageal carcinoma and solid mediastinal tumor, and even cardiac operations.

The present study reviews our experience with video assisted thoracoscopic surgery in 202

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Received: 12 April 2012; Accepted: 11 Feb 2013

patients at CMH Rawalpindi, with an objective of exploring different indications, operative procedures, complications or failure rates in the context of modern thoracic surgical practice.

PATIENTS AND METHODS

Two hundred and two patients underwent the procedure of video-assisted thoracoscopic surgery (VATS) during a period of 2 years, between January 2009 and January 2011, at the Department of Thoracic Surgery, Combined Military Hospital (CMH), Rawalpindi, for the major indications.

The patients included those with; pleural effusion of indeterminate origin, suspected tuberculous pleuritis not responding to the antituberculous therapy after two months, fibrinopurulent or chronic empyema, suspected malignant effusion, interstitial lung disease not responding to the treatment, pulmonary nodule(s) suspected of malignant origin, myasthenia gravis and paratracheal/mediastinal mass. The bronchoalveolar lavage (BAL) and transbronchial lung biopsy (TBLB) were inconclusive in relevant patients. The procedure was not offered to those patients who were too old or frail to tolerate it.

All patients were booked, demographic work performed and informed consent was obtained. A preanaesthesia assessment was done by anesthesiologist. Standard protocols of administering immunoglobulins to patients with myasthenia gravis were followed. A single dose third generation Cephalosporin was given for prophylaxis in all cases. General Anesthesia with selective one-lung ventilation was used. Three ports approach was frequently used with a 10 mm port for 0° rigid telescope inserted in midaxillary line in fifth to seventh intercostals space, a 5/10 mm port for posterior instrument inserted in third to fourth intercostals space just lateral to scapula, and a 10 mm port for anterior instruments in the anterior axillary line in third/fourth intercostals space. Anterior port was made in submammary area in women. Long rotating instruments and endostapling devices with combined stapling and cutting feature were frequently used.

A 32 no. chest tube was placed at the lowermost insertion site at the end of the procedure. All patients were extubated immediately after the surgery but were kept in surgical ICU for a mandatory 24 hours and were only shifted to special care or general care after a careful assessment. Chest tube was removed postoperatively after the air leak ceased and the lung expanded.

Data was analyzed using SPSS 14 version for different study variables like age and gender of the patients, diseases treated or investigated with VATS, postoperative complications, conversion to thoracotomy and success rate of VATS in particular disease.

RESULTS

A total of 202 patients were selected who were divided into two groups according to the indication Diagnostic and therapeutic groups. The mean age of the patients was 40.25 years (SD ± 12.58) with an age range of 13-77 years. Gender distribution, shown in fig 1 there was a male predominance. The indications for video-assisted thoracoscopic surgery (VATS) is shown in table 1 were diagnostic in 118 patients (58.4%) and therapeutic in 84 patients (41.6%). Adhesions were the most common indication of conversion (Table no 2). Postoperative complications were encountered in 12 patients (5.9%) of which a prolonged air leak (>7 days) was the most common complication 7 patients (3.5%). Three patients (1.5%) developed postoperative wound infection while one patient (0.5%) developed subcutaneous emphysema and another one (0.5%) postoperative thoracic empysema. There was no operative mortality. The overall median duration of chest tube drainage was 4 days and median postoperative hospital stay was 5 days (range 2-45 days) except for patients with thoracic empyema.

Diagnostic group

Initially there were 61 patients (51.7% of diagnostic group) with indeterminate pleural

effusion out of which 9 (7.6%) had a suspicion of malignant disease. Pleural cytology diagnosis for malignant pleural effusion was made either by macroscopic appearance or frozen section analyses. Thoracoscopic pleurodesis was made in all of these patients. Tuberculous pleuritis was observed in 42 (68.9%) of these patients, 2 patients (3.3%) were found to have malignant pleural effusion from extrathoracic malignancy and non-specific inflammation with necrotic tissue, while 7 (11.5%) patients were found to have malignant mesothelioma. One patient who was suspected of having a malignant pleural effusion was found to have tuberculous pleuritis. Definite diagnosis was reached in 55 patients (90.2%).

Thoracoscopic forceps biopsy/wedge resection was performed in 56 patients (47.5%) with undiagnosed peripheral pulmonary mass, solitary pulmonary nodule, interstitial/diffuse lung disease, mediastinal/paratracheal mass or suspected malignant pleural effusion. Wedge resection was done with electrocautery in 12 patients and endoscopic stapling device in 9 patients. Postoperative period was uneventful in all patients. Definite diagnosis was obtained in all patients. There was no major complication requiring additional surgical intervention. Prolonged air leak (>7 days) was seen in only two patients (3.6%), one patient (1.8%) developed wound infection while another patient (1.8%) developed subcutaneous emphysema.

