ORIGINAL RESEARCH PAPER

Pulmonary Medicine

TO EVALUATE THE DIAGNOSTIC YIELD OF TRANSBRONCHIAL NEEDLE ASPIRATION IN CASES OF LUNG CANCERS AND MEDIASTINAL MASSES

KEY WORDS: Bronchogenic Carcinoma, TBNA, EML, BB, BW, Bronchoscopy.

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ABSTRACT

Background: A great deal of interest in transbronchial needle spiration (TBNA) lies in its utility as a staging tool in patients with bronchogenic carcinoma. The aim of this study to evaluated the diagnostic yield of TBNA in cases of lung cancers and mediastinal masses. **Materials & Methods:** The study was carried out and data were gathered in a prospective fashion and all the data were reviewed retrospectively. Samples were collected from all patients bronchial washings (BW), brush biopsy (BB), EBB, and TBNA. All TBNA specimens were sent for cytologic evaluation without ROSE as per recommended guidelines. **Results:** The mean age of studied cases was 58.07 years. The common radiological presentation on x-ray chest was mass lesions in 76.66%, mediastinal widening 60%, consolidation 26.66% and SPN 3.33% of cases. The diagnostic yield of various bronchoscopic procedure were 27% by BW, 47% by BB, 60% by EBB, 87% by TBNA. **Conclusion:** We conclude that the overall diagnostic yield of flexible bronchoscopy procedure is increased in patients with EML or SPD by the addition of TBNA. The TBNA is a safe procedure that should be routinely used to increase diagnostic yield in patients with EML or SPD. In cases of SPD, TBNA should be considered the procedure of choice.

INTRODUCTION

Lung Cancer is the leading cause of cancer deaths worldwide. Its incidence increased dramatically throughout the twentieth century and still is increasing as the twenty first century begins.1 Lung cancer is among the five main types of cancer leading to overall cancer mortality contributing about 1.3 million deaths/year globally.2 In 2005 cancer killed approximately 8,26,000 people in India of which 5,19,000 were under the age of 70. Lung cancer may present either as a parenchymal lesion or as endobronchial disease. The endobronchial disease tends to manifest in one of three patterns. The growth may be predominantly in the mucosal layer, in which case the tumor presents as a bulky, exophytic mass lesion (EML). It can also spread predominantly in the submucosa, with endoscopic findings consisting of erythema, vascular flares, enhanced rugal pattern, loss of the normal bronchial markings, narrowing of the bronchus, or thickening of the mucosa.

The use of transbronchial needle aspiration (TBNA) in the staging of lung cancer and in the diagnosis of peripheral lesions has been well documented.4,5 However, its utility in endobronchial lesions has not been substantiated. Possibly the higher yield obtained from endobronchial forceps biopsy (EBB) has precluded its use in EML.6-8 Despite the poor yield from EBB and the reported higher yield with the use of TBNA in submucosal and peribronchial disease (SPD),3 the use of TBNA has been quite restricted.

A great deal of interest in transbronchial needle spiration (TBNA) lies in its utility as a staging tool in patients with bronchogenic carcinoma.

Most studies have confirmed that TBNA is a relatively sensitive, highly specific method of staging the mediastinum, which may avert the need for surgical staging in certain patients.9-11 The aim of this study to evaluated the diagnostic yield of TBNA in cases of lung cancer.

MATERIALS & METHODS

The study was carried out and data were gathered in a prospective fashion and all the data were reviewed retrospectively.

Patients came to the Respiratory Medicine OPD and Indoor of GBH General Hospital, attached to American International Institute of Medical Science, Udaipur, Rajasthan. . Study was carried out from January 2021 to june 2023 with suspicion of bronchogenic carcinoma were registered for the study .

A detailed clinical history with complete physical examination was carried out in all the patients including the symptoms, duration of illness, smoking history; as per Performa given.

Inclusion Criteria

Patients found to have endobronchial disease, hilar or mediastinal lymph nodes (Mediastinal masses and adenopathy) on Chest X- Ray or computed tomography. Patients found to have EML or SPD during routine fiberoptic bronchoscopy has been entered in the study.

