ORIGINAL RESEARCH PAPER

Pulmonary Medicine

CLINICO-RADIOLOGICAL AND PATHOLOGICAL EVALUATION OF THORACIC MASS IN A TERTIARY CARE HOSPITAL OF ODISHA

KEY WORDS: Fine Needle Aspiration Cytology, Lung Mass, Mediastinal Mass, Pleural Mass, Ultra-sonography, Computed Tomography.

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ABSTRACT

INTRODUCTION: Thoracic mass, which is classified into Lung, Mediastinal, Pleural, and Chest wall masses may be inflammatory, benign or malignant origin. Since specific therapies are now available for different histological types, diagnosis has to be made specific and precise.

OBJECTIVE: The aim of the study is to classify the various thoracic masses into appropriate categories and to evaluate the possible aetiology and to correlate the clinico-radiological findings with the pathological diagnosis.

DESIGN: A prospective study carried out between August'2011 and August'2013 in the Department of Pulmonary Medicine, VSS medical College & Hospital, Burla, Odisha.

METHODOLOGY: A total of 60 patients of various age groups with strong clinical suspicion and/or chest radiographic diagnosis of thoracic mass were aspirated by "free hand" approach under sonographic and computed tomography scan guidance by using Lumbar Puncture needle and specimens obtained were sent for cytological evaluation. Data was analysed and compared between clinico-radiological and pathological diagnosis using Chi-Square test.

RESULT: Image guided FNAC/ Trucut needle biopsy was performed in 51 cases out of 60 cases. Definitive diagnosis was possible in 48 cases. Among these, majority of thoracic mass were Lung mass(76.66%) followed by Mediastinal mass(18.33%). Malignancy was detected in 66.7%, benign neoplasm in 9.8%, inflammatory in 5.9%, tuberculosis in 7.8% and diagnosis could not be ascertained in 9.8% cases due to inadequate material.

INTRODUCTION:

Thoracic lesions include a large variety of benign and malignant conditions of lung, pleura, mediastinum. Primary lung carcinoma is the most common carcinoma in the world today, comprising 12.6% of all the cancers and 17.8% of all the cancer deaths[1] . Lung is also a well-known site for metastatic tumors. In addition, the mediastinum can be involved with a variety of benign lesions as well as by primary and metastatic malignant tumor, many of which present as mediastinal masses. Although clinical data, location, and radiological findings can narrow down the diagnostic possibilities, cytological diagnosis is warranted before initiating the specific treatment for malignant diseases[2] . The diagnostic accuracy of sputum cytology was maximum with centrally located neoplasms i.e., squamous cell carcinoma only and it failed to yield material in metastatic lesion which do not have an endobronchial origin[3]. In this regard the technique of aspiration cytology is gradually becoming an indispensable armamentarium in the field of medical science and image guidance has made it approachable to deep seated and non palpable lesions. Hence CT/ Ultrasonography Guided Cytology has become an accurate, safe and widely accepted technique for confirmation of suspected malignant masses and characterization of many benign lesions. FNAC not only distinguishes benign from malignant lesions but also helps in tumor typing of lung cancer, thereby avoiding unnecessary delay in initiation of specific therapy such as chemotherapy or surgery[4].

AIMS & OBJECTIVES:

To classify the various thoracic masses into appropriate categories and to evaluate the possible etiology.To correlate the Clinico-Radiological findings with the Pathological findings for specific management.

METHODOLOGY:

The study was conducted in the Department of Pulmonary Medicine, V.S.S. Medical College Burla in collaboration with Department of Radiodiagnosis & Department of Pathology during the period August 2011 to August 2013. A total of 60 patients of various age groups with strong clinical suspicion and/or chest radiographic diagnosis of thoracic mass were included in the study. The study participants were explained about their clinical diseases, procedure to be carried out and nature of the study in their own language and an written informed consent was obtained. Routine blood investigations including coagulation profile and viral markers were performed. The subjects were kept nil per orally for 6 h before procedure. Only mild sedation was used for anxious patients. 22/23 gauze bore needles were used for fine needle aspiration; 1.5 inch length needle for superficial masses and 8 cm long spinal needle for deep-seated lesions. Aspiration was performed under continuous real time USG visualization, that is, "guidance method" using "free hand approach." The needle was inserted through the skin directly into the plane of view of the transducer. This approach offers great flexibility to the operator by allowing subtle free hand adjustments to be made during the course of the FNAC, thereby compensating for improper trajectory and patient movement. After preparation of the site, 5 ml of 2% lignocaine was infiltrated into the skin, subcutaneous tissue, muscle plane, and parietal pleura. After the needle was visualized at the proper site the inner stylet was removed. A volume of 10 ml syringe was attached to the tail end of the needle. Several 1 cm up and down movements were made within the lesion. 1-2 passes were made most of the time. The suction was maintained for 30-45 s till some material appeared at the nozzle. When aspiration was completed, the negative pressure was slowly released before withdrawing the needle to equalize the pressure in the syringe. The needle was then withdrawn and pressure was applied at the puncture site for 3-5

