Egyptian experience of modified medical thoracoscopy

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Abstract

Background: Thoracoscopy can be performed by a pulmonologist under local/regional anesthesia (medical thoracoscopy) or by a thoracic surgeon under general anesthesia (video-assisted thoracic surgery). The differential diagnosis of pleural disease is often a lengthy process fraught with pitfalls. In pleural malignancies, the diagnostic yield of closed pleural biopsy (CBP) is only 50 to 60% overall, and 20% in malignant mesothelioma (MM). Contrary to thoracocentesis and percutaneous CPB, thoracoscopy permits biopsy with direct visualization. We used a modified technique which is more easy and cheaper in our patients.

Objective and Aim of the Study: The aim of this study to evaluate the use of modified medical thoracoscopy in undiagosed pleural effusion.

Methods: An informed consent was taken from patients before the beginning of the study. For each patient, one should analyze the following: (1) detailed medical history, including smoking habits, exposure to asbestos, and the personal history of cancer; (2) chest radiographs and CTs, in order to assess pleural effusion when existing; and (3) the results of available closed pleural biopsies (CPBs). Also, bleeding and clotting profile should done preoperative. Prior to the procedure, pleural effusion was fully drained in the endoscopy suite. Thoracoscopy was done under local/regional anesthesia with spontaneous breathing and mild sedation (midazolam) by an experienced pulmonologist in the thoracoscopic room. Patients were placed in lateral decubitus position, with the involved side upward. After skin sterilization and local generous 2% xylocanie anaesthesia, a 2-4 cm incision was done and blunt dissection was used to enter the pleural space between the third and sixth intercostal space, along the midaxillary line. The site of introduction is usually determined using ultrasonography of the most dependant area of the effusion. A 40F silicone tube 10 cm long was inserted into the incsion. A sterilized fiberoptic bronchoscope signed for thoracoscopy only was inserted, and the pleural cavity was inspected through 40F silicone tube. The parietal, visceral, and diaphragmatic pleura were successively inspected, together with the mediastinal vessels and lymph nodes. Biopsies were performed under direct visual control in all suspect areas, systematically in several parts of the parietal pleura, and sometimes in the visceral pleura and will be sent for pathological examination. An intercostal tube was inserted before wound closure to evacuate air and fluid. Chest radiographs were routinely, immediately after the procedure and daily thereafter until chest tube removal. When indicated, pleurodesis was performed secondarily by brushing, tetracycline installation (or Bovodine) in the pleural space.

Results: Twenty two patients were admitted to chest department with first pleural tapping undiagnostic. The age range from 28 to 70 years old, with mean of 50.8 ± 10.5 years. Fourteen patients (63.6%) were males, and 8 patients (36.4%) were females. Smokers were 13 (59.1%), and 9 (40.9%) were non-smokers. The effusion was right sided in 12 (54.5%) and left sided in 10 (45.55). The pathology was diagnostic in 18 (81.8%) and non-specific in 4 (18.1%). We found malignant mesothelioma (18.2%), non-specific inflammation (18.2%), tuberculosis (13.6%), adenocarcinoma (13.6%), metastasis from primary breast cancer (13.6%), poorly differentiated carcinoma (9.1%), anaplastic carcinoma (4.5%), non-Hodjkin lymphoma (4.5%), and small cell carcimona (4.5%).

Conclusion: Modified medical thoracoscopy is an easy cheap technique with no complications. We recommend this technique where resources and surgical thoracosopy is not available or expensive.

