

Pneumologia

Diagnostic utility of closed needle pleural biopsy in exudative pleural effusions

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Abstract

English:

Background: Exudative pleural effusions are often challenging, and on many occasions remain undiagnosed. Hence, a blind closed needle pleural biopsy (CNPB) is extremely relevant against this background.

Methods: We conducted a prospective study, in which a CNPB using a Cope's needle was done in patients with exudative pleural effusion. Data were analysed using SPSS software.

Results: Our study included 250 patients, of which 140 (56%) were males and 110 (44%) female. 218 (87.2%) had tubercular effusion 22 (8.8%) had effusion secondary to malignancy, 8 (3.2%) had synpneumonic effusions, and 1 (0.4%) each had effusion secondary to pancreatitis and rheumatoid arthritis (RA). AFB culture was positive in 50 (22.4%) on pleural fluid, as compared to 209 (87%) on pleural biopsy. CBNAAT detected MTB in 34 (14%) on pleural fluid as compared to 72 (28.8%) on pleural biopsy. Caseous granuloma was found in 184 (73.6%). The sensitivity for AFB culture using CNPB tissue and pleural fluid was 95.8% and 22.5%, respectively ($P < 0.05$). Drug susceptibility testing (DST) done on pleural tissue divided our patients as drug sensitive 182 (87%), MDR 13 (6.2%), preXDR 12 (5.7%), and XDR TB 2 (0.9%). For malignancy, sensitivity of pleural fluid and pleural biopsy was 9% and 63%, respectively ($P < 0.05$). Major complications of the procedure were pain in 25 (10%), pneumothorax in 15 (6%), and haematoma in 8 (3%). Of the patients who developed pneumothorax, only one patient required intervention with an intercostal drain, and the rest resolved spontaneously.

Conclusion: CNPB is an easy, quick, cost-effective, and reliable method that can be used for diagnosing exudative pleural effusions of indeterminate aetiology in the out-patient setting.

Keywords

exudative • closed needle pleural biopsy • Cope's needle

Utilitatea diagnostică a biopsiei pleurale cu ac închis în revărsate pleurale exudative

Rezumat

Romanian:

Context: Efuziunile pleurale exudative sunt adesea provocatoare și, în multe ocazii, rămân nediagnosticate. Prin urmare, biopsia pleurală cu ac închis (CNPB) este extrem de relevantă în acest context.

Metode: Am realizat un studiu prospectiv, în care s-a realizat un CNPB folosind un ac Cope la pacienții cu revărsat pleural exudativ. Datele au fost analizate folosind software-ul SPSS.

Rezultate: Studiul nostru a inclus 250 de pacienți, dintre care 140 (56%) au fost bărbați și 110 (44%) femei. 218 (87,2%) au avut revărsate tuberculoase, 22 (8,8%) au avut revărsate secundare malignității, 8 (3,2%) au avut revărsate parapneumonice și câte 1 caz (0,4%) a avut revărsare secundară pancreatitei și artritei reumatoide (AR). Cultura AFB a fost pozitivă în 50 (22,4%) pe lichid pleural, comparativ cu 209 (87%) la biopsie pleurală. CBNAAT a detectat MTB la 34 (14%) la lichidul pleural, comparativ cu 72 (28,8%) la biopsia pleurală. Granulomul cazeos a fost găsit în 184 (73,6%). Sensibilitatea pentru cultura AFB folosind țesut CNPB și lichid pleural a fost de 95,8% și, respectiv, 22,5% ($P < 0,05$). Testarea sensibilității la medicamente (DST) efectuată pe țesutul pleural a împărțit pacienții noștri ca sensibili la medicamente 182 (87%), MDR 13 (6,2%), preXDR 12 (5,7%) și XDR TB 2 (0,9%). Pentru malignitate, sensibilitatea lichidului pleural și a biopsiei pleurale a fost de 9%, respectiv 63% ($P < 0,05$). Complicațiile majore ale procedurii au fost durerea la 25 (10%), pneumotoraxul în 15 (6%), și hematomul la 8 (3%). Dintre pacienții care au dezvoltat pneumotorax, doar un pacient a necesitat intervenție cu montare de dren intercostal, iar restul s-a rezolvat spontan.

