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THORACOSCOPIC YIELD IN EVALUATION OF UNDIAGNOSED EXUDATIVE PLEURAL EFFUSIONS

Pulmonary Medicine

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ABSTRACT

AIM: To evaluate the yield of thoracoscopy in undiagnosed exudative pleural effusions.

MATERIAL & METHODS: This study included 42 patients having exudative pleural effusion during one year. Males & females of age >18 years were evaluated based on clinical, radiological & diagnostic analysis of pleural fluid. Patients with undiagnosed effusion were subjected to evaluation with a semi-rigid Olympus thoracoscope & biopsy was taken.

RESULTS: Overall yield of thoracoscopic pleural biopsy was 71%. Malignancy was noted in 33% with adenocarcinoma in 14 & squamous cell carcinoma in 2 patients. Tuberculosis was diagnosed in 38% of patients. The rest 29% had non-specific inflammation.

CONCLUSION: Medical thoracoscopy is a safe procedure and has a good diagnostic yield in patients with undiagnosed pleural effusion, particularly when the analysis is inconclusive.

KEYWORDS

Diagnostic thoracoscopy, malignant pleural effusion, Tuberculosis

BACKGROUND:
Medical thoracoscopy is a minimally invasive procedure used in diagnostic and therapeutic applications for pleural diseases. Contrary to thoracentesis and closed pleural biopsy, thoracoscopy permits biopsy with direct visualization.

With thoracoscopy, one can visualise the entire visceral and parietal pleura and take pleural biopsy from suspicious sites under vision. Larger pleural biopsy specimen taken under direct vision allows greater diagnostic yield.

Diagnosis of pleural TB can be achieved in 99% of patients with thoracoscopy, which is higher than the 51% yield for closed pleural biopsy[1]. The yield of thoracoscopic pleural biopsy is higher in patients with suspected pleural malignancy where a diagnosis could be achieved in 95% of patients as against 44% of patients by using a closed pleural biopsy[1].

Medical thoracoscopy increases the overall diagnostic yield in patients with exudate effusions when other investigations are inconclusive.

AIM:
Evaluating the yield of thoracoscopy in undiagnosed exudative pleural effusions.

PATIENTS & METHODS:
This is a prospective observational study that included 42 patients both males & females of age >18 years with undiagnosed exudative pleural effusions, admitted in Dr.Pinnamaneni Siddhartha Institute of Medical Sciences during a period of one year.

INCLUSION CRITERIA:
- Males & females of age >18 years with exudative pleural effusions, with inconclusive pleural fluid analysis.

EXCLUSION CRITERIA:
1. Patients with age below 18 years.
2. Patients with transudate pleural effusion, according to Light's criteria.
3. Patients whose initial pleural fluid examination through thoracentesis or closed pleural biopsy could reach a definitive histopathological diagnosis.
4. Absolute contraindications where the pleural space is obliterated by fibrous tissue.
5. Patients who are not fit for performing thoracoscopy as in the following cases:

- Patients with severe uncorrected hypoxemia despite continuous oxygen administration.
- Patients who could not withstand the lateral decubitus for a period long enough to perform the thoracoscopy.
- Patients with unstable cardiovascular or haemodynamic status.
- Patients with coagulation defects. The prothrombin concentration should be >60%, and the platelet count should be >60,000/mm^3.

This study was approved by the institutional ethics committee and written informed consent was taken from patients fulfilling the inclusion criteria and they were evaluated.

Diagnostic pleural aspiration was done and fluid was sent for bio-chemical, microbiological and cytological studies.

Undiagnosed patients on these aspects were subjected to medical thoracoscopic evaluation.

TECHNIQUE:
The procedure was done under local anaesthesia or conscious sedation in necessary cases.

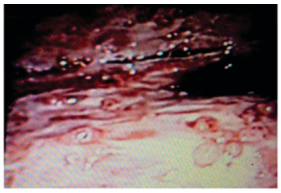
A 1-2 cm stab incision was given & presence of adhesions & bleeders from wound were checked.

