Flexible Bronchoscopy: A Favorable Diagnostic Tool

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Abstract:

Objective: To determine the diagnostic outcome of fiber-optic bronchoscopic biopsy in Pulmonology department of SZABMU/PIMS Islamabad.

Methods: An observational, cross sectional, retrospective study was conducted at Pulmonology department, PIMS Islamabad and record from July 2015 to June 2016 was reviewed. Demographic details of the patients, CT scan, bronchoscopic findings and biopsy outcome and final diagnosis were recorded.

Results: Out of 78 study patients, 78.2% were fall between 36 and 75 years of ages and 75.6% were male. 48.7% had right sided and 43.6% had left lung lesion on contrast enhanced CT scan. Right hilar mass (42.1%) and left hilar mass was (35.3%) was the most common among right and left sided lesions respectively. 50% had right sided, 39.7% had left sided and 10.3% had randomly distributed findings on bronchoscopy. Upper lobe mass/obstruction was the most common finding irrespective of the side of lesion (right 33.3% versus left 29.0%). 76.9% of the studied population had cancerous outcome on histopathology and squamous cell carcinoma was the most common final diagnosis (57.4%). Incidence of tuberculosis was very low (n=3). In our study association between smoking, gender and age with final diagnosis was not significant.

Conclusion: Diagnostic yield of flexible bronchoscopy is good enough, very useful for the diagnosis of pulmonary lesions and safe as a day care procedure.

Keywords: Bronchoscopy, Lung cancer, Tuberculosis, Hilar mass

Introduction

There are of two types of bronchoscope: rigid metal tubes with attached lighting devices and a flexible that had an optical fiber instrument. First bronchoscopy was performed by Gustav Killian in 1897 when he extracted a piece of pork bone from the right main bronchus[1]. So, bronchoscopy is a technique by virtue of which we visualize the airways not only for diagnostic but therapeutic purposes as well. Fibreotic bronchoscopy has been a valuable tool in the diagnosis of pulmonary diseases since Shigeto Ikeda introduced first flexible fiber-optic bronchoscopy in 1966[2].

In patients with endoscopic visible lesions, Bronchoscopy is the main diagnostic procedure. British Thoracic Society (BTS) guidelines from 2001 recommend biopsies, washings and brushings for sampling from all endoscopic visible lesions.

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Yield of endo-bronchial biopsy is 92% in macroscopically visible lesions and in lesions which are not visible via bronchoscope, diagnostic yield of TBA and TBB is 50%[3] where CT guided biopsy have yield of about 90%[4]. Performance of fiber-optic bronchoscopy as outpatient basis has resulted in lower cost and facilitation of health care services[5,6].

After considering proper indication, patient is advised nothing per oral at least 6 hour prior to procedure, informed consent and bronchoscope is centered in the airway usually through nasal route after applying local anesthetic agent (oral route can be used). After doing detail survey of airways required specimen is taken i-e biopsy, washings or brushings. Occasionally, mild sedation is needed. Multiple biopsies should be taken for better results especially in cases where malignancy is suspected. Hemorrhage and pneumothorax are the most frequent encountered complication usually after Trans-bronchia biopsy[7].

This study was carried out with an aim to know the diagnostic yield of flexible bronchoscopic biopsy in our setup.

Material & Methods

This cross-sectional, observational, retrospective study was conducted at Department of Pulmonology, Pakistan Institute of Medical Sciences, Islamabad from July 2015 to June 2016. Patients undergone through procedure of diagnostic bronchoscopy for the detectable lesion on CT scan were included consecutively after informed consent from the patient or his close relative where ever relevant. Approval in this regard was taken from Departmental Ethical Committee. All the patients were asked for at least 6 hour fasting prior to procedure.

A flexible Fibreoptic bronchoscope (Fujinon) was introduced via nasal route in all patients. The upper airway including nasopharynx, larynx, vocalcords, trachea and the tracheobronchial tree were visualized. The procedure room was equipped with a source for air, oxygen andcontains resuscitation equipment and medications. Oxygen saturation, pulse and blood pressure were monitored. Supplemental oxygen was administered bynasal cannula in all patients irrespective of their oxygen saturation. Biopsies were taken from representative area, saved in formalin/normal slaine and processed to pathology lab. All the procedures remained uneventful and free of cost. End point of the study was either final diagnosis was made or not.