Concluzie: CNPB este o metodă ușoară, rapidă, rentabilă și fiabilă care poate fi utilizată pentru diagnosticul revărsatelor exudative de etiologie nedeterminată în ambulatoriu.

Cuvinte-cheie

exudativ • biopsie pleurală cu ac închis • Acul lui Cope

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Introduction

Pleural effusions constitute a group of disorders encountered by physicians and pulmonologists. They can have various aetiologies and manifestations. Pleural effusions have been customarily classified into transudative and exudative based on Light's criteria for the sake of elementariness and management (1). The workup of a patient with pleural effusion generally commences with a diagnostic thoracentesis. The diagnostic yield of thoracentesis however is suboptimal and ranges between 25% and 75% (2,3). Hence, a large share of exudative pleural effusions may still remain undiagnosed even after an extensive workup on the pleural fluid. A needle biopsy of the pleura is the next investigation to be resorted to in these circumstances. The *modus operandi* for performing it could be either a blind closed needle pleural biopsy (CNPB) or an image guided pleural biopsy such as ultrasonography (USG) guided or computed tomography (CT) (4) guided pleural biopsy or a medical thoracoscopy (MT) (5) guided pleural biopsy each having its own pros and cons. CNPB has been a traditional procedure for obtaining pleural tissue since decades. It can be performed by a variety of needles, the commonest being the Copes (6) and the Abrams (7) needles. In a developing country such as ours, a tuberculosis (TB) prevails to be a titanic share of the bulk of the pleural effusion assemblage. Also, the problem of drug resistance makes the management of TB pleural effusions tedious and renders a drug susceptibility testing (DST)-based regime mandatory (8). Compromising on DST can have perilous consequences in terms of grave morbidity, tenacious infectiousness, and further magnification of drug resistance. A DST-based therapy is however possible only on pleural tissue considering the dismal yield of pleural fluid microbiology in TB (8). Also, in this era of evidence-based medicine, empiricism should be strongly discouraged, more so for a nefarious disease such as TB. Hence, a needle biopsy of pleura becomes *de rigueur* particularly in TB pleural effusions. And out of the available modalities, CNPB is a simple bedside procedure that can be performed on a day care basis even with limited resources and manpower. Hence, we decided to assess the utility of this traditional yet propitious technique in the pulmonary medicine department of a government hospital in India.

Methodology

This was a prospective observational study conducted at the Pulmonary Medicine Department of a tertiary care hospital in Mumbai after an institutional ethics committee approval. Two-hundred-and-forty patients of exudative pleural effusion determined based on Light's criteria were incorporated in the study. Exclusion criteria for pleural biopsy were: age <12 years,

