

ORIGINAL ARTICLE

Pleuroscopy in Undiagnosed Exudative Pleural Effusion, Early Experience in Bangladesh

Hossain Al Mahmud¹, Serajus Salekin², Ankan Kumar Paul³, Debasish Das⁴,
Md. Rownak Khurshid⁵, Anup Kumar Saha⁶, Md. Kamrul Alam⁷, Md. Osman Goni⁸

Abstract:

Background: Rigid pleuroscopy is an accurate diagnostic method for undiagnostic exudative pleural effusion which is a burden in our country.

Methods and Materials: It was a prospective study done in dept. of Thoracic surgery, Dhaka Medical College Hospital (DMCH), Bangladesh, from 1st July 2018 to 30th June 2019 and total 46 patients with undiagnosed exudative pleural effusion were selected and rigid pleuroscopy performed to obtain biopsy.

Results: Rigid pleuroscopy showed diagnostic accuracy of 95.7% with minimal complications (6.4%). As visualization is also a part of this procedure it gives an additional strength in the diagnosis which proved to be 100% accurate.

Conclusion: It is an excellent diagnostic tool which is accurate, easy to perform, with least complications and less time consuming, so patient turnover is better which is of great advantage in our country.

Key words: Pleuroscopy, Rigid pleuroscopy, Exudative pleural effusion.

[Chest Heart J. 2020; 44(2) : 68-72]

DOI: <http://dx.doi.org/10.33316/chab.j.v44i2.2019621>

Introduction:

Pleural effusion is a frequently encountered clinical condition which is caused by tuberculosis, malignancy, parapneumonia, congestive heart failure, pulmonary embolism and many other diseases.^{1,2} It affects around 300 subjects per 1,00,000 population per year worldwide.³ Exudative pleural effusions are usually of infectious origin in

youth, while malignancies are common in the aged.^{1,4,5}

The accurate diagnosis of pleural effusion is challenging because even after thoracentesis and/or closed pleural biopsy, 25-40% of pleural effusion remains undiagnosed.^{6,7} Pleuroscopy also referred to as medical thoracoscopy is generally described as the evaluation of the pleural space. It

1. Registrar, Dept of Thoracic Surgery, DMCH
2. Assistant Professor, Dept of Thoracic Surgery, DMCH
3. Resident, Cardiovascular and Thoracic Surgery, NICVD
4. Indoor Medical Officer, Dept. of Thoracic Surgery, DMCH
5. Indoor medical officer, Dept. of Cardiac Surgery, DMCH.
6. Resident, Cardiovascular and Thoracic Surgery, NICVD
7. Professor, Dept of Thoracic Surgery, DMCH
8. Assistant Professor, Dept of Thoracic Surgery, DMCH

Correspondence to: Dr. Hossain Al Mahmud, Registrar, Thoracic Surgery Dept., Dhaka Medical College Hospital (DMCH), Dhaka. E-mail: hamahmud57@gmail.com. Mobile:+8801914388358

Submission on: 6 May, 2020

Accepted for Publication: 19 May, 2020

Available at <http://www.chabjournal.org>

was introduced by Jacobaeus in 1910 as a diagnostic procedure.⁸ A visual inspection of the pleural space, drainage of pleural effusion, and performance of pleural biopsies are the commonly performed procedures during pleuroscopy.⁹ Rigid pleuroscopy under local anesthesia had been used successfully for pleural diseases. The instrument is easy to manipulate and covers a wider endoscopic field. So it becomes easy to visualize the site of lesion and take biopsy from accurate location which increases the diagnostic accuracy that is not possible in case of thoracentesis and closed pleural biopsy.¹⁰

Pleuroscopy is considered a safe procedure with a high diagnostic accuracy. The technique of pleuroscopy is similar to that of chest tube insertion and the procedure is easier to learn than

flexible bronchoscopy if competence in chest tube placement has already been gained.¹¹ The advantage of it over Video Assisted Thoraoscopic Surgery (VATS) is that it doesn't require general anaesthesia and single lung ventilation. Pleuroscopy is akin to chest tube insertion and can be carried out with a single site of entry using local anaesthesia. It is safe when performed by trained persons and we believe that with rapidly advancing technology, improved methods of anaesthesia and technology, pleuroscopy may replace conventional biopsy methods in the near future.^{12,13}

In this study we aim to evaluate the diagnostic accuracy and complications of rigid pleuroscopy.

