ORIGINAL ARTICLE

Medical Thoracoscopy: Pahang Experience

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SUMMARY

Medical thoracoscopy has gain its popularity in Malaysia recently. This paper presents our early experience in thoracoscopy using semi-rigid fiberoptic thoracoscope. All thoracoscopy records since October 2006 were retrieved. The patients' records, thoracocentesis investigations results, thoracoscopic findings and all pleural biopsy results were reviewed. Twenty-four thoracoscopic procedures on 22 patients in whom two patients had repeated thoracoscopy. Ten patients were confirmed carcinoma. Eight patients had inconclusive thoracoscopic pleural biopsy results. Three patients underwent pleurodesis for malignant effusion. One patient had adhesiolysis for empyema. There was no procedure-related deaths or intraoperative accidents. Thoracoscopy is a relatively safe procedure.

KEY WORDS:
Thoracoscopy, Pleural carcinoma, Pleurodesis, Safe procedure

INTRODUCTION

Pleuroscopy, thoracoscopy or medical thoracoscopy are at times interchangeable terms, which refer to a procedure which involves placement of an endoscopic instrument into the pleural space, allowing direct visualization and biopsy of the pleura. The primary objective is to diagnose pleural and lung diseases, but it is also an effective method of performing pleurodesis. Pleuroscopy was actually discovered way back in 1910 where initial efforts to view the pleural space using endoscopic techniques (a modified cystoscope) was reported[1]. Medical thoracoscopy can be performed in an operating room or an endoscopy suite under local anesthesia and intravenous sedation by the pulmonologist. In contrast, video assisted thoracic surgery (VATS) is performed by a thoracic surgeon which uses a thoracoscope as an aid to perform minimally invasive thoracic surgery in an operating room under general anesthesia with single lung ventilation. Examples of procedures performed by the surgeon using VATS include stapled lung biopsy, lobectomy or pneumonectomy, resection of benign or malignant peripheral pulmonary nodules, repair of a bronchopleural fistula, evaluation of mediastinal tumors or adenopathy and others.

Pleural disease, particularly pleural effusion, is a common diagnostic problem. About a million patients globally has pleural effusion each year[2]. A few studies have reported that a definite diagnosis of large number of patients with pleural effusion could not be made despite extensive investigations[3,4]. Several studies have shown that medical thoracoscopy provided a definitive tissue diagnosis of 80.3 to 92.8%[5,6]. This procedure has gained its popularity and has been used in a few hospitals in Malaysia recently. We have started thoracoscopy service since October 2006 and this paper presents our early experience in thoracoscopy using semi-rigid fiberoptic thoracoscope.

MATERIALS AND METHODS

All thoracoscopy records in Hospital Tengku Ampuan Afzan (HTAA) since October 2006 were retrieved from the endoscopy database and patients' names and registration numbers were recorded. Then patients' hospital and clinic follow-up records, thoracocentesis investigations results (biochemistry, bacterial culture, direct smear for acid-fast bacilli (AFB), all cytological results), thoracoscopic findings and all pleural biopsy results were reviewed. The pleural fluid cytology slides and histological slides were reviewed by two pathologists in HTAA. Baseline investigations such as full blood count and coagulation profile were taken. The patients with international normalized ratio (INR) of more than 1.5 and/or platelet count of less than 100 x 10^9/L were contraindicated for the thoracoscopy. Consent was taken before the procedure.

The patients were given sedation with intravenous midazolam 2-10mg and analgesic with IV pethidine 0.5-1.0mg/kg. The patients were placed in a lateral position with the site of pleural effusion superiorly. The site of insertion of thoracoscope was usually in the mid-axillary line between 4th to 7th intercostal space. After skin preparations and draping, the site was infiltrated with local anesthesia containing 2% lignocaine. A 1-2 cm of skin incision was made and a trocar was inserted. The trocar will be left open to allow air to enter the pleural cavity to produce a small controlled pneumothorax for better visualization. A pleuroscope (Olympus flex-rigid pleuroscope 0197 from Japan) was advanced through the trocar to visualize the pleural cavity. Pleural biopsies were taken from the abnormal looking pleura and pleural based nodule or mass. Adhesiolysis or pleurodesis with sterile talc (3g per patient) was done accordingly as indicated. Chest tube was inserted post-thoracoscopy and connected to an underwater-seal drainage system.