We noted 1) age, 2) gender, 3) CT scan findings, 4) bronchoscopy findings, 5) histopathology features of the specimen taken, 6) final diagnosis and 7) status of smoking. Data was collected on a specifically designed Performa and was subsequently entered in SPSS-16. Frequency and percentage were calculated for qualitative variables like gender. T test was used as test of significance to look for association between quantitative variables and diagnosis. Chi-square test was similarly used for qualitative variables, P value <0.05 was considered as significant.

Results

78 patients were included in the study. Maximum population were fall in ages between 36 and 70 years (n=61) and rest were above 70 years. 75.6% (n=59) patients were male and the rest were female. 48.7% (n=38) had right sided lesion, 43.6% (n=34) had left sided lesion and 7.7% (n=6) had other site lesion on CT scan chest respectively. In definition of others patients had widened mediastinum (n=2), crazy paving pattern (n=2), bilateral lesion (n=2). Further distribution among right sided lesions is shown in table1.

Table 1: Distribution of right sided lung lesions on CT scan

Lesion	Frequency	Percentage
Right hilar mass	16	42.1%
RUL mass/opacity	14	36.8%
RML mass/opacity	4	10.5%
Right lung collapse	3	7.9%
Right lung nodule	1	2.6%
Total	**38**	**100.0**

Among left sided lesions most common finding was left hilar mass (35.3%) followed by left upper lobes mass/cavity (29.4%), left main-stem mass/opacity (14.7%), left lung collapse (5.9%), left lower lobe mass/opacity (5.9%),left paratracheal mass (2.9%), left lung multiple nodules(2.9%) and left lower lobectomy (2.9%).

50% (n=39) had right sided findings on bronchoscopy, 39.7 % (n=31) had left sided findings and 10.3% (n=8) had other findings respectively. In the context of others patient had carinal mass(n=3), bilateral mains-tem infiltration (n=1) and no endo-bronchial lesion in n=3. Among right sided findings, 33.3% (n=13) had right upper lobe mass/obstruction followed by right main-stem infiltration in 28.3% (n=11) patients,while among left sided findings, 29.0% (n=9) had left upper lobe mass/obstruction followed by left upper lobe infiltration, left main-stem infiltration, or main-stem mass/obstruction in 19.4% patients respectively.

On the basis of histological findings of biopsy specimen, 76.9% (n=60) had cancerous lesion and 23.1% (n=18) had non-cancerous lesion. Details are in table 2 and Figure 1

Table 2: Bronchoscopic biopsy histology finding

Findings	Frequency	%age
Poorly differentiated carcinoma	18	23.1
Squamous cell metaplasia/dysplasia	16	20.5
Atypia	11	14.1
Adenocarcinoma	8	10.3
Insignificant tissue	6	7.7
Malignant cell infiltration	5	6.5
Fibrosis	4	5.1
Normal tissue	4	5.1
Caseous necrosis	1	1.3
Secretions only	1	1.3
Dysplasia	1	1.3
Pulmonary alveolar proteinosis (PAP)	1	1.3
Numerous plasma cells	1	1.3
Acute inflammation	1	1.3
Total	**78**	**100.0**

Poorly differentiated carcinoma was at the top (30.0%) followed by squamous cell metaplasia/dysplasia (26.1%), atypia (18.3%), adenocarcinoma (13.3%), malignant cell infiltration (8.3%), numerous plasma cell (1.7%) and dysplasia (1.7%) among cancerous lesion. Insignificant tissue was 33.3% from non cancerous findings followed by fibrosis (22.2%), normal tissue (22.2%), acute inflammation (5.6%), secretions only (5.6%), pulmonary alveolar proteinosis (PAP) (5.6%) and caseous necrosis (5.6%). Immunohistochemistry (IHC) was applied in some cases but data was not available.
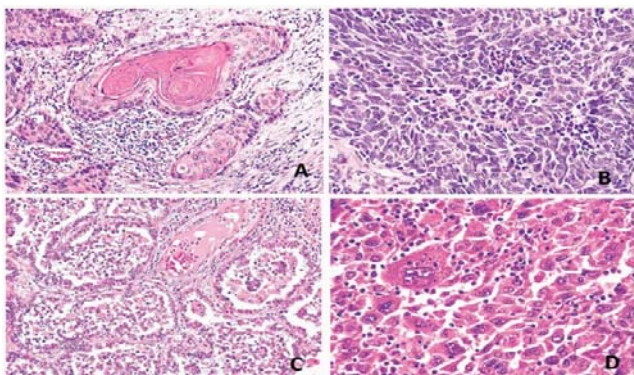

