ORIGINAL ARTICLE

A Clinical Study : Role of Flexible Fiberoptic Bronchoscopic Biopsy in Diagnosis of Lung Cancer

Dr. Nalin T. Shah*, Dr. Kandarp Nimavat, Dr. Smit Patel**, Dr. Chintan Shah**, Dr. Akash Dodiya****

Professor and HOU*, Resident Doctor** Pulmonary Medicine Department (T.B. & Chest Diseases)

B. J. Medical College & Civil Hospital, Asarwa, Ahmedabad.

KEY WORDS : Flexible Fiberoptic Bronchoscopy, Lung Cancer

ABSTRACT

Fiberoptic bronchoscopy is very safe and highly sensitive investigation for patients suspected of having lung cancer. It allows one to visualize the tracheobronchial tree and perform a variety of diagnostic and therapeutic procedures. **Aim & Objectives :** To study the clinical profile of patients suspected of having lung cancer, the etiological factors, the complications and safety of the procedure & diagnostic yield of the procedure. **Materials & Method:** This is a prospective study conducted in the Pulmonary Medicine Department of B. J. Medical College and Civil Hospital, Ahmedabad from November 2015 to December 2016. We performed flexible bronchoscopy and took biopsy for histopathological examination along with BAL and Endobronchial Brushings in 44 patients suspected of lung cancer after through clinical examination and investigations. **Observation & Conclusion:** Out of 44 patients 40 were diagnosed lung cancer with histopathological confirmation by bronchoscopy while rest 4 patients were diagnosed with CT guided biopsy. Yield of bronchoscopic biopsy is 90.91%, of BAL is 20.45% and of brushings is 70%. Adenocarcinoma is the most common type (50%). Only 4.54% patients developed complications. Mortality is 0%. Thus flexible fiberoptic bronchoscopy is very safe procedure.

INTRODUCTION

Fiberoptic bronchoscopy is very safe and highly sensitive investigation for patients suspected of having lung cancer. It is performed in the bronchoscopy room or suit, under local anaesthesia and conscious sedation, with routine cardiorespiratory monitoring but without endotracheal intubation, mechanical ventilation or general anaesthesia. It allows one to visualize the tracheobronchial tree and perform a variety of diagnostic and therapeutic procedures i.e broncho alveolar lavage, transbronchial needle aspiration, endobronchial lung biopsy, endobronchial brushings and transbronchial lung biopsy. In the present study, we describe our experience with the fiberoptic bronchoscopy and biopsy for diagnostic purposes.

AIMS AND OBJECTIVES

To study the clinical profile of patients suspected of having lung cancer, the etiological factors, the radiological manifestations, the complications and safety of the procedure & diagnostic yield of the procedure.

MATERIALS AND METHODS

This is a prospective study conducted in the Pulmonary Medicine Department of B. J. Medical College and Civil Hospital, Ahmedabad from November 2015 to December 2016. After through clinical examination and investigations we performed flexible bronchoscopy and took biopsy for histopathological examination along with BAL and Endobronchial Brushings in 44 patients having symptoms higly suggestive of lung cancer i.e. hemoptysis, clubbing and chest x-ray or CT evidence of obstructive airway lesion or mass lesion.

The patient was kept nil by mouth for 3 hours. In cases of COPD and asthma they were given nebulisation with levosalbutamol 1.25mg (2-4ml) and ipratropium bromide 500ug (2-4ml), 15-20 min prior to bronchoscopy. Intramuscular atropine was given as anticholinergic to reduce airway secretions, prevent vasovagal reactions & reduce reflex bronchoconstriction whenever appropriate. As anesthetic agent nasal jelly of 2% lignocaine and 10% lidocaine spray (10 mg per actuation, usually two to five actuations) as oropharyngeal topical anaesthesia were used. Intravenous Midazolam was given to the patient to maintain conscious sedation (maximum up to 10 mg).

The patient was in supine position with continuous pulse oximetry and heart-rate monitoring. 'Spray-as-you-go' delivery was used to administer lidocaine to the larynx and lower airways. Full examination of tracheobronchial tree was done andbronchoalveolar lavage, endobronchial brushings and endobronchial or transbronchial biopsies were taken. For biopsy open cup forceps with/without spike were used and at least 5 samples were taken. Biopsy samples were immediately fixed with 10% neutral buffered formalin. Endobronchial brush slide were fixed with 95% ethanol or 100% methanol. The final diagnosis was made in light of histopathologic examinations with all the previous investigations.