The patients were monitored in the ward for complications associated with thoracoscopy. The chest tube insertion site was observed and dressed daily until the patient was discharged. The chest tube was removed once the drainage was less than 150ml per day. All the patients were given follow up appointment date on discharge.

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RESULTS

From October 2006 to Jan 2008, we have carried out 24 thoracoscopic procedures on 22 patients (12 men and 10 women) in whom two patients had repeated thoracoscopy. Out of these 22 patients, 16 were Malay and 6 were Chinese. The median age was 59.5 years (range 15 to 72 years). All the procedures were performed in a day care operating theatre. We were able to access the pleural cavity in 20 patients. We had difficulty in exploring the whole pleural cavity in two patients: one patient had extensive adhesions secondary to empyema and the other patient had a huge pleural mass occupying the pleural cavity. However, we were able to take biopsy for the latter patient in which the histopathological examination revealed osteosarcoma. Pleural drainage after the procedure was achieved with a single chest tube in 20 patients. Chest tube was not inserted for two patients with extensive adhesion and large pleural mass. The duration of chest tube drainage generally ranged from 2-4 days. None of the patients required any assisted ventilation after the procedure.

The indications of medical thoracoscopy in our patients were undiagnosed exudative effusion, pleurodesis for malignant effusion and adhesiolysis for inadequate drainage of empyema. Eighteen out of 22 patients had undiagnosed exudative pleural effusion based on Light's criteria. Ten patients were confirmed carcinoma (eight cases of adenocarcinoma, one case of non small cell carcinoma, one case of osteosarcoma) by thoracoscopy. These patients had negative pleural fluid cytology except one patient who had positive cytology result from a second sample of pleural fluid (adenocarcinoma) but the result was only obtained after the thoracoscopy. Closed pleural biopsies prior to thoracoscopy were done for four patients which were negative for malignancy but subsequent thoracoscopic pleural biopsy confirmed malignancy.

The remaining eight patients had inconclusive thoracoscopic pleural biopsy results. The thoracoscopic pleural biopsies results were reported as follows: one "chronic inflammation", one "hyalinized fibrosed tissue", two "necrotic tissue", one "very scanty viable tissue seen", two "no pleural tissue for interpretation" and one "fibrin clot". One of these patients who was initially diagnosed to have parapneumonic effusion had persistent effusion with symptoms despite adequate antibiotic treatment. A repeat pleural biopsy via thoracoscopy in this patient confirmed malignancy (adenocarcinoma). One patient who is a chronic smoker with smear positive pulmonary tuberculosis presented with persistent right pleural effusion despite one year treatment with anti-tuberculosis (anti-TB) medication. His pleural fluid for cytology, acid fast bacilli direct smear and mycobacterium culture were negative. Thoracoscopy was performed to rule out malignancy. Thoracoscopic findings in this patient were multiple nodules over the parietal and visceral pleural of the lung which appeared necrotic and fibrotic. The biopsy result showed necrotic tissue only. He was treated with anti-TB medication for another six months. Repeated computed tomography of the thorax showed small loculated effusion and pleural thickening. He is now well and remained asymptomatic 18 months after completing anti-TB medications. Another patient had two consecutive ipsilateral thoracoscopic procedures. This patient is positive for human immunodeficiency virus (HIV) and presented with three weeks of dry cough associated with progressive shortness of breath, loss of weight and appetite. He had massive right exudative pleural effusion and inconclusive thoracocentesis results. Thoracoscopy findings in this patient were multiple adhesions and nodules on the parietal and visceral pleural. His thoracoscopic guided pleural biopsies were negative for malignancy and only revealed necrotic tissues. This patient was treated empirically with anti-TB drugs. However he succumbed from severe hospital acquired sepsis. The remaining six patients presented with fever associated with unilateral exudative pleural effusion and were treated for parapneumonic pleural effusion with antibiotic. Thoracoscopy was done in these patients to rule out malignancy or pulmonary tuberculosis. All thoracoscopic guided pleural biopsies were negative for malignancy. Fever settled with antibiotics in all patients. All were discharged well but defaulted follow up.