A trocar was introduced & then fluid is evacuated and ipsilateral pneumothorax was induced as needed to create space for visualisation & a semi-rigid Olympus thoracoscope was introduced. Pleural cavity was examined systematically starting at the apex & then costal pleura, diaphragm & finally the mediastinal pleura, ending back at the apex. Biopsies were taken under direct vision from suspicious areas over costal and diaphragmatic parietal pleura.

Biopsies are placed in formalin for histopathological studies. At the end, a 24 size chest tube drain was fixed & connected to underwater-seal drainage.

A plain chest radiograph was taken to confirm tube position & proper drainage.

FIGURE-1



THORACOSCOPIC VIEW OF PLEURAL SURFACE SHOWING NODULES

RESULTS:

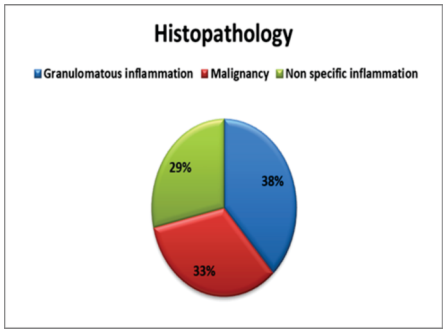
The study is conducted among 42 patients with undiagnosed exudative pleural effusions based on clinical, radiological & pleural fluid analysis.

Table-1: Demographic Profile

Age group	Frequency	Percentage	Male	Female
≤ 20 years	0	0%	0	0
21-40 years	8	19%	6	2
41-59 years	20	47.60%	18	2
≥ 60 years	14	33.30%	12	2
Total	42	100%	36	6

Among 42 patients, majority i.e., 47.60% (20) are between 41-59 years & 85.70% (36) are males & 14.30% (6) are females.

Figure-2: Histopathological examination



As shown in figure2, the overall diagnostic yield of thoracoscopic biopsy was 71%.

Tuberculosis was diagnosed in pleural biopsies with typical granulomatous inflammation in (16) 38% of patients & all of them were males.

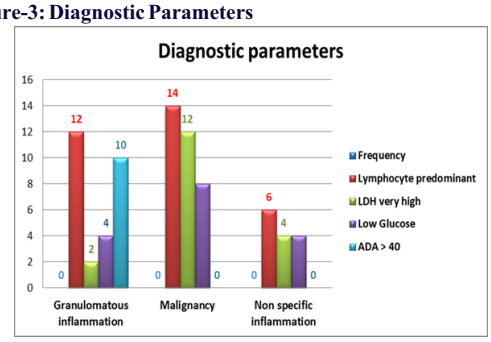
Malignancy was diagnosed in 33% i.e., 14 patients, among which 12 were males & 2 were females. And 2 patients were diagnosed as squamous cell carcinoma and rest of 12 were diagnosed as adenocarcinoma.

12 out of 42 patients (28%) were having non-specific inflammation, and 8 were males and 4 were females.

Table-2: Diagnostic parameters

Biopsy	Frequency	Low Glucose	LDH high	lymphocytes	neutrophils	ADA < 40	ADA > 40	CBNAAT
Granulomatous inflammation	16 (38%)	4	2	12 (75%)	4 (25%)	6 (37%)	10	0
Malignancy	14 (33%)	8	12	14 (100%)	0	14 (100%)	0	0
Non specific inflammation	12 (29%)	4	4	6 (50%)	6 (50%)	12 (100%)	0	0

Figure-3: Diagnostic Parameters



According to Table-2 and figure-3, 85% of malignant effusions show very high LDH (>1000U/L) and all are lymphocyte predominant.

Whereas, 62% of Tubercular effusions show elevated ADA levels & 75% are lymphocyte predominant. No bacteriological evidence through nucleic acid amplification tests was detected in tubercular effusions.