min with sterile cotton to prevent hemorrhage or formation of hematoma. Gross evaluation of the aspirate was performed on-site by naked eye examination or by quick differential staining. If samples were inadequate repeat aspiration was done. In almost all cases smears were prepared in the manner described above, part of the wet smears were fixed in 95% ethyl alcohol and part of the smears were air dried. The alcohol fixed smears were stained with haematoxylin and eosin and PAP. Two air dried smears were stained with stain for Quik Differential staining, few of this Air Dried Smear were rehydrated and post fixed in a mixture of 5% glacial acetic acid and 95% ethyl alcohol. They were similarly stained as wet fixed smears.

The participants were kept under observation for 2-3 h. Chest radiographs were done before discharging the patient to rule out any complications of the procedure. Oxygen delivery system, resuscitation kit and the emergency service are kept ready at hand anticipating any complication. For sterility the transducer was cleaned with isopropyl alcohol and placed directly on the skin. Sterile gel was used as an acoustic agent. Clinico-radiological diagnosis made before FNAC procedure was correlated with cytology results and data were analyzed.

RESULTS:

Total number of the study participants in the study were 60; 43 (71.66%) males and 17 (28.33%) females. One fourth of the subjects, that is, 15 belonged to age group of 45-54 . The most common symptom was cough present in 83.33% followed by chest pain in 73.33% of patients and breathlessness in 63.33% cases. Clubbing was found in 31 (51.66%), and pleural effusion in 23 (38.33%) of patients followed by mass lesion and lymphadenopathy in 19 (31.66%) and 15(25%) cases. In the current series 46 cases (76.66%) were of lung mass, 11 cases (18.33%) were of mediastinal mass, 2 cases (3.33%) were of pleural mass, & 1 case (1.66%) was of chest wall mass. 51 cases were subjected to CT/USG guided FNAC/Trucut needle biopsy. The sample was adequate in 48 cases (94.1%). Malignancy was detected in 34 patients (66.67%), benign neoplasm in 5 patients (9.8%) and 7 cases (13.7%) were non-malignant. In non-neoplastic samples, 4 was tubercular, and 3 were inflammatory. Most common type of lung cancer was adenocarcinoma (64.3%) followed by squamous cell carcinoma (17.9%) and Small Cell Carcinoma, large cell carcinoma, metastatic lesion combinedly (3.6%%). 5 cases came out to be non-diagnostic and FNAC could not be done in 9 cases due to suspicion of hydatid cyst-7 cases, aspergilloma-1 case, & phantom tumor-1 case. The complication recorded was only in 6 (11.76 %) cases. Chest pain was the most common complication observed in 11.76%. Pneumothorax was observed in 1.96% cases, vasovagal reaction in 3.92% and haemoptysis in 3.92% cases which were mild enough to be managed conservatively. The Clinico-Radiological diagnosis was compared with the Pathological diagnosis in 51 cases. In 42 cases the Clinico-Radiological diagnosis was well correlated with the Pathological diagnosis. Two cases suspected to be malignant clinico-radiogically came out to be benign pathologically. Similarly 2 cases suspected to be benign clinico-radiologically came out to be malignant pathologically. In 5 cases there was in-conclusive report/in-adequate sample. The Clinico-Radiological & Pathological correlation of Thoracic mass in my study is 82% which is statistically significant (p=0.01) with a sensitivity of 94% and specificity of 83.3%.

DISCUSSION:

In today's practice an evidence based treatment is of prime importance and thoracic masses in clinical practice can vary widely and is usually difficult to diagnose without the aid of radiological evidence and tissue diagnosis. CT/USG guided FNAC being a simple, safe, and quick procedure for pathological diagnosis of thoracic masses, has been recommended for obtaining bacteriological material, staging patients with neoplastic conditions, diagnosing mediastinal masses for specific management[5,6]. Thoracic masses have always remained an enigma in clinical practice and its evaluation by percutaneous transthoracic aspiration and transthoracic needle biopsy dates back to **Leyden (1883)[7]. Menebriel (1886)[8]** being the first to diagnose lung cancer by this procedure. However it was reawakened by **Dahgren and Nondenstrom in 1960**, FNAC and biopsy under image guidance is a step forward and is one of the expanding interventional diagnostic techniques. It was started by **Alfidi and Hagga (1976)** who were the first to report CT guided FNAC of lung. Imaging techniques localizes the lesion well while fine needle aspiration provides cells augmenting the diagnosis. It has been used successfully as a nonsurgical tool for confirmation of primary as well as metastatic lesions[9].