Forceps biopsy/wedge resection was performed on 12 patients who had enlarged hilar/paratracheal lymph nodes. The histological diagnosis was non-Hodgkin's lymphoma in 6 (50%) cases, tuberculous lymphadenitis in 4 cases (33.3%) and metastases from an extrathoracic malignancy (carcinoma breast) in 2 patients (16.7%). Perioperative complications were observed in only 4 patients (3.4%) of the diagnostic group while conversion to thoracotomy rate was 2.5%.

Therapeutic group

Thoracoscopic debridement / decortication were performed in 34 patients (16.8%) with fibrinopurulent exudates, in 20 patients of which had non-tuberculous empyema. Video thoracoscopic decortication was attempted in only five patients. Three procedures of decortications were successfully performed with VATS while two of these decortications procedures had to be converted to thoracotomy. Trapped lung due to adhesions was the most common reason for conversion to thoracotomy. The success rate of VATS as a primary procedure for debridement / decortications was 64.7% (22/34).

Stapling wedge resection was performed in 9 patients, primary indication being solitary pulmonary nodules and pulmonary fibrosis not responding to treatment. Part of apparent normal tissue at the rim of nodule was included in the resection tissue. A definitive diagnosis was reached in all patients.

Apical pleurectomy together with bullectomy, apical pleural abrasion/pleurectomy and pleurodesis was performed in 36 patients with bullous lung disease. Twenty two of these patients presented with primary spontaneous pneumothorax while fourteen patients had recurrent episodes of pneumothorax. None of the procedures was converted to thoracotomy.

Thirteen patients of myasthenia gravis underwent thymectomy using VATS. One of the procedures (7.7%) was converted to thoracotomy. One patient (7.7%) developed postoperative wound infection of the port site.

Twelve patients with mediastinal mass or cystic lesion underwent VATS. Wedge resection up to the pleural surfaces was done mostly using electrocautery. Six patients (50%) were found to have non-Hodgkin's lymphoma, four patients (33.3%) had tuberculous lymphadenitis while two patients (16.7%) had metastases from extrathoracic malignancy.

Three patients with primary hyperhidrosis underwent bilateral VATS sympathectomy of T2,T3.

We also used VATS for diaphragmatic plication in a patient with eventeration of diaphragm. Another patient who had received a firearm injury and was drained with a chest tube initially but did not have a lung re-expansion, also underwent VATS. He was found to have a lung contusion and organized blood clots without any obvious leak. Thoracoscopic debridement was done and found successful in re-expansion of the lung. Prolonged air leak was the most common post-operative complication 6% (5/84 patients) while 2 patients developed wound infection and one patient had a persistent empyema on follow up.

DISCUSSION

Over the years thoracoscopy evolved mainly as 'pleuroscopy' and was used as an adjunct to other procedures. It is the gold standard in the diagnosis of pleural pathologies particularly in effusions with unknown etiology. A tentative diagnosis of tuberculous pleural effusion with positive tuberculin skin test and predominantly lymphocytic reaction in the pleural fluid may be sufficient to initiate the treatment for patients living in an endemic area for tuberculosis. However, in patients with persistent pleural effusion after an adequate antituberculous therapy, thoracoscopic evaluation is needed to confirm the diagnosis. In this study the diagnostic yield for thoracoscopy in undiagnosed pleural effusion was 90.2%. This is very much in accordance with another case series with a diagnostic yield of thoracoscopy in undiagnosed pleural effusion being 95.2%[5].

The recent development of video-assisted thoracic surgery has changed the surgical approach to patients with thoracic empyema. Thoracoscopic examination yields detailed anatomic information regarding the stage and extent of the empyema cavity that guide the management plan. We routinely performed thoracoscopic debridement in our patients of empyema, breaking all loculi and short of obtaining a visceral and parietal wall peel. In our series, if a thickened parietal wall and visceral wall were discovered, thoracoscopic decortication was done in selected patients. Our success rate in thoracoscpic debridement/decortications as a primary procedure in fibrinopurulent/chronic empyema is comparable to other international studies[6].

Biopsies of intrathoracic lesions are now routinely performed using VATS. With the aid of a thoracoscope, it is possible to drain effusions, perform pleural and lung biopsies, and resect small nodules or even Stage I lung cancers with a wedge resection. The decision to use VATS for resecting small nodules and masses depends on the size and location of the tumor. Small peripheral lesions near the visceral pleura are more likely to be found with a thoracoscope. Generally, lesions greater than 10 mm are more easily seen without the need for direct palpation. Lesions deeper in the parenchyma or closer to the hilum become more difficult to find and more dangerous to resect using VATS. Attempts at biopsy with radiologic techniques are usually performed prior to proceeding with a VATS biopsy when the main first objective is to obtain a diagnosis. In our series we performed thoracoscopic wedge resection in about 44 patients with great success. A study conducted by Shennib et al. (2000)[7] confirms the feasibility of wedge resecting stage I lung nodules using VATS in high risk patients whose lung function would make it unlikely to tolerate a lobectomy. Post-operative radiation therapy was used in these patients. Cancer-free survival and recurrence rates were reasonable and indicate that this minimal approach for small Stage I lung cancers in high risk patients may be the safest option.