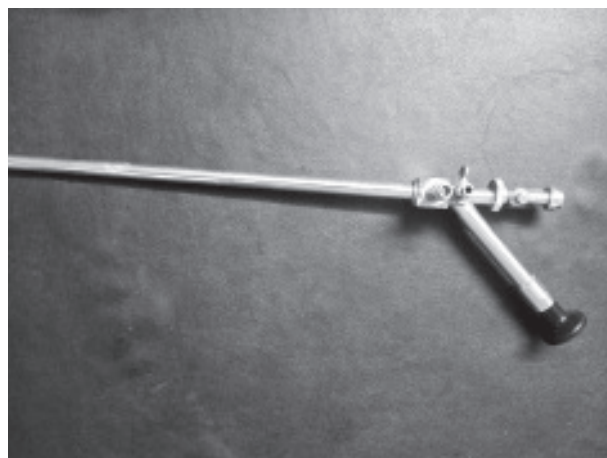


Fig.-1: Rigid Pleuroscopic Endoscope

Materials and Methods:

This prospective study was conducted in dept. of Thoracic Surgery, Dhaka Medical College Hospital from 1st July 2018 to 30th June 2019. Total 46 patients with exudative pleural effusion was selected as sample diagnosed by chest x-ray, CT scan of chest and pleural fluid study (Protein, sugar, LDH) in whom diagnosis couldn't be confirmed. Rigid pleuroscopy was done in aseptic technique under local anaesthesia in through 5th or 6th intercostals spaces in mid-axillary line and multiple (5-6) biopsies were taken from parietal pleura in suspicious areas. A 28FR chest drain was placed in the site of pleuroscope introduction. Histopathology was done and patient was followed up to see any complications. A chest X-ray obtained on the next day and drain removed after 48 hours if lung is expanded and the collection is minimal.

Result:

Table-I
Patient Characteristics

Patient Characteristics		% (n=46)
Age	Mean age (years)	47.3 years (Range 20-70 years)
Sex	Male	26 (56.5%)
	Female	20 (43.5%)
Side of effusion	Right	22 (47.8%)
	Left	22 (47.8%)
	Bilateral	2 (0.4%)
Symptoms	Breathlessness	38 (82.7%)
	Fever	16 (34.8%)
	Cough	36 (78.3%)
	Chest pain	15 (32.6%)

Mean age of the patients were 47.3 years, 56.5% male and 43.5% female. Equal number of patients (47.8%) developed right and left sided pleural effusion. 2 patients were bfound to have bilateral disease. Te symptoms they presented with were Breathlessness (82.7%), cough (78.3%), fever (34.8%) and chest pain (32.6%) (Table-1)

Table-II
Pleuroscopic findings

Nodules	28 (60.9%)
Adhesion	12 (26.1%)
Thickened pleura	4 (8.7%)
Normal Pleura	2 (4.3%)

After introducing the pleuroscope visual observation of parietal pleura was done and 60.9% patients showed multiple nodules. Adhesions were present in 26.1% cases, 8.7% revealed thickened pleura and 2 patients had normal pleura (Table-2).

Biopsy was taken from 5-6 suspicious sites in each patient and in Table-3 the results of histopathology have been shown. 95.7% patients were found to have definitive diagnosis. Out of which 60.8% patient had primary and secondary malignancy, but malignant cell in pleural fluid study was found in only 8.7% patients. 26.1% patients were diagnosed as tuberculosis whereas none of them had any evidence of tubercular organism in any cytology or culture. 4.3% patients were diagnosed as empyema thoracis and same percentage of patients revealed normal pleura. In only 2 patients (4.3%) no conclusive results were found.

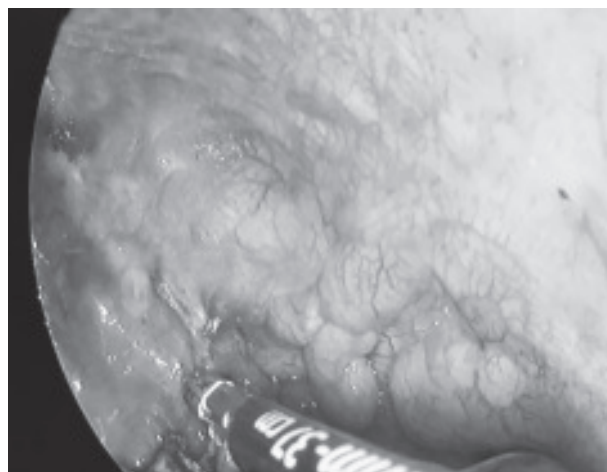


Fig.-2: *Pleural metastasis from Lung adenocarcinoma.*

Table-III
Findings on Histopathology

Findings	%
Metastatic Adenocarcinoma	22 (47.8%)
Poorly Differentiated Metastatic Carcinoma	4 (8.7%)
Mesothelioma	2 (4.3%)
Tubercular Pleuritis	12 (26.1%)
Empyema Thoracis	2 (4.3%)
Thickened Pleura	2 (4.3%)
Normal Pleura	2 (4.3%)

Table-IV
Complications

Subcutaneous emphysema	2 (4.3%)
Prolonged air leak	1 (2.1%)
Fever	3 (6.5%)
Mild pain	24 (52.2%)

Although Table 4 showing that a large number of patients developed complications it was actually mild pain which was well controlled with NSAIDs. 6.5% patients developed transient fever controlled with paracetamol. Only 2 patients developed surgical emphysema and one patient had prolonged air leak and both were controlled conservatively.