Exclusion Criteria

- Patients with pre-existing known malignancy.
- Patients in whom bronchoscopy was contraindicated

The patients was kept nothing by mouth (NBM) at least 6 hour for liquids and 8 hour for solids before procedure and patients was premedicated with 0.6mg atropine and promethazine hydrochloride 50mg injection intramuscularly. First of all xylocaine sensitivity was done then gargling with at least 20ml of 2% xylocaine solution followed by spraying of oropharynx and epiglottis with 3-5ml of 1% xylocaine solution with the help of atomizer. Nasal cavity was also anaesthetize with 2% xylocaine jelly.

The procedure was perform with the help of flexible fiberoptic video bronchoscope (**OLYMPUS BF TYPE 1T-150** with fully compatible OLYMPUS CV-150 video processor, biopsy forceps- FB-20C and cytology brush BC-9C) via nasopharyngeal or oropharyngeal route.

Samples were collected from all patients bronchial washings (BW), brush biopsy (BB), EBB, and TBNA. The procedural sequence between EBB and TBNA was randomly allocated to either of the two sequences:
(1) BW and TBNA, or (2) BW, EBB, BB and TBNA

Sample Collection

Following specimen has been collected:

Bronchial Washing:

This was the first sample collection before endobronchial biopsy or bronchial brushing with instillation of normal

saline(0.9% NaCl solution), when growth was visualize, the bronchoscope was fixed in close proximity and 10 to 15 ml normal saline was introduced through the internal channel of the bronchoscope. The material was immediately be sucked out again and has been collected in a sterile specimen TRAP bottle to be placed in the suction pathway and bronchoscope. The bronchial washing was centrifuged and the supernatant was discarded. The sediment was smeared over 4 to 5 glass slides.

Air dry slides was fix in 70% ethyl alcohol, later on stain with M.G.G stain (May Grunwald and Giemsa stain) for malignant cells.

TBNA/EBNA

(A) To obtain adequate TBNA specimens three passes for endobronchial vascular lesions and two passes for mediastinal masses and adenopathy with the cytology needle (19 or 21- gauge; Length 15mm to 18mm) was performed. Both smear preparation and flushed aspirates was sent for cytology evaluation and ROSE was not be performed because of unavailability of facility in the hospital and limited resources.

(B) For obtaining specimens from EML, the needle was directly inserted into the lesion, avoiding necrotic areas as practiced with other CDP.

(C) For submucosal lesions, the needle was partially introduced at an angle of 45° into the bronchial wall, whereas complete penetration through the wall was performed in the case of extrinsic compression from peribronchial disease[7]. The bronchoscopic findings has been correlated with the anatomic location of the peribronchial lesion on CT scans of the chest.

Technique for TBNA/EBNA

Before the procedure, the operator should review the radiology images to locate the lung nodules, masses and mediastinal lymph nodes involvement, using the **IASLC** LNs map to help select the proper lymph nodes sites for needle puncture.

We would like to highlight the most common mistakes that the beginners tend to make which results in a failed and ineffective TBNA.

(I) The needle did not penetrate the bronchial wall completely;

(II) Inadequate angulation of the needle;

(III) Lymph node missed despite adequate penetration and angulations;

Before the needle is inserted into the scope, the needle tip must be inside the metal hub. When the metal hub is visualized, the needle is advanced and locked. The whole catheter should be withdrawn to a point where only the distal tip of the needle is visible. Then the scope is advanced to the target area. After this, there are 3 methods described of needle insertion through the bronchial wall. First, **Jabbing Method:** after the scope is fixed at the nose or the mouth by assistant, the needle is thrust through the inter cartilaginous space with a quick, firm jab.

Second, **Pushing Method** (**Piggy Back Method**): after the needle tip contacts the mucosa at the puncture site, the catheter is advanced until the hub is visible. Then, the catheter is fixed in relation to the scope at the proximal insertion port using the left hand fingers, and the scope is pushed forward at the distal end close to the nose by the right hand. The bronchoscope and catheter are actually pushed forward as a single unit until the entire needle penetrates the tracheobronchial wall. Thirdly, occasionally, with the needle retracted, the distal end of the catheter (the metal hub) can be placed directly in contact with the mucosa and held firmly; then the needle is pushed in and locked. Usually the needle will penetrate through the tracheobronchial wall. If not, follow through with the jabbing or pushing technique. This was called the **Hub Against the Wall Method**. All of these techniques can be used singly or in combination to insert the needle through the tracheobronchial wall.