Three patients underwent pleurodesis for recurrent malignant effusion (two were adenocarcinoma of the lung and one was metastatic adenocarcinoma of unknown primary). Mean chest tube drainage post-thoracoscopy duration was three days (range, 2-4 days). Repeated chest radiograph for these three patients in subsequent clinic follow-up three weeks later showed persistent pleural effusion but of smaller size in all patients. All of them did not have worsening chest symptoms and did not require repeated drainage. Two of them died of malignant cachexia within one month and one defaulted follow up.

There was only one patient who was planned for adhesiolysis for inadequate drainage of empyema from the chest tube. The access to the pleural cavity failed because of dense adhesion. The patient was then referred to the cardiothoracic surgeon for further management.

No major adverse event occurred. There were no procedure-related deaths or intraoperative accidents. There were no episodes of procedure-related sepsis or prolonged air leak requiring further intervention or thoracotomy. Minor adverse events were noted. Two patients developed mild subcutaneous emphysema which resolved spontaneously without further intervention. Another two patients developed low grade fever 2-3 hours post-thoracoscopy which settled spontaneously within 24 hours. There was no mortality within 24 hours associated with medical thoracoscopy in our experience. One patient (stage IIIb non small cell lung carcinoma with functional status of Eastern Cooperative Oncology Group 3) died at home five days post thoracosopy with unknown cause (post-mortem was not done).

DISCUSSION

Medical thoracoscopy involves passage of an endoscope through the chest wall, allowing the pulmonologist to have direct visualization and to obtain pleura biopsy. It is a valuable diagnostic and therapeutic procedure. In Malaysia, only a few government tertiary hospitals offer such services. These centres are HTAA, Universiti Kebangsaan Malaysia

Medical Centre, Hospital Queen Elizebeth Kota Kinabalu, Kuala Terengganu State Hospital and Pulau Penang State Hospital. Thoracoscopy service in Malaysia was only available three years ago.

In general, the indications for diagnostic medical thoracoscopy include pleural effusion of unknown aetiology, mesothelioma, lung cancer with pleural metastasis, tuberculosis and other benign pleural disorders. The indications for the therapeutic medical thoracoscopy include pleurodesis and adhesiolysis for multiloculated effusion. The indication for majority of our patients was undiagnosed exudative pleural effusion.

Approximately 25 percent of pleural abnormalities remained undiagnosed after thoracentesis and/or closed pleural biopsies [7-10]. Thoracoscopy in patients with a pleural effusion of unknown etiology often yields a specific diagnosis. The sensitivity of thoracoscopic guided biopsies in confirming malignancy was 81-95% [10,11]. Out of ten patients with confirmed malignant effusion by positive thoracoscopic pleural biopsy, all had negative pleural fluid cytology prior to thoracoscopy except one patient who had positive pleural fluid cytology but the result was only available after thoracoscopy. Studies have shown that cytological examination of even large effusions is diagnostic in only 60-80% of patients with metastatic pleural involvement [12-14]. Closed pleural biopsy was only performed in four of our patients but were negative for malignant cells. The main reason why this procedure was not done in all the patients was the yield of closed pleural biopsy in malignant effusion was only 55-62% [11,12] as compared to thoracoscopic pleural biopsy which was as high as 81-95% [10,11]. One patient was confirmed malignant effusion only after the second thoracoscopy. The patient was initially treated for parapneumonic effusion but had persistent effusion with symptoms despite adequate antibiotic treatment. The first thoracoscopic pleural biopsy of this patient was inconclusive (chronic inflammation) probably because there was inadequate sampling of tissue or wrong sampling. This case illustrated to us that it is important to repeat thoracoscopy if the patient was not responding to the initial treatment and if the malignant effusion is highly suspected. Six patients who defaulted follow up were likely to have improved with adequate antibiotic treatment. We were unable to calculate the diagnostic yield because this study was a retrospective one and some of our patients with inconclusive biopsy results did not undergo VATS to confirm the diagnosis.