Discussion:

Pleural effusions are a common problem in our Thoracic surgery ward. If a pleural biopsy specimen is needed, a surgeon must usually choose between a blind pleural biopsy and a Pleuroscopic biopsy. In our institute we did pleuroscopy, because most of our patients were referred and they are already on anti TB drugs for more than 3 weeks duration with no clinical improvement and thoracentesis and blind closed pleural biopsy has an diagnostic yield of only 50-60% for combined tuberculosis and malignancy.^{7,9,14} In our study 60.8% patients had malignancy whereas only 8.7% were diagnosed to have malignant cell in pleural fluid study. Also 26.1% patients were diagnosed as tuberculosis but none of them had any confirmatory evidence of TB in pleural fluid study. The use of fiberoptic bronchoscopes in the pleural space has been reported previously. Despite providing better views at the apex and paravertebral gutters, it was difficult to control and the diagnostic yield was low.⁹ VATS is an excellent alternative with high diagnostic accuracy but needs more expertise and sometime multiple ports. Moreover VATS needs general anaesthesia and related complications are more. In comparison rigid pleuroscopy is done under local anaesthesia and it is technically easy to do.

The primary role for pleuroscopy is to enhance the diagnostic capabilities when less invasive

tests fail.^{13,15} Rigid instruments have been pivotal in the technique.^{16,17} Pleuroscopy with rigid telescopes and trocars provides good visualization of the parietal and visceral pleura. However, with

the single puncture technique, the posterior and mediastinal aspects of the hemithorax are not easily accessed when the procedure is carried out in patients under local anaesthesia. This may necessitate the creation of a second or third port of entry. The presence of adhesions between the lung parenchyma and the chest wall can limit examination, which might account for the false-negative results frequently observed with mesothelioma.¹⁷ These problems can be solved by use of single lung ventilation and collapsing the lung on the site of examination but will require general anaesthesia. So it can be restricted to selected cases where rigid pleuroscopy fails to visualize abnormal pleura. Another alternative is flex-rigid pleuroscopy where areas not visualized in rigid pleuroscopy can be visualized.

In our study diagnostic accuracy of rigid pleuroscopy was 95.7%. This was comparable with most other studies like, Prabhu et al.,⁹ Munavvar et al.,¹⁸ Wang et al.,¹⁹ Blanc et al.,²⁰ Law et al.,²¹ Tscheikuna,²² Diacon et al.,²³ and McLean et al.²⁴ An excellent evidence of diagnostic accuracy has been shown in our study. Total 28 patients were found to have nodules in parietal pleura when visualized by pleuroscopy and 28 patients were found to have malignancy that is 100%. So it allows the visualization of abnormal areas and a direct biopsy.

In addition to visualization of pleural cavity and to take a biopsy of an abnormal area, it allows for the complete removal of pleural fluid without any additional complication like re expansion pulmonary edema which are more common following closed thoracocentesis when more than 1.5 L of pleural fluid was removed in single sitting. The re expansion pulmonary edema does not occur following pleuroscopy because during the removal of pleural fluid, some amount of air enters through the trocar.⁹

The complications of pleuroscopy are minimal. Only 6.4% developed countable complications (4.3% subcutaneous emphysema and 2.1% prolonged air leak). This was comparable to Prabhu et al.,⁹ Munavvar et al.,¹⁸ and Law et al.²¹

Conclusion:

So, in conclusion we can say that pleuroscopy is a very much valuable tool in the diagnosis of

undiagnosed exudative pleural effusion where thoracentesis failed to yield an accurate diagnosis. It is a simple and safe method that can be done under local anaesthesia with high diagnostic accuracy and with low complication rates. Also this procedure is less time consuming as we have used local anaesthesia and also patient turnover is better which is the best thing in a country like us where patient burden is an important factor to be considered.