Introduction

Thoracoscopy is not a new technique; H.C. Jacobeus, the Swedish internist, was the first to perform thoracoscopy in 1910, as a diagnostic procedure for exudative pleuritis. H.C. Jacobeus published the first series of thoracoscopy cases in 1921, describing the value of thoracoscopy in the diagnosis of tuberculous and malignant effusions. However, in the following decades, thoracoscopy was used mainly as a therapeutic tool for adhesiolysis in patients with tuberculosis (TB), in order to obtain a "therapeutic" pneumothorax. After the decline of thoracoscopic interventions as a treatment for TB, some centres in continental Europe continued to use thoracoscopy as a diagnostic and therapeutic tool in other disorders, such as pneumothorax and pleural effusion (1). In the early 1960s, thoracoscopy was used, mainly by pneumologists in Europe, on a much broader basis for the diagnosis of many pleuropulmonary diseases (2). Due to technical improvements, thoracoscopy was rediscovered by thoracic surgeons at the beginning of this decade, and renamed "surgical" thoracoscopy, better known as video-assisted thoracic surgery (VATS), requiring general anaesthesia with selective endobronchial intubation, disposable equipment, and at least three points of entry (3-4).

Medical thoracoscopy is a minimally invasive procedure performed by the pneumologist in an endoscopy suite, is much less invasive requiring only local anaesthesia with conscious sedation and only one or two points of entry. It also allows for basic diagnostic (undiagnosed pleural fluid or pleural thickening) and therapeutic procedures (pleurodesis) to be performed safely and distinct from video-

assisted thoracoscopic surgery, an invasive procedure that uses sophisticated access platform and multiple ports for separate viewing and working instruments (5). In Europe, thoracoscopy is intrinsic in the training programme of pneumology (6). In the USA, according to a national survey in 1994, only 5% of all pulmonologists were applying medical thoracoscopy (2).

The main indications of medical thoracoscopy are the diagnosis and treatment of pleural effusions and pneumothorax. In pleural effusions medical thoracoscopy provides the proof or exclusion of malignancy and tuberculosis with an accuracy approaching 100%. As a staging procedure it helps determine the aetiology and extent, and possibly, prognosis of malignant effusions as well as treatment strategies. The insufflation of talc powder during thoracoscopy is the best conservative method of pleurodesis in malignant and recurrent benign effusions, including chylothorax. Medical thoracoscopy has proved also to be successful in the management of empyema and of spontaneous pneumothorax. In the future, it may become even more popular once more respiratory physicians are trained in the procedure (2).

Patients and Methods

An informed consent was taken from patients before the beginning of the study. For each patient, one should analyze the following: (1) detailed medical history, including smoking habits, exposure to asbestos, and the personal history of cancer; (2) chest radiographs and CTs, in order to assess pleural effusion when existing; and (3) the results of available closed pleural biopsies (CPBs). Also, bleeding and clotting profile should done preoperative. Prior to the procedure, pleural effusion was fully drained in the endoscopy suite. The medical thoracoscopy usually is performed by a pulmonary physician and an assistant in an endoscopy suite with one or two trained nurses and an anathesiologist. Thoracoscopy was done under local/regional anesthesia with spontaneous breathing and mild sedation (midazolam) by an experienced pulmonologist in the thoracoscopic room. The patient's BP, pulse rate, and oxygen saturation to be monitored continuously. Supplemental oxygen often given to the patients to maintain oxygen saturation (7). Patients were placed in lateral decubitus position, with the involved side upward. After skin sterilization and local generous 2% xylocanie anaesthesia, a 2-4 cm incision (Fig.1) was done and blunt dissection was used to enter the pleural space between the third and sixth intercostal space, along the midaxillary line. The site of introduction is usually determined using ultrasonography of the most dependant area of the effusion. A 40F silicone tube 10 cm long was inserted into the incision (Fig.2). A sterilized fiberoptic bronchoscope signed for thoracoscopy only was inserted, and the pleural cavity was inspected through 40F silicone tube (Fig.3). The parietal, visceral, and diaphragmatic pleura were successively inspected, together with the mediastinal vessels and lymph nodes. Biopsies were performed under direct visual control in all suspect areas, systematically in several parts of the parietal pleura, and sometimes in the visceral pleura and will be sent for pathological examination. An intercostal tube was inserted before wound closure to evacuate air and fluid (Fig.4). Chest radiographs were routinely obtained, immediately after the procedure and daily thereafter until chest tube removal. When indicated, pleurodesis was performed secondarily by brushing, tetracycline installation (or Bovodine) in the pleural space.

