

MEDICAL THORACOSCOPY IN UNDIAGNOSED PLEURAL EFFUSION CASES- OUR EXPERIENCE FROM A TERTIARY CARE CENTER IN KERALA

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ABSTRACT

BACKGROUND

Aetiological diagnosis in exudative pleural effusions may be difficult in resource poor settings. Medical thoracoscopy is an excellent tool to establish diagnosis in patients with exudative pleural effusion of unclear origin even after routine diagnostic work up. Diagnostic efficacy, indications and complications of medical thoracoscopy need to be assessed further.

MATERIALS AND METHODS

The study was conducted among 61 patients over a period of 18 months. Medical thoracoscopy was performed in all the patients fit to undergo the procedure, in whom the diagnosis remained obscure after the routine initial work up.

RESULTS

Pleural biopsy was performed in all 61 cases. A diagnosis could be established by medical thoracoscopy in 54 of these cases, which corresponds to 88.5% diagnostic yield. No significant complications were noted in the study. An average 4.75 days of post-procedure intercostal tube drainage was required.

CONCLUSION

In patients with exudative pleural effusions, remaining undiagnosed after preliminary investigations, medical thoracoscopy is a safe and reliable procedure for obtaining pleural biopsy and establishing a diagnosis. With proper patient selection and adequate expertise complications of the procedure can be minimised to negligible rates.

KEYWORDS

Medical Thoracoscopy, Pleuroscopy, Pleural Effusion, Pleural Biopsy.

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BACKGROUND

Medical thoracoscopy is an excellent tool to establish diagnosis in patients with exudative pleural effusion of unclear origin. It is highly valuable in clarifying the origin of pleural effusions in patients with lung cancer, as the presence of a malignant pleural effusion is associated with poor survival and precludes the possibility of treatment with curative intention.¹

Pleuroscopy (Thoracoscopy) is an invasive technique that should be used only when other simpler methods do not provide the diagnosis. Appropriate training is mandatory.

Pleuroscopy is primarily a diagnostic procedure, but it can also be applied for therapeutic purposes. Pleuroscopy is mainly indicated for diagnosis of pleural effusions of unknown aetiology, for staging of lung cancer or diffuse

malignant mesothelioma and for treatment by talc pleurodesis of malignant or other recurrent effusions. Pleuroscopy is also useful for management of spontaneous pneumothorax and empyema. In advanced settings, it can also be used for diagnostic biopsies from the lungs, diaphragm, mediastinum and pericardium.²

Closed pleural biopsy and pleural fluid cytology remains the conventional methods of tissue diagnosis for pleural pathologies. Cytology is a more sensitive test for diagnosis than percutaneous pleural biopsy, because pleural metastases tend to be focal and the latter is a blind sampling procedure. The yield of either procedure increases as the disease becomes more advanced. The yield from pleural biopsy with a proven malignant effusion averages 50% to 60% and for exfoliative cytology, with advanced techniques is considered nearly 90%.¹

In thoracoscopy, we have the added advantage of direct visualisation of pleura, lung, diaphragm and mediastinum. Also in cases which are highly likely to be malignancy on visualisation, we can go ahead with talc poudrage pleurodesis for symptomatic relief of patients. The diagnostic yield of pleuroscopy is found out to be 75% to 98% by various studies.^{3,4} Paucity of Indian studies on the

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topic of thoracoscopy prompted us to conduct this study and find out the diagnostic yield of pleuroscopy in an Indian setting.

Objective- To study the role of medical thoracoscopy in obtaining an etiological diagnosis in undiagnosed pleural effusion cases attending a tertiary care centre, over a period of 18 months.

Settings and Design- Descriptive study; conducted in pulmonary medicine department in a government medical college.

MATERIALS AND METHODS

A cross-sectional study was conducted among 61 patients, presenting with pleural effusion attending Department of Pulmonary Medicine from May 2015 to November 2016. All patients undergoing diagnostic thoracoscopy, who presented with pleural effusion and negative for pleural fluid cytology, AFB staining & closed pleural biopsy were included in the study.