noncooperative and/or moribund patient, and patients with bleeding diathesis, transudative effusion, and local skin infections. After giving a detailed explanation regarding the study, written informed consent was obtained from the patients. The study participants were assessed in detail with history, general physical and systemic examination, routine blood investigations such as complete haemogram, liver, and renal function tests, and a chest X-ray posteroanterior and lateral view. A lateral decubitus view was also obtained in subpulmonic effusions. Abdominal, chest ultrasound, and CT scan were also done where required in some cases. A diagnostic thoracentesis was done, and aspirated fluid was evaluated for cell count, biochemistry, acid fast bacilli (AFB) smear and culture, cartridge-based nucleic acid amplification test (CBNAAT), adenosine deaminase (ADA) levels, and cytology for malignant cells. The patients were subjected to a pleural biopsy with Copes pleural biopsy needle. The patient was seated on a procedure table, leaning forward on a side table, arms across the chest placed on shoulders. Biopsy site was selected by clinico-radiological correlation. In the selected intercostal space, biopsy was done from the inferior and lateral aspects. The superior aspect was avoided in order to spare the intercostal bundle from damage. The site was cleaned, wrapped, and anaesthetised with topical 2% lignocaine. The Copes needle was inserted after making a small scalpel incision in the skin and subcutaneous tissue under all aseptic precautions. Once the tip of the needle was in the pleural space after a give way sensation was appreciated, the inner stylet was removed. The outer trocar was held firmly with one hand while the inner cannula with a cutting edge was inserted and rotated into the closed position with the other hand to obtain a small piece of parietal pleura. The biopsy needle was then slowly withdrawn and the biopsy tract immediately occluded with a finger to prevent pneumothorax. The patient was instructed and taught to breath-hold at end expiration during the insertion or removal of the inner cannula to minimise the chances of an iatrogenic pneumothorax. The biopsy specimen obtained was collected in formalin as well as normal saline bottles for histopathological (HP) and AFB smear and culture examination, respectively. DST was done by the line probe assay (LPA) method for isoniazid (H), rifampicin (R), fluoroquinolone (FQ), and second-line injectables (SLI), that is, amikacin, kanamycin, and capreomycin was performed on all patients who had CNPB tissue culture positivity. Pleural fluid as well as pleural biopsy AFB smear and culture and DST was performed from a laboratory accredited by RNTCP for MGIT culture and first-line DST. Therapeutic pleural fluid aspiration was done at the same time wherever required. Biopsy wounds were sealed with sterilised dressing and a follow-up chest X-ray was obtained. All the information

thus collected was analysed using SPSS version 10 by the statistician. Means, ratios, percentages, and frequencies were calculated.

Results

Our study included 250 patients with exudative pleural effusion, of which 140 (56%) were males and 110 (44%) female. The mean age was 36.2 (± 12.1) years. Ninety (36%) cases presented with massive effusion and 160 (64%) with moderate effusion. Pleural fluid was straw-coloured (serous) in 160 (64%) patients, purulent (empyema) in 50 (20%), and haemorrhagic in 40 (16%) patients. Pleural fluid ADA was elevated in 204 (81.6%) patients.

Of the 250 patients, 218 (87.2%) patients had tubercular effusion while 22 (8.8%) had effusion secondary to malignancy, as proven on AFB culture/histopathology/cytology of pleural biopsy or pleural fluid. Further, eight (3%) patients had bacterial/synpneumonic effusion, and one patient each (0.5%) had RA-associated and pancreatitis-related effusion (Table 1). Of the 160 serous pleural effusions, 154 (96%) were tubercular, 2 (1.25%) were malignant, 3 (1.87%) were bacterial, and 1 (0.67%) was secondary to RA. Empyema was secondary to TB in 45 cases (90%), while the remaining 5 cases (10%) were secondary to bacterial aetiology. The main causes of haemorrhagic pleural effusions were TB in 19 patients (47.5%), malignancy in 20 patients (50%), and pancreatitis in 1 patient (2.5%). (Table 2)

TB was eventually diagnosed in 218 patients, of whom 209 patients had pleural biopsy tissue AFB culture positive. Out of the remaining nine patients, pleural fluid culture standalone could give the diagnosis in three patients while pleural fluid CBNAAT was positive in three patients. In the rest of three patients, the diagnosis was achieved based on HP evidence of granuloma against a background of subacute clinical history, pleural fluid routine microscopy suggestive of exudative, lymphocytic predominant effusion, with elevated ADA, and a positive TST. On pleural fluid examination, CBNAAT