These three techniques was used for TBNA and for endobronchial lesions, we were penetrate needle in the centre of lesions.

All TBNA specimens were sent for cytologic evaluation without ROSE as per recommended guidelines.

Table 1: Age wise distribution

Years	Male	Female	Total	Percent
30 – 40	0	0	0	0%
41 – 50	7	2	9	30%
51 – 60	9	1	10	33.33%
> 60	10	1	11	36.66%
Total	26	4	30	-

Table 2: Site of disease on CT Scan thorax

Site	Lymphadenopathy		Mass Lesion	
	No.	%	No.	%
Right	13	48.14%	13	54.16%
Left	8	29.62%	7	29.16%
Bilateral	1	3.7%	3	12.5%
Mediastinal	5	18.51%	1	4.16%
Total	27	-	24	-

Table 3: Complications of TBNA procedure

Complication	No.
Pneumothorax	1
Pain on puncture	2
Needle stuck during puncture	1
Total	4 (13%)

Table 4: Diagnostic yield of different bronchoscopic sampling techniques

Techniques	Application		Diagnosti c results		Only technique with a diagnostic results	
	No.	%	No.	%	No.	%
Br. Washing	30	100%	8	27%	0	-
Br. Brushing	30	100%	14	47%	1	7%
TBNA	30	100%	26	87%	8	31%
EBB	15	50%	9	60%	1	11%
EBNA	7	23%	4	57%	0	-

RESULTS

Our study showed that the maximum number (70%) of patients were belonged to 50-60 years and above age group. Out of that (n=30), 26 were male and only 4 were female. The mean age of patients was 58.07 years (table 1).

Maximum mass lesions (54.16%) and lymphadenopathy (48.14%) were on the right side while bilateral mass lesions were seen in 12.5% and lymphadenopathy seen in 3.7% cases. Mediastinal lesion was seen more in the form of lymphadenopathy (18.51%) as compared to mass lesion (4.16%) (Table 2).

Overall 13% complication rate was found in the present study but actually only 1 patient (3.33%) had complication of TBNA procedure (Marginal pneumothorax which was resolved on supplemental oxygen in two days) (table 3).

TBNA was the only technique that gave an additional diagnostic yield of 31% followed by EBB (11%) and Brushing (7%) (table 4).

DISCUSION

The average age was 58.07 year in the study has been quite similar to other study. The male: female ratio in present study

M:F: 6.5:1 quite comparable to other studies (Narang et al 1977 and Malhotra et al 1986). The average total duration of illness between onset of symtoms and reporting was less than 1year in majority of the patients (93%). Suggested that these patients when 1st seen already had advanced disease this is an agreement with most of other studies. In the present study, the overall complication rate was found 13% but actually only 1 patient (3.33%) had complication of TBNA procedure. This complication rate was comparable to other studies i.e. Frank Reichenberger et al 1999, Thida win et al 2003.

The overall diagnostic yield was increased with the use of TBNA technique. In bronchoscopic procedure in suspected cases of malignancy in various studies. In the present study, the additional diagnostic yield was increased from 67% to 93% (26%) which is very much similar to other studies i.e. Benan Caglayan et al (26%) and Ashok Dasgupta et al(20%) and it was higher to Thida Win et al (6%) and Frank Reichenberger et al(16%).

In the present study TBNA was performed in all 30 cases and found positive in 26(87%) of cases. The results were consistent with study of Ashok Dasgupta et al 1999(85%) but higher to study i.e. Frank Reichenberger et al (35%), Thida Win et al 2003(41.9%), David A. Schenk et al 1987(45%). On comparison addition of TBNA for diagnostic procedure given the additional diagnostic yield comparably similar to Ashok Dasgupta et al, Frank Reichenberger et al, David A. Schenk et al with present study. The higher results of TBNA in present study may be because of highly patients selection workup for malignancy, expertise of bronchoscopist, the choice of needle selection (19G), combination of TBNA technique and pathologist.

CONCLUSION

To conclusion, our study emphasises that TBNA procedure should be performed with minimal complication for diagnosis and staging of lung cancer. The highest success rates with TBNA was obtained in the presence of enlarged lymph nodes/mass on CT scan of the thorax and extrinsic compression or mucosal irregularity in bronchoscopic evaluation for malignancy.

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