After getting informed consent, demographic data was obtained from every patient. History taking and clinical examination were performed. Chest X-ray, Routine Blood examination, Sputum AFB staining, USG thorax, CECT thorax were done. Pleural fluid analysis for cell count, protein, sugar, LDH, ADA, cytology for malignant cells, AFB staining and culture & sensitivity were done in all patients. Closed pleural biopsy was performed in selected patients using Abram’s pleural biopsy needle. Tuberculous pleural effusion being very common, was extensively evaluated and patients with ADA positive lymphocytic exudate, with clinical features of TB were started on Anti-TB drugs from RNTCP and followed up.

Medical thoracoscopy was performed using Karl-Storz rigid thoracoscope. A detailed pre-operative medical evaluation was carried out for assessing fitness for the procedure. Rigid thoracoscopy was done by trained faculty, under short term anaesthesia and with strict aseptic precautions. 3-5 pleural biopsy specimens were collected from suspicious sites and were sent for histopathology and microbiological studies. Systematic visualization of pleura and therapeutic interventions like adhesiolysis, talc pleurodesis etc were carried out in required patients. Complications during and after the procedure were documented. The intercostal drainage tubes were removed once the drainage was less than 100 ml for 2 consecutive days. Data obtained was analysed using SPSS 17 Data Software.

RESULTS

Age- The mean age of study participants was 54.51 years with standard deviation of 16.458 years. (Table 1)

Age	Number of Subjects	Percentage
<20	2	3.27
20 -39	10	16.39
40 -59	22	36.06
>60	27	44.2

Table 1. Age Distribution of Study Subjects

Gender Distribution- Male population was predominant in the group accounting for 62.3% of study population. (Table-2)

Gender	Number of Subjects	Percentage
Male	38	62.3
Female	23	37.7
Total	61	100

Table 2. Gender Distribution of Study Subjects

Side Distribution- Pleural effusion was left sided in 57.4% and right sided in 42.6% cases. (Table 3)

Side of Lesion	Number of Subjects	(%)
Left side	35	57.4
Right side	26	42.6
Total	61	100

Table 3. Side Distribution of Pleural Effusion

Smoking Status	Number of Subjects	(%)
Smoker	32	52.5
Non-smoker	29	47.5
Total	61	100

Table 4. Distribution of Study Subjects Based on Smoking Status

Smoking Status	Number of Subjects	(%)
Smoker	17	27.9
Non-smoker	44	72.1
Total	61	100

Table 5. Distribution of Study Subjects Based on Current Smoking Status

32 out of 61 in the study population were smokers. This corresponds to 52.5% of total study population. (Fig. 1, Table 4) Current smokers are defined as smoker with history of smoking at least 100 cigarettes in their lifetime and have smoked within last 28 days. 17 out of this 32 were current smokers. This corresponds 27% of total study population. (Table 5).

Symptoms - All patients in the study had dyspnoea as the major symptom. All but 2 patients had complained of cough (96.7%). Loss of appetite (86.9%), Chest pain (78.7%), fever (54.1%) & Haemoptysis (3.3%) were the other symptoms.

Diagnosis	Number of Subjects	(%)
Malignancy	31	50.8
Tuberculosis	15	24.6
Other infections	8	13.1
Non-specific pleuritis	7	11.5

Table 6. Distribution of Study Subjects Based on Diagnosis Obtained

An etiological diagnosis was obtained in 54 out of 61 patients. This equated to a diagnostic yield of 88.5%. Malignancy accounted for 50.8% of cases and tuberculosis was the diagnosis in 24.6% cases. (Table 6)

Malignancy Types- Commonest histological type of malignancy identified was adenocarcinoma (36%). Mesothelioma, squamous cell carcinoma and metastasis were the other malignancies detected. (Table 7)

Malignancy	Number of Subjects	(%)
Adeno-carcinoma	22	36.1
Squamous cell carcinoma	1	1.6
Mesothelioma	7	11.5
Other malignancies	1	1.6
No malignancy	30	49.2
Total	61	100

Table 7. Distribution of Study Subjects Based on Type of Malignancy

Complications- No major complications like significant haemorrhage during the procedure, was noted. Pain was the commonest complaint in the post procedure period, which was managed by analgesics. Mild fever was noted in some patients on the day of procedure. 1 patient had wound-site infection, needing surgical reference.