Fig 1: The typical skin incision

Fig 2: A 40F silicone tube 10 cm long was inserted into the incision

Fig 3: A sterilized fiberoptic bronchoscope inserted, and the pleural cavity inspected through the 40F silicone tube

Fig 4: An intercostal tube was inserted before wound closure

Fig 5-A: Thoracoscopic view showing diffuse infiltration of mesothelioma

Results

Twenty two patients were admitted to chest department with first pleural tapping undiagnostic. The age range from 28 to 70 years old, with mean of 50.8 ± 10.5 years. Fourteen patients (63.6%) were males, and 8 patients (36.4%) were females. Smokers were 13 (59.1%), and 9 (40.9%) were non-smokers. The effusion was right sided in 12 (54.5%) and left sided in 10 (45.55). The pathology was diagnostic in 18 (81.8%) and non-specific in 4 (18.1%). We found malignant mesothelioma (Fig.5) in (18.2%), non-specific inflammation (Fig.6) in (18.2%), tuberculosis (Fig.7) in (13.6%), adenocarcinoma (Fig.8) in (13.6%), metastasis from primary breast cancer (13.6%), poorly differentiated carcinoma (9.1%), anaplastic carcinoma (4.5%), non-Hodjkin lymphoma (Fig.9) in (4.5%), and small cell carcimona (4.5%).

Pleural biopsy specimens were obtained in all the 22 cases, and all specimens were deemed to be of satisfactory quality. A definitive histologic diagnosis was made in 18 of the 22 patients who underwent thoracoscopy for evaluation of an unexplained exudative effusion, and malignancy was discovered in almost two third of the cases. Mean duration of chest tube drainage was 2.5 ± 1.4 days postprocedure

Medical thoracoscopy was a safe and easy procedure in our patients. Procedure-related mortality was 0.00%. Potential adverse events that occurred during or after the procedure included mild bleeding in 1 (4.5%) patient, persistent pneumothorax in 2 (9.1%) patients, sinus tachycardia 2 (9.1%) patients, low-grade fever in 4 (18.2%) patients, there were no complications related to anesthesia, no respiratory failure occurred, wound infections in 2 (9.1%) patients, empyema in 1 (4.5%) patient, and severe pain in 3 (13.6%) patients.

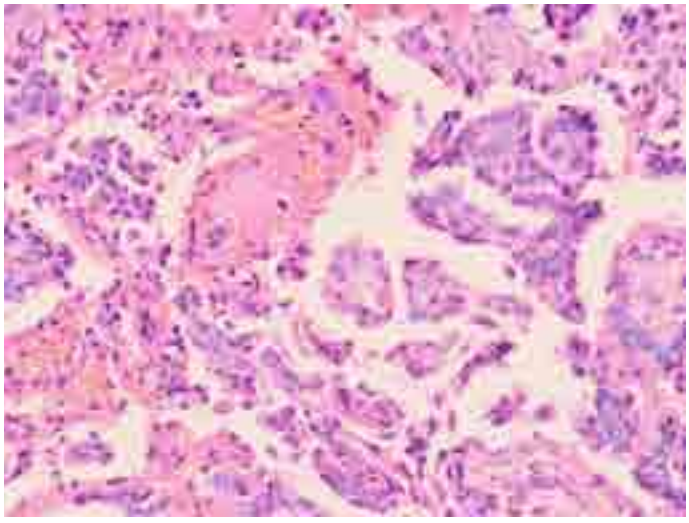

Fig 5-B: Pathological examination reveals tumor tissue composed of regular cells with regular nuclei, scanty cytoplasm arranged in acini and papillary structures a classic features of mesothelioma (H&E Stain x 200)

