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***Original Article***

# Video Assisted Thoracoscopic Surgery in Exudative Pleural Effusion and its Complication Management: An Experience in a Community Hospital

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## Abstract

### Background

Exudative pleural effusions are common presentation of pleural disease. Long standing pleural effusion might complicate with loculations and cortex formation. Video assisted thoracoscopic surgery can be a useful tool for the diagnosis and the management of the complications. The aim of the study is to determine the cause and treat the complications related to the exudative pleural effusions.

### Materials and Methods

It is a retrospective analysis of prospectively collected data of all patients with exudative pleural effusions subjected to surgical management. Data were collected over a period of four years in a community hospital in Kathmandu.

### Results

Out of 38 patients who underwent Video assisted thoracoscopic surgery only 33 were eligible for analysis. Male to female ratio was 2.3:1 with male (23) dominance. Twenty six (78.8%) had lymphocyte predominance and 23 (69.7%) had Adenosine deaminase level of more than 40 International unit in pleural fluid analysis. In histopathological examination most common finding was granulomatous inflammation 13 (39.4%), 9 (27.3%) were malignancy and 9 (27.3%) were nonspecific chronic inflammation. Of malignancies adenocarcinoma 3 (9.09%) was the most common finding, mesothelioma 2(6.06%) and 4 (12.12%) other.

### Conclusion

Video assisted thoracoscopic surgery has a role to play in diagnosis of exudative pleural effusions, particularly when there is dilemma in diagnosis. Video assisted thoracoscopic surgery definitely has a role in diagnosis and treatment of the complications related to pleural effusions.

**Keywords**: *Pleural effusions, Video assisted thoracoscopic surgery, Tuberculosis, Malignancy*



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## Introduction

Collection of fluid in pleural space is called pleural effusion. Pleural effusion is most common manifestation of the pleural diseases. When protein content is high the effusion is called exudative effusion and there are several causes for exudative pleural effusion. Acute diseases like pneumonia can cause “Neutrophilic exudative pleural effusion.” Tuberculosis and malignancy are the most common causes for the lymphocytic exudative pleural effusion in developing countries [1]. Tuberculosis is the leading cause of the lymphocytic exudative pleural effusion in developing countries accounting to up to 60% of cases [1-2]. Tubercular pleural effusion is diagnosed by demonstration of the granuloma or the tubercle bacilli in the pleural biopsy specimen [3]. Various parameters in pleural fluid aspirate evaluation are used for the diagnosis of the exudative pleural effusions as an alternative to more invasive pleural biopsy procedure. The combination of the ADA and lymphocytosis is considered most app-ropriate in diagnosis of tuberculosis [4].

History, examination, radiological investigations, Pleural fluid analysis and blind pleural biopsy are the modalities described to diagnose the pleural effusions. Fifteen to 20% of all pleural effusions remain undiagnosed despite these intensive efforts [4-6]. Blind pleural biopsy has highest yields for the diagnosis reported upto 50% of the cases [7]. complicated pleural effusions require surgical modality of treatment most of the time. Tube tho-racostomy, catheter drainage, intra pleural thrombolytic, thoracoscopic drainage, decortication and open drainage are alternatives in the management of the complications. Diagnostic yields of these measures are reported up to 95%. [7-10].

There is paucity of data regarding VATS used for the diagnosis of exudative pleural effusions in our part of world. There has been no studies' investigating pleural biopsy in the workup of Exudative pleural effusion at our center.

## Materials and Methods

It is a retrospective cross sectional analysis of prospectively collected data of all patients with exudative pleural effusions subjected to surgical management. Data were collected over a period of four years from 1st November 2015 till 30th November 2019 in a community hospital in Kathmandu, Ethical approval was taken from the institutional review committee of helping hands hospital. All the patients referred from respiratory medicine unit with undiagnosed exudative pleural effusions unresponsive to medical management, empyemathoracic and multiloculated effusions subjected to surgical therapy were included. Patients less than 15 years of age and with immune-compromised statuswere excluded. Relevant history and physical examination was done and a preformed proforma was filled for all the patients undergoing video assisted thoracic surgery for the pleural effusion and its consequences. The procedure was done in all patients in lateral position with operating side up; double lumen endotracheal intubation with provision of single lung ventilation was done. All the patients were approached with two ports approach for majority of cases and were executed with the same especially when only deloculation, pleural biopsy were required. We increased one more port when there was poor progression of the procedure and converted to open when we have bleeding and poor progression. Demographic data age, sex along with site, ADA level, protein level, Total count, differential count, Zeil-Nelson stain, cytology and Histopathology examination were recorded. Use of antitubercular therapy and its response were recorded. These recorded data were analysed using SPSS 17.0. Mean, median , standard deviation etc were analysed using SPSS 17.0.