Figure 1: histological view of :A) Squamous cell carcinoma, B) Small cell carcinoma, C) Adenocarcinoma, D) Large cell carcinoma (H&E X 100)

Patients with unspecified atypia or dysplasia considered for rebiopsy. Based on CT scan, bronchoscopic and histopathological findings final diagnosis of cancerous and non cancerous condition was made in 69.2% (n=54) and 30.8% (n=24) respectively. Details of cancerous diagnosis are in table 3. Pulmonary tuberculosis (n=3), PAP (n=1), rebiopsy (n=15), infective etiology (n=1) and normal tissue (n=4) were the finalized among noncancerous conditions.

Table 3: Final Diagnosis of Cancerous Conditions

Diagnosis	Frequency	%age
Squamous cell carcinoma	31	57.4
Adenocarcinoma	14	25.9
Poorly differentiated CA	3	5.6
Small cell CA	3	5.6
Mesothelioma	1	1.9
Plasma cell dyscrasia	1	1.9
Metastatic disease	1	1.9
Total	**54**	**100.0**

73.1%(n=53) were smokers among study population while rest were non smokers.There is no association between cancerous (Final Diagnosis) and smokers (0.395), and with stratification of gender,the P values are 0.284 for male and 0.21 for female. The results are also same with stratification of age groups having 0.763 for less than 70 years and having 0.119 for more than 70 years of age. The relation of smoking will be significant (P value will be <0.05, as 0.11 is still close to significance) with final diagnosis in second group of age when we increase our sample size as in our study we have just 17 (21.8%) sample.

We also find the estimated prevalence of cancer in smokers by one sample t-test (one tailed test). In our population (71.9%) of smokers have cancer. On the basis of this sample, we conclude that in our population of smokers at least 61% will suffer from cancer.

Discussion

Diagnostic bronchoscopy has a definite role in proper diagnosing the lung lesions especially the malignant ones. Different modalities are used for sampling purpose but in our centre we are doing endobronchial biopsies, bronchial washings, lavage and toilet. In this study we found that our patients had more incidence of right lung lesions (n=38) on contrast enhanced CT Scan as compared to left (n=34). Authors from Saudi Arabia also found similar results in their eight year audit[8]. Among lesions on CT scan, right hilar mass was the most common finding followed by left hilar mass in our study population and it is contrary to others[8].Bronchoscopic examination showed right sided lesions (50%), commonest was involvement of right upper lobe in the form of mass or infiltration but not the main-stem as in previous study[8].

69.2% (n=54) were finally diagnosed having cancerous issues and most common was squamous cell carcinoma 57.4% (n=31) followed by adenocarcinoma (n=14) (fig:1). This was only in 25.2% and small cell carcinoma was at the top among cancerous condition in Saudi audit[8]. Small cell carcinoma was diagnosed in only n=3 in our study. Adenocarcinoma followed by squamous cell carcinoma are the most common histological subtypes of lung cancer in USA[9,10]. Interestingly, despite high burden of pulmonary tuberculosis in our country, incidence of tuberculosis as a diagnosis was very much low in our study (n=3). This was contrary to results of local[11] and neighboring country studies[8]. One patient was diagnosed as a case of pulmonary alveolar proteinosis and another with plasma cell dyscrasia. In case of pulmonary alveolar proteisosis, biopsy specimen was PAS positive and fulfills all the histological features. Plasma cell

dyscrasia was finally diagnosed as multiple myeloma in medical department.

Out of 78, n=15 advised repeat biopsy as despite endobronchial lesion, tissue was not representative and includes secretions, too small to examine. Normal histological findings were observed in n=4. These all patients were communicated for repeat biopsy. No significant relation between smoking status, gender and age group with cancerous outcome was found in our study contrary to past studies that favours smoking as a major association and male gender is more at risk as habit of smoking is more common among males[8].

No major complication was observed in present study. Limitation of our study is small sample size and we follow only endobronchial biopsies. As our calculation showed if we increase sample size in same format, smoking association with cancerous condition may be justified.

Conclusion

Common as well as rare pulmonary diseases especially lung carcinomas can be reasonably diagnosed through fiberoptic bronchoscopy. Endobronchial lesions have more diagnostic yield than non visible lesions. Diagnostic bronchoscopy is a safe, cheap and daycare procedure with favourable diagnostic outcome.

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