Fig 6-A: Thoracoscopic view showing non-specific inflammation

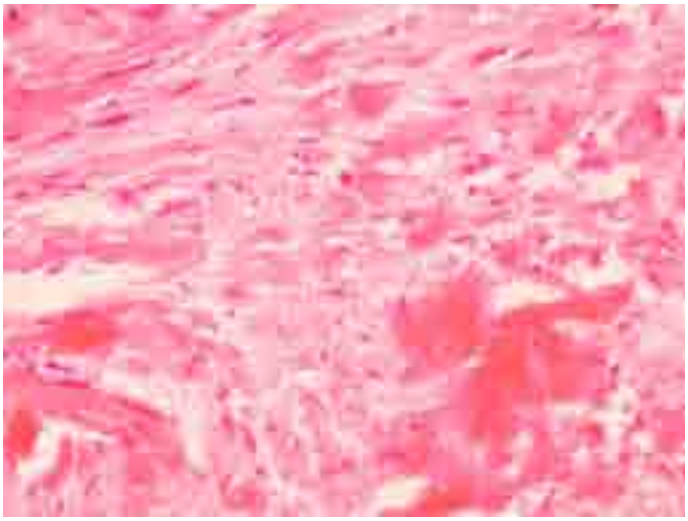

Fig 6-B: Pathological examination reveals markedly thickened pleural membranes entangling few scattered mononuclear inflammatory cells (H&E Stain x 400)

Fig 7-A: Thoracoscopic view showing diffusely inflamed thickened pleural surfaces with multiple adhesions

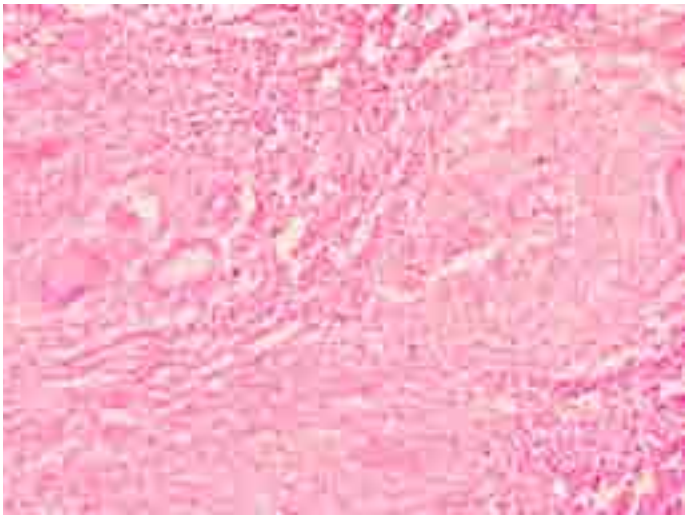

Fig 7-B: Pathological examination reveals granulomatous lesion composed of langehans giant cells surrounded by epithelioid cells with caseous necrosis (H&E Stain x 200)

Fig 8-A: Thoracoscopic view showing nodular infiltrations of adenocarcinoma

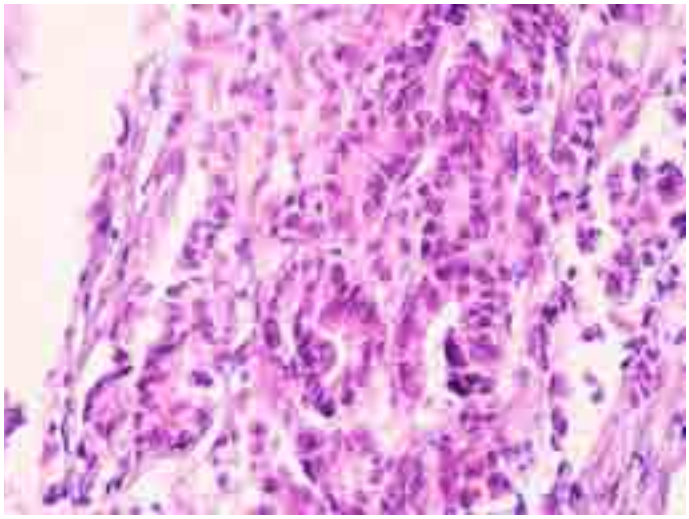

Fig 8 B: Pathological examination reveals metastatic deposits of well organized glandular cells with nuclear atypia of metastatic well differentiated adenocarinoma (H&E Stain x 400)