References:

1. Valdes L, Alvarez D, Valle JM, Pose A, San Jose E. The etiology of pleural effusions in an area with high incidence of tuberculosis. *Chest*. 1996;109(1):158-62.
2. Nance KV, Shermer RW, Askin FB. Diagnostic efficacy of pleural biopsy as compared with that of pleural fluid examination. *Modern pathology: an official journal of the United States and Canadian Academy of Pathology, Inc.* 1991;4(3):320-4.
3. Du Rand I, Maskell N. Introduction and methods: British Thoracic Society pleural disease guideline 2010. *Thorax*. 2010;65(Suppl 2):1-3.
4. Sinzobahamvya N, Bhakta HP. Pleural exudate in a tropical hospital. *European Respiratory Journal*. 1989;2(2):145-8.
5. Emad A, Rezaian GR. Diagnostic value of closed percutaneous pleural biopsy vs pleuroscopy in suspected malignant pleural effusion or tuberculous pleurisy in a region with a high incidence of tuberculosis: a comparative, age-dependent study. *Respiratory medicine*. 1998;92(3):488-92.
6. Light RW. Clinical practice. Pleural effusion. *N Engl J Med* 2002; 346:1971-7.
7. Poe RH, Israel RH, Utell MJ, Hall WJ, Greenblatt DW, Kallay MC. Sensitivity, specificity, and predictive values of closed pleural biopsy. *Archives of internal medicine*. 1984;144(2):325-8.
8. Jacobaeus HV. Uber die Moglichkeit, die Zystoskopie bei Untersuchung seroser Hohlungen anzuwenden. *Munch Med Wschr.* 1910;40:2090-2.

9. Prabhu VG, Narasimhan R. The role of pleuroscopy in undiagnosed exudative pleural effusion. *Lung India: official organ of Indian Chest Society*. 2012;29(2):128.
10. Watanabe Y, Sasada S, Chavez C, Matsumoto Y, Izumo T, Tsuchida T. Flex-rigid pleuroscopy under local anesthesia in patients with dry pleural dissemination on radiography. *Japanese journal of clinical oncology*. 2014;44(8):749-55.
11. Shujaat A, Bajwa AA, Usman F, Jones L, Cury JD. Safety and accuracy of semirigid pleuroscopy performed by pulmonary fellows at a major university hospital: our initial experience. *Journal of bronchology & interventional pulmonology*. 2013;20(3):213-23.
12. Mathur PN, Loddenkemper R. Biopsy techniques in the diagnosis of pleural diseases. *European Respiratory Monograph*. 2002;7: 120-30.
13. Lee P, Colt HG. Rigid and semirigid pleuroscopy: the future is bright. *Respirology*. 2005;10(4):418-25.
14. Prakash UB, Reiman HM. Comparison of needle biopsy with cytologic analysis for the evaluation of pleural effusion: analysis of 414 cases. In *Mayo Clinic Proceedings 1985* (Vol. 60, No. 3, pp. 158-164). Elsevier.
15. Boutin C, Viallat JR, Cargnino P, Farisse P. Thoracoscopy in malignant pleural effusions. *American Review of Respiratory Disease*. 1981;124(5):588-92.
16. Colt HG. Thoracoscopy: a prospective study of safety and outcome. *Chest*. 1995;108(2): 324-9.
17. Lee P, Hsu A, Lo C, Colt HG. Prospective evaluation of flex rigid pleuroscopy for indeterminate pleural effusion: Accuracy, safety and outcome. *Respirology*. 2007;12(6):881-6.
18. Munavvar M, Khan MA, Edwards J, Waqaruddin Z, Mills J. The autoclavable semirigid thoracoscope: the way forward in pleural disease?. *European respiratory journal*. 2007;29(3):571-4.
19. Zhen W, Tong ZH, Li HJ, Zhao TT, Li XY, Xu LL, et al. Semi-rigid thoracoscopy for undiagnosed exudative pleural effusions: a comparative study. *Chinese medical journal*. 2008;121(15):1384-9.
20. Blanc FX, Atassi K, Bignon J, Housset B. Diagnostic value of medical thoracoscopy in pleural disease: a 6-year retrospective study. *Chest*. 2002;121(5):1677-83.
21. Law WL, Chan JW, Lee S, Ng CK, Lo CK, Ng WK, et al. Pleuroscopy: our initial experience in Hong Kong. *Hong Kong Medical Journal*. 2008;14(3):178.
22. Tscheikuna J. Medical thoracoscopy: experiences in Siriraj Hospital. *J Med Assoc Thai*. 2006;89(Suppl 5):S62-66.
23. Diacon AH, Van de Wal BW, Wyser C, Smedema JP, Bezuidenhout J, Bolliger CT, Walzl G. Diagnostic tools in tuberculous pleurisy: a direct comparative study. *European Respiratory Journal*. 2003;22(4):589-91.
24. McLean AN, Bicknell SR, McAlpine LG, Peacock AJ. Investigation of pleural effusion: an evaluation of the new Olympus LTF semiflexible thoracofiberscope and comparison with Abram's needle biopsy. *Chest*. 1998;114(1):150-3.