DISCUSSION:

Table-3 Comparison Of Results

	PRESENT STUDY	CHETAN BASAVARAJ PATILet.al[2]	MOOTHA et.al[3]	MERLIN THOMAS et.al [4]	L.A.HELALA et.al [6]
YIELD	71% (30/42)	85.2% (110/129)	74.3% (26/35)	91.4% (407)	95% (38/40)
MALIGNANCY	33% (14/42)	0.664	45.7% (16/35)	0.052	70% (28/40)
GRANULOMATOUS INFLAMMATION	38% (16/42)	0.282	22.8% (8/35)	0.845	22.5% (9/40)
COMPLICATIONS	NIL	NIL	5% (2/35)	0.012	10% (4/40)

In present study, overall diagnostic yield of thoracoscopic biopsy was 71% (30/42). A similar study conducted by C.B.Patil.et.al,[2] reported a yield of 85.2% i.e., 110 out of 129 patients studied; whereas V.K. Mootha.et.al,[3] reported 74.3% (26/35) yield, & M.Thomas.et.al,[4] had a yield of 91.4% which was done among 407 patients.

Malignancy was detected in (14/42) 33% of patients in our study. V.K.Mootha.et.al,[3] observed 45.7% (16/35) malignancy whereas C.B.Patil.et.al,[2] reported 66.4% (110/129) & L.A.Helala.et.al,[6] found malignancy in 70% (28/40). When compared to other studies the lower incidence of malignancy in our study can be attributed to the presence of more number of patients <59years.

All of them had lymphocyte predominant effusion, pleural fluid LDH >1000U/L & pleural fluid glucose <60mg/dl. Out of 42 patients studied, 18 (42%) had LDH>1000U/L, in which 12(66.6%) were proven to be malignant. Therefore elevated LDH had no significant correlation with malignancy (p=0.118). A study conducted by Dharmendra.A.Bamaniya.et.al,[7] reported LDH value of 678 ± 513 in malignant effusions, whereas A.Verma.et.al,[8] reported that LDH value of >1500U/L had poor prognosis in adenocarcinoma of the lung.

Among the granulomatous effusions diagnosed as tuberculosis, i.e. (16/42) 38%, all of them had pleural fluid ADA >40IU/L, while CBNAAT was negative in all of them. The sensitivity and specificity of the nucleic acid assay in pleural fluid were 43.6% and 98.6% respectively[9]. Hence, the diagnosis of tubercular effusion was made based on biopsy & other parameters. This indicates low sensitivity of pleural fluid CBNAAT as a marker in diagnosing tubercular effusion. Among 16 tubercular effusions, 12 patients had lymphocyte predominance whereas 4 patients had neutrophil predominance.

In a study on ADA levels & tuberculosis, done by D. Jimenez Castro.et.al, [10] the cut-off level of ADA in diagnosing tubercular effusions was 40 IU/L. In the present study, it was found that pleural fluid ADA >40IU/L had a significant correlation with tubercular effusions (p<0.05).

Out of the 28% i.e, 12 patients having nonspecific inflammation on pleural biopsy 6 patients had lymphocyte predominant fluid & were diagnosed as tubercular effusion and the rest of the patients (6/12) were treated as para-pneumonic effusion based on clinical history.

A variety of complications associated with thoracoscopy have been described in the literature[12-17], namely subcutaneous emphysema(0.6%-4.9%), air leak(0.5%-8.1%), empyema(0.5%-2.7%), haemorrhage(0.3%-0.4 %), shock (0.2%), chest wall seeding by malignancy(0.5%-4.0%).

When compared to other studies, procedure related complications were low, with 2 cases complicating empyema in a study done by V.K.Mootha.et.al,[3] and a minor bleed (1.2%) with no mortality in a

study done by M.Thomas.et.al.[4] In the present study, there were no intra procedural complications and procedure-related mortality was nil.

CONCLUSION:

Medical thoracoscopy is a safe procedure and has a good diagnostic yield in patients with undiagnosed pleural effusion, particularly when the pleural fluid analysis is inconclusive. A diagnostic dilemma can be reduced and more precise treatment can be offered to the patient at the earliest.

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