Three patients underwent pleurodesis via thoracoscopy for malignant effusion. Talc was use as a sclerosing agent. Studies have shown to achieve successful pleurodesis with talc via thoracoscopy in 88-95% [6,15]. Successful pleurodesis in their study was defined as absence of clinically significant increase of pleural effusion on a chest X-ray film compared with baseline film and no requirement for further thoracocentesis. Talc has been shown to be superior to other agents, such as tetracycline and bleomycin for pleurodesis [16,17]. All of our three patients who underwent talc pleurodesis have shown clinical improvement of chest symptoms and radiological improvement of pleural effusion.

We failed to explore the pleural cavity completely of one patient with empyema due to dense adhesion. In empyema, the lung is often adherent to the chest wall, making lung laceration possible at the time of trocar insertion which in turn cause prolonged air leaks. Adhesiolysis may even cause bleeding. Therefore management of empyema via thoracoscopy requires good experience and technical expertise than that for routine thoracoscopy for pleural biopsy or pleurodesis. The physician or pulmonologist should not hesitate to obtain thoracic surgeon consultation or to urgently refer patient for decortication if the pleural space is inaccessible, thick visceral pleural peel is present, or if satisfactory drainage and chest tube placement are unlikely or difficult.

In regards to the patient with pulmonary tuberculosis and persistent pleural effusion, thoracoscopy was carried out in this patient as thoracocentesis and closed pleural biopsy were inconclusive. Mycobacterial tuberculosis culture has a higher sensitivity than direct smear for AFB in pleural fluid because direct examination requires bacilli concentration of 10,000/ml whereas the culture only requires the presence of 10 to 100 organisms per ml[18]. The sensitivity of closed pleural biopsy to diagnose tuberculous pleural effusion is 50-74% and has also been shown to be higher than two former tests [19-21]. The thoracoscopic appearance of tuberculous effusion is usually that of caseating nodules with adhesion. At other times, the appearance is simply that of patchy pleuritis. Thoracoscopic pleural biopsy for pleural tuberculosis had a high diagnostic rate of 90.1-93.8% [22,23].

Complications associated with thoracoscopy are usually mild and not life threatening. Death is extremely rare as a complication of thoracoscopy ranging from 0.00-0.82% [24,25]. None of our patients died during the thoracoscopy. Potential complications related to thoracoscopy are perioperative incidents (trocar lung injury, intercostals injury), air leak, bleeding, respiratory failure, atelectasis and pneumothorax. Minor adverse events related to thoracoscopy are transient elevation of temperature, subcutaneous emphysema, wound infection and paraesthesia or lateral chest wall discomfort. None of our patient had major adverse event. Studies had reported that major adverse events occur in only 1.90-1.92% and minor adverse events in only 5.7-7.5% [6,26]. Only two of our patients had low grade fever and two patients had mild subcutaneous emphysema which resolved spontaneously without further intervention.

CONCLUSION

Thoracoscopy is indeed a very effective and valuable tool for the evaluation of pleural disease and to allow clinician to intervene therapeutically. We found that thoracoscopy has been very helpful to confirm malignant pleural effusion. It is a relatively safe procedure with very low risk of life-threatening complications. We strongly believe that thoracoscopy in the future can revolutionize our practice of respiratory medicine in Malaysia and thus renew interest in pleural diagnosis and management among our chest physicians.

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