Fig 9-A: Thoracoscopic view showing nodular diffuse infiltrations of non-Hodgkin lymphoma

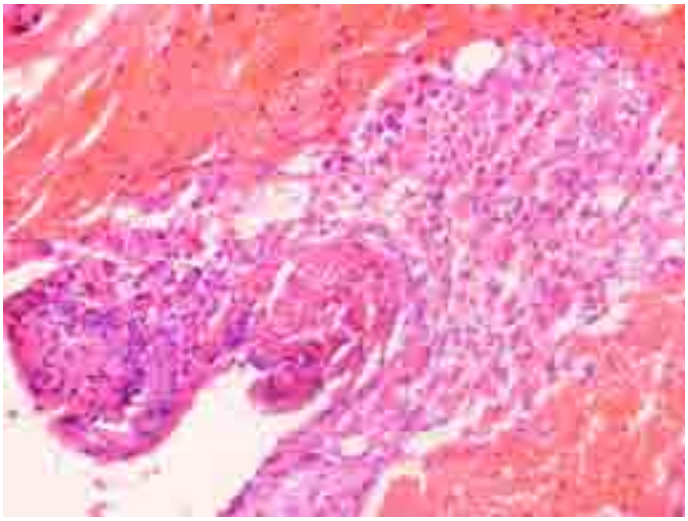

Fig 9-B: Pathological examination of non-Hodgkin lymphoma showing small malignant lymphoid cells (H&E Stain x 400)

Discussion

We use a modified technique for medical thoracoscopy which is an easy technique and cheaper for medical patients. We found this technique was diagnostic in 18 (81.8%) and non-specific in 4 (18.1%). The pathology was malignant mesothelioma in (18.2%) of patients, non-specific inflammation in (18.2%) of patients, tuberculosis in (13.6%) of patients, adenocarcinoma (13.6%) of patients, metastasis from primary breast cancer in (13.6%) of patients, poorly differentiated carcinoma in (9.1%) of patients, anaplastic carcinoma in (4.5%) of patients, non-Hodgkin lymphoma in (4.5%) of patients, and small cell carcimona in (4.5%) of patients.

Davidson AC, et al (8); had used the fiberoptic bronchoscope for inspection of the pleural space and compared it with rigid thoracoscope in 1988. The practicality of physicians performing thoracoscopy for diagnostic purposes was assessed in 30 patients with pleural effusions of unknown cause. Arigid thoracoscope was compared with a fibreoptic bronchoscope used as a flexible thoracoscope and the diagnostic adequacy of biopsy specimens obtained with the two instruments assessed. The two instruments were inserted by a physician in the bronchoscopy suite using local anaesthesia. The procedure proved safe, acceptable, and diagnostically effective. The rigid thoracoscope proved a more satisfactory instrument but the fibreoptic bronchoscope, with minor adaptations, may be used for thoracoscopy (8).

One method which essentially used local anaethesia and one opening for the scope and instrument. This method was described by Kolschmann et al (7),who used Lidocaine 2% for local anesthesia, and sedation was achieved by a combination of midazolam and fentanyl. They used a 6.5-mm thoracoscope (0° and 30°; Karl Storz; Tuttlingen, Germany) with a single 7-mm trocar. After complete aspiration of all of the remaining fluid, a thorough inspection of the pleural surface was made. The adhesions were taken down with the biopsy forceps, if possible. Biopsy specimens were made for histopathologic examination, if necessary. Under visual control, an average of 8 g of sterile asbestos-free talc (Steritalc; Novatech; France) were distributed onto the pleural surface for pleurodesis. After removal of the thoracoscope, a thoracostomy tube (24 Charrière) was inserted. Suction (–20 cm H2O) was started after 1 h, and the chest tube was left in place until < 100 mL of fluid was drained in 24 h. Chest radiography was performed the same day after the procedure and before discharge (7).