detected MTB (*Mycobacterium tuberculosis*) in 34 patients. Of these 34 patients, 30 had tubercular empyemas, while 4 had serous effusion. On AFB culture examination, pleural fluid was positive in 50 patients. Thus, pleural fluid CBNAAT had a sensitivity, specificity, Positive predictive value (TPV), and Negative predictive value (NPV) of 15%, 100%, 100%, and 15%, respectively, while for AFB culture, sensitivity, specificity, TPV, and NPV are 22.5%, 100%, 100%, and 13.5%, respectively (Table 3; Figure 1A). However, when the fluid is purulent, the diagnostic yield of CBNAAT increased significantly, with sensitivity being 66.7%. This difference was statistically significant ($P < 0.05$). AFB culture was positive in 209 (95.8%) patients on pleural biopsy. CBNAAT detected MTB in 72 (33%) patients on pleural biopsy. On HP examination, caseous granuloma was found in 184 (73.6%) patients evaluated with pleural biopsy, consistent with the diagnosis of TB. The sensitivity and specificity of pleural biopsy for AFB culture were 96% and 100%, respectively, with a TPV of 100% and an NPV of 78%. On the other hand, for CBNAAT, this sensitivity, specificity, TPV, and NPV for pleural biopsy were 33%, 100%, 100%, and 18%, respectively (Table 4; Figure 1A). Finding a granuloma on HP examination increases the likelihood of diagnosis, as in our study, the sensitivity and

Table 2. Pleural fluid characteristics.

Characteristic of pleural effusion		
Type (n)	Cause	No. of patients (%)
Serous (160)	TB	154 (96)
	Malignancy	2 (1.25)
	Bacterial	3 (1.85)
	RA-associated	1 (0.67)
Empyema (50)	TB	45 (90)
	Bacterial	5 (10)
Haemorrhagic (40)	TB	19 (47.5)
	Malignancy	20 (50)
	Pancreatitis	1 (2.5)
Total	250	

RA, rheumatoid arthritis; TB, tuberculosis.

Table 1. Causes of pleural effusion in our patients.

Causes of pleural effusion	
Aetiology	No. of patients (%)
TB	218 (87.2)
Malignancy	22 (8.8)
Synpneumonic	8 (3.2)
RA	1 (0.4)
Pancreatitis	1 (0.4)
Total	250 (100)

RA, rheumatoid arthritis; TB, tuberculosis.

Table 3. Diagnostic yield of pleural fluid.

Diagnostic yield of pleural fluid			
	TB		Malignancy
	AFB culture	CBNAAT	
Sensitivity (%)	22.5	15.5	9.00
Specificity (%)	100	100	99.5
TPV (%)	100	100	66.7
NPV (%)	13.5	15	92.00

AFB, acid fast bacilli; CBNAAT, cartridge-based nucleic acid amplification test; TB, tuberculosis.