The present study constituted 43 males (71.67%) and 17 females (28.33%) out of the total 60 cases with a M:F ratio of 2.53:1. The age ranged from 16-84 years. Although many studies have reported high male:female ratio, attributing it to more exposure to toxic substance and outdoor life of males, some recent documentation shows fall in incidence in males and increase in females, **Hansen (2006)[10].** Our study coincides with **Tan et al (2002)[11],** with findings of M: F ratio of 2.53:1 with age ranging from 11-82 years. **Mazza et al (2005)[12]** also reported a ratio of 2.32:1 with an age range from 20-86 years. In this study the most common age group affected was within 45-54 years in which, 15(25%) patients were found. The least common age group was found to be 15-24 years, in which 4(6.66%) patients were found. **Tan et al.[11],** also found malignant lung tumor most common in people with age of >50 years and more. The evaluation in the present study shows that the common age group for benign lesion was 45-54 years with 13.33% of cases whereas for malignant lesion it was 55-64 years age with 18.33% of cases. Detection of 35.3% of malignancy in less than 50 years of age in the present study is close to the finding of **Behera et al (2004)[15]** who reviewed the data from national research registry programme of ICMR which showed 40% of lung cancer in less than 50 years of age.

In the present study the adequacy of sampling was 94%. Adequacy of sample in more than 90 % cases was also reported in studies made by **Clee et al (1982)[13], Holings et al (2002)[14] and Behera et al (2004)[15].** The cytology specimen evaluated in the present study showed definite malignancy in 66.66%, inflammatory lesions in 5.88%, tuberculosis in 7.84%, and benign neoplasms in 9.80%. Similar observation was found by **Bandyopadhyay et al (2007)[16]** with malignant lesions in 67.4%, benign and inflammatory lesions in 19.5%, atypical cells in 5.8% and granulomas in 7.8%. **Tan et al (2002)[11]** also observed 65.8% malignant lesions, 25.4 % inflammatory /non malignant lesions and TB in 5.3%, with an yield of 93%. **Dahlstrom et al (2001)[17] and Gouliamos et al (2000)[18]** reported 64.6% and 61 % malignant lesions respectively. A higher value was reported by **Ahmad et al (2006)[5]** with malignancy in 78% cases and TB in 12% cases.

Thomas et al (2006)[19] laid the importance of determining the cell type before the course of treatment is planned. It was particularly important with small cell carcinomas for which surgery is not the primary choice, and also in cases when surgery is contraindicated for reasons like poor pulmonary functions, extensive emphysema and metastatic lesions. So an attempt was made for the cellular typing of malignant lesion obtained. Incidence of adenocarcinoma was 64.29%, followed by squamous cell carcinoma in 17.86 %, small cell carcinoma, large cell carcinoma, and metastatic in 3.57% cases each. Overall the Non Small Cell Carcinoma was in 85.71% cases. **Pathak et al (2003)[20]** observed NSCLC in 75-80% of malignant lesions with increasing incidence of adenocarcinoma which is comparable to my study. Similar observations were also noted by **Moran (2006)[21], Hansen (2006)[10], and Collins et al (2007)[22].**

Powers et al (1996)[23], Sherwani et al (2006)[6], and Bandyopadhyay et al (2007)[16], described lymphoma, thymoma, germ cell tumor and neural tumours being common in the mediastinum, correlating our study, being the Germ cell tumors (36.36%) was more common, others being lymphoma (18.18%) & thymoma(18.18%) in the anterior superior mediastinum.

Needles of 22-23 G were used for most aspirates in the present study with a reproducibility percentage of 94%. The Papanicolaou Society of Cytopathology Task Force (1999) also opined the use of 22 G chiba or grenne needle. **Sonnenberg et al (2003)[24]** found that by using 25 G needle for emphysematous lung, COPD and

coagulopathy, the sample was adequate in 88.5%. **Ghaye et al (2001)**[25] too noticed that pneumothorax was reduced by use of thinner needle. The complication recorded in the present study was only in 6 (11.76 %) cases. Chest pain was the most common complication observed in 11.76%. Pneumothorax was observed in 1.96% cases, vasovagal reaction in 3.92% and haemoptysis in 3.92% cases which were mild enough to be managed conservatively. Near similar complication rate of 11.8% was noted by **Singh et al (2004)**[26]**. Bandyopadhyay et al (2007)**[16] have reported pneumothorax in 6.3% cases. Chaffey (1988)[27] in the early days too found pneumothorax as the commonest complication associated with the FNAC of lung.