Flexible bronchoscopes have also been used by other authors, which in comparison with rigid thoracoscopes have several disadvantages, in particular the less adequate orientation within the pleural cavity and the smaller biopsies (9). Most authors use flexible instruments only because rigid instruments are not available or appear dangerous: some authors believe that local anaesthesia is not adequate (10).

Ernst et al (11); described their experience with the use of a novel endoscope that is similar in design to a commonly used bronchoscope. This pleuroscope interfaces with existing processors and light sources that are routinely employed for flexible bronchoscopy and, therefore, are available in most endoscopy units. The instrument used was a prototype semirigid pleuroscope the outer diameter of the shaft is 7.0 mm. The length of the insertion portion is 27 cm, which consists of a proximal rigid portion (22 cm) and a bendable distal end (5 cm). The tip is movable in one plane with the help of a lever on the handle, which is similar to a conventional flexible bronchoscope. A 2.8-mm single working channel accommodates the biopsy forceps and other instruments(11). The most common indications were for pleurodesis of a malignant pleural effusion (53%) or for evaluation of an exudative effusion of unknown etiology (44%). Pleural biopsy specimens were obtained in 13 cases, and all specimens were deemed to be of satisfactory quality. A definitive histologic diagnosis was made in 4 of the 14 patients who underwent pleuroscopy for evaluation of an unexplained exudative effusion, and malignancy was discovered in all 4. Pleural biopsies were performed in 13 patients, and talc pleurodesis procedures were performed in 25 patients. Mean duration of chest tube drainage was 2.9 ± 1.8 days postprocedure. There were no complications (11).

Tassi et al (12); evaluated minithoracoscopy using 3-mm instrumentation for diagnosis of pleural effusions. The basic components for minithoracoscopy are two 3.8-mm trocars, one 3.3-mm telescope, and one 3.0-mm biopsy forceps. The key instrument is the telescope (Karl Storz Endoskope; Karl Storz; Tuttlingen, Germany), which is 25 mm in length and has viewing angles of 0° and 45°. Indication was later extended to larger nonloculated effusions that could have been examined using conventional thoracoscopy. A total of 30 patients were studied, including 12 patients with nonloculated effusions of undetermined etiology, 17 patients with loculated effusions, and 1 patient with bilateral effusion. In two patients with mesothelioma, lung biopsy samples obtained by minithoracoscopy allowed diagnosis of invasion from the visceral pleura. In the remaining patient, the sample was not interpretable due to coagulation-related artifacts (12). Minithorascopy provided high diagnostic yield (93.4%). Visualization using minithoracoscopy instrumentation was equal to that obtained using conventional thoracoscopy instrumentation. Tolerance and cosmetic results were good. Minithoracoscopy is safe and effective for routine diagnostic applications (12).

Potential advantages of modified medical thoracoscopy over more conventional techniques include certainty of representative tissue for diagnosis, reduced requirements for postoperative analgesia, shorter hospital stays, and a shorter duration of chest tube drainage compared with thoracotomy (13). Also, it was studied to decrease procedure-related costs by employing reusable instruments. Additional studies are necessary to determine ideal settings for thoracoscopic intervention and to evaluate current perceptions regarding thoracoscopic practice (14).

Conclusion

Modified medical thoracoscopy is an easy and safe technique with less complications. It is less expensive than rigid thoracscopy, and thoracotomy in many diagnostic and therapeutic indications. The instruments needed are so simple

and re-usable. The outcome is safe and results are satisfactory and conclusive. We recommend this technique where resources and surgical thoracosopy is not available or expensive especially in developing countries and where resources are limited with equal and promising results as rigid thoracscopy.

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