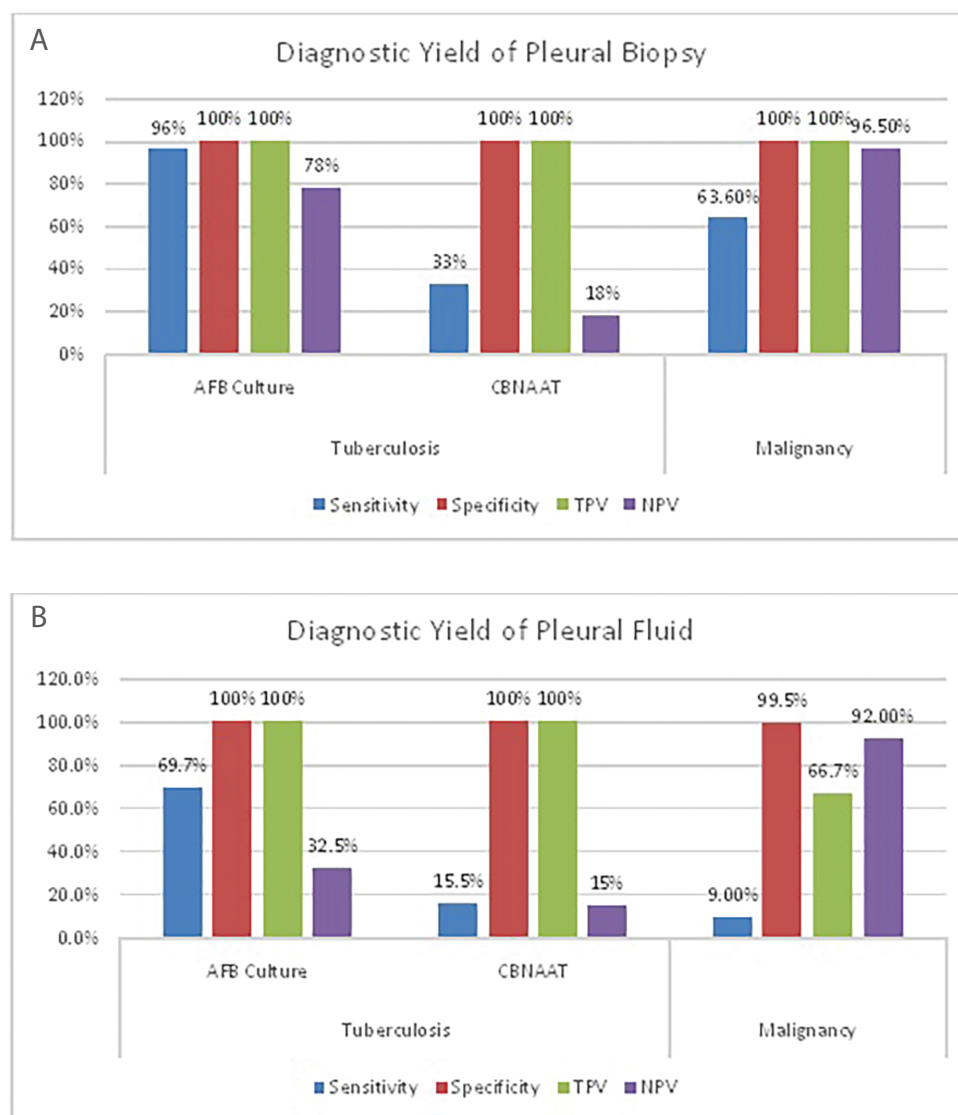


Figure 1. (A) Diagnostic yield of Pleural Biopsy for TB & malignancy. (B) Diagnostic yield of Pleural Fluid for TB & malignancy.

specificity of finding a granuloma for TB diagnosis were 84.5% and 100%, respectively. This had a TPV and an NPV of 100% and 48.5%, respectively. DST with LPA method for H, R, FQ, and SLI was performed on all patients who had CNPB tissue culture positivity, that is, in 209 patients. Out these, 182 (87%) patients were sensitive to R, while 27 (13%) had R resistance on first line LPA, that is, multidrug resistant tuberculosis (MDR TB). Of the 182 R sensitive patients, 177 (97%) were sensitive to H as well, while the remaining 5 (3%) patients had H resistance. Of the 27 R resistant patients, 13 (48%) were sensitive to both FQ and SLI. Twelve (44%) patients were resistant to FQ, that is, pre-extensively drug resistant tuberculosis (preXDR TB), while being sensitive to SLI, while the remaining two (8%) patients had resistance to FQ along

with linezolid or bedaquiline or both drugs, that is, extensively drug resistant tuberculosis (XDR TB) (Table 5).

Out of the 22 cases that proved to be malignancy eventually, CNPB could diagnose 14 (63.5%) of these cases on HP examination, with findings of atypical cells, later confirmed on immune histochemistry markers (IHC). Other cases were diagnosed based on CT-guided/USG-guided biopsy of the underlying mass lesion and lymph node in some cases. Out of 22 cases diagnosed as malignant effusion, 18 (82%) were adenocarcinomatous deposits in pleura, 3 (13.5%) were squamous cell carcinomatous deposits, and 1 (4.5%) was adenosquamous variety. Pleural fluid analysis found atypical cells in three patients, of whom two turned out to be malignancies eventually, while one had pancreatitis.

Table 4. Pleural biopsy diagnostic yield.

	Diagnostic yield of pleural biopsy		
	TB		Malignancy
	AFB culture	CBNAAT	
Sensitivity (%)	96	33	63.60
Specificity (%)	100	100	100
TPV (%)	100	100	100
NPV (%)	78	18	96.50

AFB, acid fast bacilli; CBNAAT, cartridge-based nucleic acid amplification test; TB, tuberculosis.