## Results

There were total 38 patients collected for study of which 5 were excluded for various reasons (Table 4). There were 33 patients for the final analysis of which 23 (69.69%) were male and 10 (30.30%) were female (Table 1). Most of the patients in our study were in age group 50-60 years (36.36%).

**Table 1: Gender distribution**

| Gender | Number | Percentage |
|---|---|---|
| Male | 23 | 69.69% |
| Female | 10 | 30.30% |

Twenty two (66.66%) patients were on ATT at the time of operation or had completed ATT within 2 weeks. Five patients had ATT in the past.Pleural fluid analysis showed ADA of more than 40 in 22 (66.66%) patients, who were in ATT. Twenty six patients, had lymphocytic predominance, two had eosinophilic predominance and rest had lymphocytic predominance.(Table 2)

**Table 2 : Clinical and lab parameters in the study population**

| Parameters | Findings | |
|---|---|---|
| Site | Right | Left |
| | 26 | 7 |
| ADA | <40 | >40 |
| | 11 | 22 |
| Lymphocytosis | <50% | >50% |
| | 7 | 26 |

Table 3 : Operative procedures and rate of conversions

| Operative procedure | Executed with VATS N(%) | Conversion to open N(%) |
|---|---|---|
| Decortication N=18 | 14(77.7%) | 4(22.2%) |
| Pleural Biopsy N=13 | 12(92.3%) | 1(7.6%) |
| Deloculation and biopsy N=2 | 2(100%) | 0(0%) |

All the patients were planned for the VATS and proceed with definitive procedures based on the VATS findings. Sixteen patients underwent VATS biopsy along with decortication or deloculation, twelve patients underwent VATS pleural biopsy and pleurodesis. Five patients were converted to open procedure (Table 3). Of those who were converted to open procedure one was for completion of decortication as we failed to proceed with VATS approach and the second we failed to establish VATS port due to crowded ribs and too small cavity. Two patients who required decortication were converted to open due to bleeding and suspected bronchial injury. one patient in whom we have planned for the pleural biopsy only we could not establish port because of dense adhesion and the chest wall infiltration with the tumor we did a small thoracotomy and took a sample of pleura which came out to be mesothelioma in histopathological examination. (Table 3)

Majority of the patients in Histopathology examination were consistent with tubercular pathology 12 granuloma (fig-1) and 1 granuloma and tubercle bacilli. Nine patients HPE showed nonspecific chronic inflammation, three of these patients were in ATT which was discontinued. Elaven patients had malignancy in HPE of whom five were adenocarcinoma, 2 were mesothelioma, one squamous cell carcinoma and one metastatic renal cell carcinoma (Table 4).

Table 4: Histopathological reports of the patients Total patients (N=33)

| | | |
|---|---|---|
| Tuberculosis (13) | Chronic granulomatous lesion | 12 |
| | Tuberculosis bacilli with granuloma | 1 |
| Others | Chronic nonspecific inflammation | 9 |
| Malignancy (11) | Adenocarcinoma | 5 |
| | Squamous cell carcinoma | 1 |
| | Mesothelioma | 2 |
| | Others (metastatic) | 3 |