Nu. of ICD Days	Number of Subjects	(%)
<5	36	59.01
5 -10	19	31.14
>10	6	9.83

Table 8. Distribution of Study Subjects Based on Number of Days ICDs were Kept in situ

An average of 4.75 days were required for Intercostal tube removal, with maximum days being 14. (Table 8)

DISCUSSION

During the 18-month study period from May 2015 to November 2016, 61 patients underwent medical thoracoscopy, for pleural effusion remaining undiagnosed after extensive initial work-up. These patients were evaluated in detail and the diagnostic outcome and the safety of the procedure in them were studied.

Most of the patients were in the age group more than 60, mean age was 54.51 (range 19-85) years. 44% of the study population was over 60 years, 36% was between 40 - 59. Only 20% was below 40 years. There were 38 males and 23 females in the study with a male to female ratio of 1:0.60.

32 out of 61 in the study population were smokers, and 17 out of this 32 were current smokers. This corresponds to 52.5% and 27% of total study population respectively. 47.5% of population were non-smokers. Large number of non-smokers in our study was comprised of the female population in the study. There was no female smoker in the study.

Most common comorbidity observed was COPD (25.6%), followed by diabetes (14.8%), 5 patients had hypertension, 5 had coronary artery disease and 2 patients had previous history of pleural effusion.

Most common presenting symptom was dyspnea which was seen in 100% of cases, cough was the presenting symptom in 96% cases, loss of weight was complained by 86.9% patients, 78.7% patients complained of loss of weight and chest pain. 54.1% of patients had symptom of fever.

Of the 61 cases done, pleural biopsy was performed in all the patients. All the pleural biopsies were performed from costal pleura. Malignancy was confirmed from pleural biopsy in 31 cases accounting for 50.8% of study population. All these cases were proven malignant by the histopathological examination.

Among the malignancy cases 22 were confirmed to be adenocarcinoma cases, comprising 36% of the total study population. Mesothelioma was found in 7 cases. Difficulty in differentiating between adenocarcinoma and mesothelioma is a well-known dilemma of the pathologist.⁵ In our study also this evident in the fact that, 6 of the mesothelioma cases required immunohistological confirmation to differentiate from adenocarcinoma. In only one case, was the pathologist able to diagnose mesothelioma confidently, with the histological pattern.⁶ Histological markers used for differentiating adenocarcinoma and mesothelioma were TTF-1, calretinin, CEA and cytokeratin 5/6. One of the biopsy was reported as metastasis from round cell neoplasm. Most of the malignancies had visible pleural masses or discrete nodules. Many of them presented with haemorrhagic pleural effusion and extensive adhesions. 24 of the malignancy cases belonged to the age group of more than 60 years. There was no statistical significance in the age to malignancy status of the study population (P= 0.13). 20 of the malignant cases were males. Mesothelioma was predominantly seen in males with 6 out of 7 being that gender.

Tuberculosis was diagnosed in 15 cases of pleural effusion (24.6%). 11 out of 15 tuberculosis patients belonged to the 40-59 age group. 8 of the cases being males and the rest females. In 14 of these cases caseating granuloma formation was demonstrated in the pleural biopsy specimen. In 1 case, AFB was demonstrated on staining the biopsy specimen and culture was positive. Pleural appearance of tuberculosis patients mainly revealed an inflamed pleura with multiple adhesions and septations. Multiple, small nodules were seen on parietal pleura in many cases.

8 pleural biopsy specimens showed inflammation of pleura, suggestive of infection, without any granuloma formation or pleural nodules. Extensive loculations were noted in them and adhesions were removed. Culture and sensitivity reports of the pleural fluid or biopsy material were not conclusive of any particular organism in these cases. 7 of the pleural biopsy specimens (11.5%) showed non-specific inflammation. These cases were followed up but no etiological diagnosis could be identified.