Table 5. DST pattern obtained on the CNPB tissues with AFB culture positive.

Drug sensitivity pattern of TB patients	No. of patients (%)
Rifampicin sensitive	182 (87)
R & H sensitive	177 (84.5)
H mono-resistance	5 (2.5)
Rifampicin resistant (MDR)	27 (13)
FQ & SLI sensitive	13 (6.2)
Pre-XDR (FQ resistant only)	12 (5.7)
XDR (FQ & LZD or BDQ resistant)	2 (1)

AFB, acid fast bacilli; CNPB, closed needle pleural biopsy; DST, drug susceptibility testing; FQ, fluoroquinolone; MDR, multidrug resistant; SLI, second line injectables; TB, tuberculosis; XDR, extensively drug resistant; pre-XDR, pre-extensively drug resistant.

Table 6. Cross tabulation of pleural fluid cytology with pleural biopsy histopathology.

Pleural biopsy analysis	Pleural fluid cytology		
	Nonmalignant	Malignant	Total
Malignant, <i>n</i> (%)	12 (4.8)	2 (0.8)	14 (5.6)
Tubercular pleuritis, <i>n</i> (%)	212 (84.8)	0 (0)	212 (84.8)
Nonspecific pleuritis, <i>n</i> (%)	12 (4.8)	6 (2.4)	18 (7.2)
Inconclusive, <i>n</i> (%)	4 (1.6)	2 (0.8)	6 (2.4)
Total, <i>n</i> (%)	240 (96)	10 (4)	

$P < 0.05$.

Sensitivity, specificity, TPV, and NPV of pleural biopsy and pleural fluid for diagnosis of malignancy were 63%, 100%, 100%, 96.5% and 9%, 99.5%, 66.7%, and 92%, respectively (Table 6; Figures 1A and 1B). Further comparison of pleural fluid and biopsy has been given in Figures 1A and 1B. It shows that pleural biopsy has significantly higher diagnostic yield for diagnosis of TB as well as malignancy, with P value < 0.05 . Out of the 250 patients, pleural biopsy standalone provided the definitive diagnosis on 223 (89.2%) patients, based on microbiology and histopathology. Of the remaining 27 cases, 3 patients (1.2%) had granuloma, without conclusive microbiology, and responded on empirical ATT, and 18 (7.2%) had nonspecific pleuritis, while 6 (2.8%) had inconclusive

Table 7. Complications of pleural biopsy in our patients.

Complications	No. of patients (%)
Pain	25 (10)
Pneumothorax	15 (6)
Haematoma	8 (3)

biopsy. Out of the 240 patients with TB or malignancy, pleural biopsy was conclusive in 223 patients (93%). Of the remaining 10 patients, 8 had bacterial/synpneumonic effusions. Of these eight patients, five had empyemas, while three had serous effusion. Pleural fluid analysis suggested exudate with neutrophil predominance in six of these patients, while ADA was elevated in five patients. Pleural biopsy HP suggested nonspecific pleuritis in all these cases, while AFB culture and CBNAAT were negative in all. One patient had pancreatitis-related effusion, which was haemorrhagic. Pleural fluid cytology yielded atypical cells; however, pleural biopsy was inconclusive. Pleural fluid amylase and lipase levels were elevated, consistent with serum amylase and lipase levels. One patient with RA-associated pleural effusion had low fluid glucose levels, which failed to elevate on oral glucose challenge test. Pleural fluid RA factor was positive, consistent with serum RA factor. Pleural biopsy was inconclusive.

Major complications of the procedure were pain in 25 patients (10%), pneumothorax in 15 (6%), and haematoma in 8 patients (3% of the patients). Of the 15 patients who developed pneumothorax, only 1 patient required intervention with an intercostal drain, and the rest resolved spontaneously (Table 7).