The role of VATS in the curative resection of early stage lung cancer or metastatic lung disease remains controversial. In our series we resorted to formal resection of mediastinal lymph node dissection for curative purposes. A more recent

study by Thomas et al (2002)[8] reports results of 110 VATS procedures for lung cancer and compares their results with 405 standard thoracotomies. Their results indicate similar five-year survival for Stage IA and IB patients. No significant differences were shown in recurrence rates. No recurrences were observed at the port sites or the thoracotomy incision.

Interstitial lung disease (ILD) is much more than just an interstitial pneumonia. Moreover this disease entity is a classical example for diseases having inter-observer diagnostic variability at all levels. A surgical biopsy through a mini anterior thoracotomy has been the gold standard in obtaining the diagnosis in patients of ILD with atypical clinical or radiological features and for the patients responding poorly to the treatment. But to go for their surgical biopsy is yet another challenging task requiring utmost care and perfection as these patients require advanced anaesthesia management and a surgical dexterity expeditious yet precise. This surgical precision is never complete as most of the lung cannot be assessed through the usual anterior thoracotomy practiced for open lung biopsy. This problem can be overcome through the use of VATS as most of the lung surface can be assessed and biopsied if required. We used VATS for 31 patients with ILD and obtained a 100% diagnostic yield. Twenty six of the patients were successfully subcategorized and five patients were found to have chronic non-specific inflammation thus helping in their management. These results concur with another local study[9] emphasizing the role of VATS in the diagnosis of ILD.

The role of thoracoscopy and VATS in the surgical management of pneumothorax has evolved over the past two decades. Recent studies[10,11] on the subject reinforce the recommendation to consider VATS as the primary mode of surgical intervention. We used VATS for bullectomy, apical stapling, apical pleurectomy/pleural abrasion, and pleurodesis in 36 cases of spontaneous pneumothorax. In every case the surface of lung was carefully examined and subpleural blebs identified with particular attention to the apex and superior segment of the lower lobe. The blebs were resected by firing several staples at their bases. In those cases where no blebs were found still apical stapling and resection was performed. Two of the patients had a prolonged air leak (>7 days).

Table-1: Frequency distribution of indications for VATs in the study.

Indication	n	%
Diagnostic Group		
Indeterminate pleural effusion	61	30.2
Pulmonary nodule/mass/ILD	44	21.8
Mediastinal mass	12	5.9
Therapeutic Group		
Spontaneous pneumothorax	36	17.8
Myasthenia Gravis	13	6.4
Primary hyperhydrosis	3	1.5
Eventeration of diaphragm	1	0.5

Table-2: Causes for conversion of VATs to thoracotomy.

Indication	n	%
Adhesions	9	4.5
Bleeding	2	1
Completion of Excisional	5	2.5
procedure		

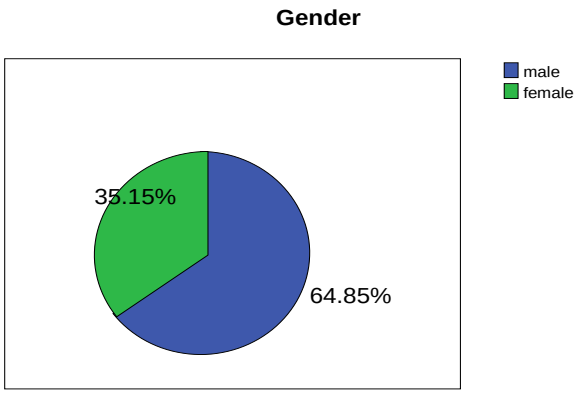

Figure-1: Gender distribution of cases.

Although a higher incidence of pneumothorax recurrence (5%) is reported with VATS as compared to thoracotomy[12,13] we did not observe any recurrence in our follow up of the patients for one year.

Thymectomy is a well-established treatment for myasthenia gravis and thymomas. Theoretically VATS thymectomy has the advantage of less pain, faster recovery and superior cosmesis but all these benefits have to be weighed against the possible shortfalls of completeness of VATS thymectomy, its safety and long-term oncological efficacy for thymomas. We performed 13 thymectomies using VATS during a period of two years. All the patients improved by 1 or more Osserman grades postoperatively. One of the procedures had to be converted to thoracotomy and we did not observe a postoperative complication except wound infection in a single patient. All the patients were asymptomatic till one year of follow-up. Although our patients were fewer than other studies but our results are in concordance with the suggestion that VATS thymectomy is a safe procedure with good long-term results[14,15]. Cosidering our experience with VATS thymectomy we support the recommendation that this procedure be performed by experienced surgeons who are well versed in VATS[16].

In our series, we have been able to collect sufficient number of cases to serve as a reliable data to substantiate the importance of VATS as an emerging surgical procedure. This is possibly the study of its kind where a large number of cases have been selected to serve as indications for VATS in contrast with previous studies where the efficacy of VATS was discussed for only one specific indication.

CONCLUSION

This review indicates that VATS can be performed with minimal morbidity for therapeutic purposes as a current approach for thoracic surgery and has the advantage of less pain, faster recovery and superior cosmesis.

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