Hence, out of 61 medical thoracoscopy cases done, we were able to identify an aetiology in 54 cases. This corresponds to a diagnostic yield of 88.5%, at par with other studies.

Pain was the commonest complaint in the post procedure period and mild fever was noted in some patients on the day

of procedure. Analgesics and antipyretics were administered empirically for patients following the procedure. Hence, objective assessment of these minor side effects was not fully done. No major complications like significant haemorrhage occurred during the procedure. This may be due to the fact that biopsies were attempted only from costal parietal pleura and supported by electro cautery facilities. Only one patient had a major complication, wound-site infection, needing surgical reference.

Intercostal drainage tube was inserted on wound closure in all the patients. Intercostal tubes were removed after confirming no air leak or fluid drainage of less than 100 ml for 2 consecutive days. Majority of the patients required tube drainage for less than 5 days (59%). Maximum days required for tube removal was 14 days. An average of 4.75 days was needed for intercostal tube removal following thoracoscopy. Prolonged intercostal drainage was needed in some patients with malignancy.

A study conducted in Department of Pulmonary Medicine, Provincial Hospital affiliated to Shandong University, Jinan, CHINA on "the diagnostic value of medical thoracoscopy for unexplained pleural effusion" concluded that medical thoracoscopy had a diagnostic positive rate of 96.8%.³ The pathological diagnosis was as follows: pleural metastases in 899 (37.8%), primary pleural mesothelioma in 439 (18.4%), tuberculous pleurisy in 514 (21.6%), non-specific inflammation in 226 (9.5%), empyema in 190 (8.0%), hepatic pleural effusion in 36 (1.5%) and pleural effusion of unknown causes in 76 (3.2%) cases.

Another study conducted by Department of Pulmonary and Critical Care Medicine, Cleveland Clinic Foundation on "the impact of thoracoscopy on the management of pleural diseases" concluded that thoracoscopy had a diagnostic sensitivity of 95% for malignancy and 100% for benign disease.⁴ Malignancy was shown by thoracoscopy in 27 of 41 (66%) patients who had a preoperative non-diagnostic closed pleural biopsy, and in 24 of 35 (69%) patients who had at least 2 preoperative negative pleural cytological specimens.

In a study conducted by Wilsher et al in 1998 diagnostic sensitivity for pleural malignancy was 85% and specificity 100%.⁷ There were no major complications, but four patients had late tumour seeding at the thoracoscopy site.

Post-operative pain was the most common complaint following the procedure. NourMoursi Ahmed S et al. in their study named 'Safety and Complications of Medical Thoracoscopy' concluded a similar result.⁸ Among the minor side effects, fever (3.9%) seen in 5 out of 127 patients were the most common one.

Brimms et al. reported outcomes for 58 patients for whom thoracoscopy had been performed over a twelve-month period. Hospital-acquired infections (pneumonia or empyema) proved to be the most problematic complication, occurring in six (10.5%) patients.⁹ Mootha et al, reporting retrospective data between 2007 and 2008 in an Indian tertiary referral hospital with a differing range of pleural

disease, reported similar incidence of empyema, which occurred in two of 35 cases (5.2%).¹⁰

CONCLUSION

Among patients with pleural disease remaining undiagnosed after usual initial investigation, thoracoscopy is a rapid, safe, and well-tolerated procedure with an excellent diagnostic yield. Considerable amount of training and skill development is needed before embarking on doing medical thoracoscopy. Malignancy, followed by tuberculosis is found to be the commonest cause detected with pleural biopsies in medical thoracoscopy. With good patient preparation and thoracoscopic technique, complication rates of medical thoracoscopy is very minimal.

Our study shows that rigid thoracoscopy is a safe procedure, that can be done by a trained pulmonologist in any tertiary healthcare with basic facilities. This has an appreciable diagnostic yield and can be useful for therapeutic interventions like treating loculations by adhesiolysis and talc pleurodesis.

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