## Discussion

The management of the exudative pleural effusion becomes challenging once treatment based on clinical, radiological and pleural fluid analysis fails to improve the patient condition. Some of these effusions complicates to empyema thoracic. VATS is advantageous for the establishment of the histopathological diagnosis in these conditions and has therapeutic advantages in cases of complicated effusions [9]. The mean age in our study was 46.94 +/-12.61 and range between 15 to 72 years of age which is consistent with other studies. Malignancy was common in age group more than 60 years [2-5]. But malignancy was not the diagnosis of old age in our group with two patient less than 50 years of age were diagnosed with malignant disease who were otherwise on antitubercular therapy on the basis of exclusion of other diagnosis. There was a male preponderance with male is to female ratio of 2.3:1. Both malignancy and the tubercular effusion were common in the male gender. Right sided pleural effusion is common in our study which is also a common finding in several other studies [2, 5, 7]. Tuberculosis is the leading cause of the lymphocytic exudative pleural effusion in developing countries accounting to up to 60% of cases. [2] In our study all the patient with high ADA and lymphocytosis in younger age group were on ATT and those who didn't responded to the medical therapy were subjected for VATS biopsy, of these ATT could be discontinued in twenty seven percentages of patients who had alternative diagnosis on histopathology.

Someof our cases had neutrophilic predominance which is explained by super added bacterial infection and empyema secondary to pneumonitis and parapneumonic effusion. Two of our patient had eosinophilic predominance of which later one had features suggestive of the systemic lupus erythromatosisand treated as SLE, while the other had ruptured hydatid cyst in the pleural space. None of these patients with eosinophilia had malignancy as final diagnosis which is consistent with other studies [11].

Like many studies tuberculosis was the most consistent finding in histopathology in our study [Figure 1]. Tubercular pleural effusion is diagnosed by demonstration of the granuloma or the tubercle bacilli in the pleural biopsy specimen [3]. Various parameters in pleural fluid aspirate evaluation are used for the diagnosis of the exudative pleural effusions as an alternative to more invasive pleural biopsy procedure. Lymphocytic predominance was the most common findings in our study consistent in both tuberculosis and the malignancy [1-4].

Malignant pleural effusion (MPE) signifies an advanced stage of malignancy. Lung and the breast cancer are the most common primary tumor that metastasizes to the pleura.Unlike this common dictum we had no identified breast

primaries with malignant pleural effusion. This disparity might be because we donot routinely investigate for the histopathologic evaluation pleura in patients identified with primary breast cancer. The identification of an MPE may have implications for the staging, management, and prognosis of a patient with established cancer, or it can be the source of initial diagnostic material. A pleural effusion can be definitively called MPE only after the detection of neoplastic cells or tissue in the pleural space or histopathological evaluation of pleural tissue. Twenty seven percent of our patient had malignancy in histopathology which is consistent with several other studies [11-14]. Of these adenocarcinoma is the most common finding, followed by metastasis from other organ cancer (renal cell carcinoma in 1, hepatocellular carcinoma 1 and sarcoma 1). One had squamous cell carcinoma in the histopathology of which primary could not be localized as she died on fourth postoperative day. Two of the patients had mesothelioma in histopathology both were relatively young in age between 40 to 50 years and both were female. Most common type of malignancy being adenocarcinoma, followed by metastasis is consistent with findings of other study.

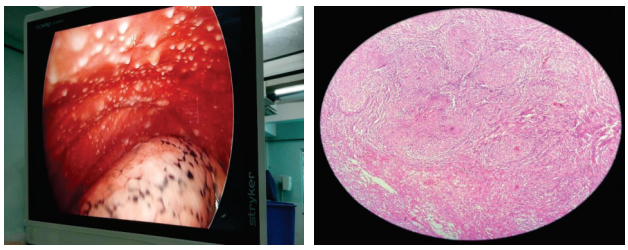

**Figure 1: Endoscopic view of pleural space with pleural tubercles & H and E section showing multiple defined granulomas with central caseous necrosis.**

## Conclusion

In chronic exudative effusion and its complication VATS has a definite role either to establish the definitive tissue diagnosis and for the management of the complications related to the prolonged effusion. This approach of management helps clinician to stop unnecessary antitubercular therapy who had alternative diagnosis in histopathological examination. A patient of exudative pleural effusion requires an extensive workup to reach the etiological diagnosis. This includes clinical, microbiological, chemical, cytopathologicaland radiological examination. For those who does not respond to treatment based on these work up and who complicates requires histopathological diagnosis. VATS was helpful in this endeavor and had additional theuraputic advantage of pleurodesis and decortication wherever indicated.

**Conflicts of interests:** None

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