Discussion

We included 250 patients with exudative pleural effusion and made an endeavour to reach the diagnosis by an assessment of the pleural fluid and CNPB features. In our study, 56% were men and 44% women. The mean age was 36.2 years. On the other hand, in a study done by Choubey et al. (9), there were 77% men and 23% women and the mean age was 38 years. Pleural fluid was straw-coloured in 160 (64%) patients, empyema in 50 (20%), and haemorrhagic in 40 (16%) patients. In haemorrhagic effusions, out of 40 cases, 20 (50%) were diagnosed as malignant effusion, 19 (47.5%) as tuberculous effusion, and 1 (2.5%) as pancreatitis-associated effusion. This was similar to a study done by Ramesh et al. (10), in which pleural fluid was haemorrhagic in 39% of the patients and straw-coloured in 61 patients. In haemorrhagic effusions, 52% were diagnosed as malignant effusion while 30% were diagnosed as tuberculous effusion. In this study, an adequate pleural tissue was obtained in 96% of the cases while we could obtain an adequate tissue in all our cases. The

predominant aetiologies in our study were tuberculous 87.2%, malignancy 8.8%, and bacterial empyema 2%. In a similar study done by Suri et al. (11), the distribution was tuberculous 43%, malignancy 29%, and empyema 6%. The yield of pleural fluid microbiology or cytology alone in establishing the definitive diagnosis in exudative pleural effusions has been variably reported in literature to be 10%–40% (12). In cases of malignant pleural effusion, the yield of pleural fluid cytology alone has been shown to be around 60% (13). In our study, the yield of pleural fluid cytology was 66.7%. In our study, the overall yield of CNPB was 89.2%. There is a huge disparity in the overall yield of CNPB reported in literature to the extent of the range being 40%–80% (9,10,11,14). CNPB outcome was nonspecific pleuritis or inconclusive only in 27 (10.8%) cases. This is much lesser than the inconsistent results to the extent of 30% mentioned in other studies done that belong to a similar kind (15). CNPB can be performed with the aid of a variety of needles of different architecture, the most common ones being the Copes and Abrams needles. The Abrams needle is larger, has a wider bore, and procures bigger tissue bits. However, it is more traumatic as compared to the Copes needle. Studies comparing the efficacy of the two needles have demonstrated comparable yields (16). We therefore used a Copes needle and our yield was at par with other studies conducted with an Abrams needle in the literature (9,17,18). This variability can be attributed to the differences in the prevalence of TB in the population studied, the biopsy technique and the needle used, the number of specimens taken, and the quality of HP analysis (17,19). The yield has been shown to increase in proportion commensurate to the number of samples taken. Also, the procedure is a simple bedside technique and the yield is not significantly affected even if performed by a junior performer who is adequately trained as compared to a senior fellow (17). The yield of an image-guided pleural biopsy such as that done with the assistance of CT or USG guidance has been reported to be up to 75%, whereas the yield obtained by a thorascopic technique has been reported to be in the range of 75%–95% (18,20). Thus, in our study, the yield obtained by a blind CNPB is one of the maximum reported in the literature till date, and is comparable to an image and thorascopic pleural biopsy.

Out of the 218 patients having a tuberculous pleural effusion, CBNAAT could detect MTB in 34 (15.5%) when done on pleural fluid whereas it could detect MTB in 72 (33%) when done on pleural biopsy tissue. On the other hand, in a study done by Friedrich et al. (21), the sensitivity on CBNAAT in pleural fluid was 25%. There is a paucity of literature pertaining to the efficacy of CBNAAT in pleural biopsy tissue. Isolated pleural fluid culture is around 12%–30% sensitive in identification of tuberculous pleural effusion (22), whereas when combined with pleural biopsy culture and histopathology the yield increases to 70%–90% (23,24). This phenomenon was seen in our patients