The Clinico-Radiological diagnosis was compared with the Pathological diagnosis in 51 cases. In 42 cases the Clinico-Radiological diagnosis was well correlated with the Pathological diagnosis. Two cases suspected to be malignant clinico-radiogically came out to be benign pathologically. Similarly 2 cases suspected to be benign clinico-radiologically came out to be malignant pathologically. In 5 cases there was in-conclusive report/in-adequate sample. The Clinico-Radiological & Pathological correlation of Thoracic mass in my study is 82% which is statistically significant (p=0.01) with a sensitivity of 94% and specificity of 83.3%. **Torkian et al (2003)**[28] observed that of all radiologicaly indeterminate solitary pulmonary nodules, 50% were malignant and of all the lesions < 5% lung neoplasm were benign. So when a clinician suspects neoplasia, then there is a high probability that the lesion is malignant.

CONCLUSION:

Although thoracotomy and biopsy is the most accurate method of diagnosis, CT/USG guided FNAC/Trucut needle biopsy is safe, less expensive and less invasive with high rate of accuracy. CT is mostly used for guidance but with proper triage USG can be used reducing the expense, time, and radiation exposure. Interdepartmental coordination of pulmonologists, with expert radiologists and experienced pathologists provides maximum efficiency, yield and ensuring most accurate diagnosis with better therapeutic decision making , so that proper management schedule can be planned out .

TABLE –1: Age And Sex Distribution Of Cases With Thoracic Mass

Age Group (In Years)	No. of Cases (%)	Male (%)	Female(%)
15-24	4(6.66)	4(6.66)	-
25-34	8(13.33)	5(8.33)	3(5)
35-44	10(16.66)	7(11.66)	3(5)
45-54	15(25)	10(16.66)	5(8.33)
55-64	12(20)	6(10)	6(10)
≥65	11(18.33)	11(18.33)	-
TOTAL	60(100)	43(71.67)	17(28.33)

TABLE – 2: Symptoms And Signs In Patients Of Thoracic Mass

Clinical Symptoms & Signs	No. of Cases	% of total cases
Cough	50	83.33
Hemoptysis	20	33.33
Chest Pain	44	73.33
Breathlessness	38	63.33
Constitutional Symptoms	53	11.66
Clubbing	31	51.66
Lymphadenopathy	15	25
Pleural Effusion	23	38.33
Superior Venacaval Sydrome	6	10
Mass Lesion	19	31.66

TABLE – 3: Pathological Diagnosis Of Thoracic Mass By Ct/ Usg Guided Fnac/trucut Needle Biopsy(fnac Done In 51 Cases & Could Not Be Done In 9* Cases) (*Due to suspicion of hydatid cyst-7 cases, aspergilloma-1 case, & phantom tumor-1 case.)

Pathological Diagnosis	No. of cases	%
Non Neoplastic - Inflammatory - 3 - Tubercular - 4	7	13.7
Neoplastic	5	9.8
- Benign - 5 - Malignant - 34	34	66.66
Non-diagnostic - In adequate - 3 - In conclusive - 2	5	9.8

TABLE – 4: Types Of Malignant Pulmonary Lesions

Cell Type	No. of cases	%
Adenocarcinoma	18	64.29
Squamous cell carcinoma	5	17.86
Small cell carcinoma	1	3.57
Large cell carcinoma	1	3.57
Metastatic	1	3.57
Others	2	7.14
Total	**28**	**100**

TABLE – 5: Correlation Of Clinico-radiological Versus Pathological Diagnosis

THORACIC MASS	TYPE OF LESION	CLINICO-RADIOLOGICAL Δ	*PATHOLICAL Δ*			MICRO-BIOLOGY
			Correct	In-correct	In-conclusive/ In adequate material	
LUNG MASS (n-46)	Malignant	31	27	1	3	-
	Tuberculoma	2	2	-	-	AFB +ve
	Inflammatory	4	3	1	-	-
	Hydatid cyst	7	Not approached			Sero +ve
	Aspergilloma	1	Not approached			Sero+ve
	Hemangioma	1	-	-	1	-
MEDIASTINAL MASS (n-11)	Germ cell tumor	4	3	1	-	-
	Thymoma	1	1	-	-	-
	Invasive Thymoma	1	1	-	-	-
	Lymphoma	3	2	-	1	-
	Esophageal hamartoma	Malignant(1)	-	1	-	-
	Met. Squamous cell Ca	1	1	-	-	-
PLEURAL MASS (n-2)	Tuberculosis	1	1	-	-	AFB +VE
	Phantom Tumor	1	Not approached			-
CHEST WALL MASS (n-1)	Metastatic follicular Ca of thyroid	1	1	-	-	-

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