too. Out of the 218 cases that proved to be TB eventually, pleural fluid culture could pick up MTB in 50 (22.4%) cases while pleural biopsy could diagnose 209 (95.8%) cases. We also observed a very interesting fact. When the fluid is purulent, the diagnostic yield increased significantly, with sensitivity for CBNAAT being 66.7%. This difference was statistically significant ($P < 0.05$). The superior yield of CBNAAT in pus samples as compared to pleural fluids has been shown in few studies (25). We observed this phenomenon in empyema thoracis too. On HP examination, caseous granuloma was found in 184 (73.6%), which is comparable to a study done by Rao et al. (26) where granuloma could be obtained in 69.6% of the cases. Finding a granuloma on pleural biopsy is very relevant especially in cases that are microbiologically negative for TB by CBNAAT and AFB smear. As in these patients, granuloma can endorse the diagnosis of TB in the correct clinicoradiological context of an exudative lymphocytic pleural effusion with elevated ADA levels. These patients can be started on ATT while awaiting the culture report. Thus, pleural biopsy is an extremely sensitive and specific tool to diagnose tuberculous pleural effusion by a three-pronged approach of CBNAAT, AFB culture, and HP. The most salient aspect of our study was the performance of DST on the CNPB tissues. This enabled the determination of drug sensitivity pattern and classification of the patients into MDR (27), preXDR (27), or XDR (27) at baseline itself, facilitating initiation of appropriate first- or second-line anti-TB therapy. In the treatment of TB, a therapy without background knowledge of DST is similar to shooting aimlessly in the dark. This leads to amplification of drug resistance and loss of precious lives (8). However, a DST-based therapy will not be possible if a pleural biopsy is refrained, as the yield of pleural fluid positivity for AFB is highly unsatisfactory as compared to pleural tissue. The occurrences of MDR, preXDR, and XDR TB pleural effusion in our study were 13 (6.2%), 12 (5.7%), and 2 (0.9%), respectively. This pattern is concordant with that seen in a study done by Anastasakos et al. (8) on pleural fluid isolates. However, even after an exhaustive literature review, we did not come across any study pertaining to DST done on pleural tissue obtained by a CNPB to compare our results. Hence, our study becomes noteworthy from this aspect as well.

The yield of blind CNPB in the diagnosis of malignant involvement of the pleura has variably been reported in literature to be 50%–70% (9,14,24), whereas that obtained by a thorascopic technique is higher to the extent of 85% (28). This difference is due to the fact that malignancy involves the pleura in an irregular skewed fashion with predominant involvement of the visceral pleura, which is relatively inaccessible by a blind CNPB. This in contrast to tuberculous involvement of the pleura, which is diffuse granulomatous and has an inclination for the parietal pleura. In our study, the yield of blind CNPB in malignancy was 63.5%, which is very satisfactory. Also, a precise cell typing by IHC was possible in these patients.

The complications known to occur with a CNPB are pain, pneumothorax, haematoma, subcutaneous emphysema, vasovagal syncope, and transient fever (29). The complications encountered in our patients were pain in 25 patients (10%), pneumothorax in 15 (6%), and haematoma in 8 patients (3% of the patients). Only one of the patients with pneumothorax required a chest drain insertion. This complication rate is almost similar to another study of this kind by Pereyra et al. (28), where they were found recorded in 14.4% of patients (pneumothorax, 9.4%; chest pain, 5.6%; vasovagal reaction, 4.1%). CNPB has been a canonical and evidence-endorsed procedure for the diagnosis of exudative pleural effusions since ages (30). However, this concept has been disputed with the burgeon of thoracoscopy-guided pleural procedures and the current literature and guidelines preferring a thorascopic approach after an inconclusive thoracocentesis (31). However, these techniques are costlier, require prowess, and may not be pragmatic in resource-limited settings. In contrast to this, CNPB has its own oysters in the form of commensurate yield, safety, simplicity, low resource and expertise requirement, widespread availability, and cost effectiveness. These give it an edge over thoracoscopy, particularly in developing countries such as India with a high incidence of TB pleural effusions. We therefore reiterate that a blind CNPB should be the first resort in the further workup of an exudative pleural effusion of undetermined aetiology after a thoracocentesis.

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