Correspondence Address : **Dr. Nalin T. Shah**
Pulmonary Medicine Department (T.B. & Chest Diseases)
B. J. Medical College & Civil Hospital, Asarwa, Ahmedabad

OBSERVATIONS

Age & Gender:

Age (Yrs)	21-30	31-40	41-50	51-60	61-70	71-80	81-90	Total
Patients	1	3	9	13	13	4	1	44

Most common age of presentation is 51 to 70 years. Patients less than 40 years of age are few. The average age is 57.88 years. 37 (84.09%) patients were male and 7 (15.91%) were female.

Symptomatology:

Symptoms	Patients
Cough	39
Hemoptysis	7
Dyspnoea	22
Chest pain	30
Fever	10
Clubbing	16
Anorexia	17
Weight loss	10
SVC obstruction	2

Duration (Months)	Patients
1	10
2	11
3	6
4	3
5	4
6 - 12	10
Total	44

Cough is the most common symptom (88.64%). Chest pain is second most common (68.18%). Signs and symptoms related to SVC obstruction i.e. facial swelling & prominent neck veins are rarest (4.55%). Most (27) (61.36%) presented within 3 months of symptoms.

Smoking:

Pack Years	0-5	6-10	11-15	16-20	21-25	26-30	>30	Total
Patients	2	4	8	8	3	4	1	30

30 (68.18%) patients were smokers, all were male.

Bronchoscopic Findings:

Findings	Patients	Percent
Endobronchial lesion	31	70.45
Mucosal abnormalities	10	22.73
Constricted airway	9	20.45
Mucoid/mucopus secretions	3	6.82
Normal	1	2.27

As seen endobronchial lesion is most common finding(62%). Mucosal abnormalities (20%) and constricted airway (18%) are other common findings.

Histopathological Diagnosis:

Diagnosis	Patients		
	Biopsy	BAL	Brushings
Adenocarcinoma	19(43.18%)	4(9.09%)	2(20%)
Squamous cell ca.	16(36.36%)	2(4.55%)	1(10%)
Small cell ca.	2(4.55%)	0	0
Large cell ca.	1(2.27%)	0	0
Carcinoid tumor	1(2.27%)	0	0
Metastatic ca.	1(2.27%)	0	0
Atypical Cells	0	2 (4.55%)*	4(40%)*
Undiagnosed	4(9.09%)	36(81.82%)	3(30%)
Total	44(100%)	44(100%)	10(100%)

In biopsy Adenocarcinoma is the most common cancer (43.18%) followed by Squamous cell carcinoma (36.36%). BAL fluid analysis yielded useful information in only 20.45% patients. Brushings were taken in only 10 patients out of which 7 provided useful information.*BAL & brush showing atypical cells but not diagnostic of any particular subtype.

Comparison of yield:

Procedure	Biopsy	Brushings	BAL
Yield	90.91%	70%	18.18%

Thus yield of bronchoscopic biopsy is highest (90.91%) in all investigations.

CT guided biopsy:

All the four undiagnosed case were confirmed malignant by CT guided biopsy. 3 were peripherally located adenocarcinoma while 1 was centrally located squamous cell carcinoma.

Cancer Types according to Gender:

Type	Male	Female	Total
Adenocarcinoma	18	4	22
Squamous Cell Ca.	15	1	16
Small Cell Ca.	2	1	3
Other	2	1	3
Total	37	7	44

As seen both in male and female patients adenocarcinoma is the most common cancer accounting for 50% of cases.

Cancer Type according to Smoking:

Type	Smoker	Non-smoker	Total
Adenoca.	12	10	22
Squamous Cell	15	1	16
Small Cell	2	1	3
Other	1	2	3
Total	30	14	44

Squamous cell carcinoma is more common in smokers (50%) while adenocarcinoma is more common is non-smokers (71.43%). 85.71% of the female patients has exposure to bio-mass fumes. Only non-exposed female had adenocarcinoma.

Cancer Types based on Location:

Types	Adenoca.	Squamous Cell Ca.	Small Cell Ca.	Other	Total
Central	6	15	3	2	26
Peripheral	16	1	0	1	18
Total	22	16	3	3	44

As described Squamous cell carcinoma is the most common (57.69%) centrally located cancer while Adenocarcinoma is most common (88.89%) in periphery.

Coml l

Only two patients had complications. Hemoptysis was mild and was controlled easily. Only one patient had dyspnea but was relieved within short time. There was zero mortality.

DISCUSSION

The sensitivity for endobronchial lesion is high, especially for biopsies and brushings. The sensitivity is lower for peripheral lesions, in which cytobrushing shows the highest sensitivity, followed by transbronchial biopsies and BAL washings. Flexible bronchoscopy has a poor sensitivity for peripheral lesions <2cm in diameter. The sensitivities of CT guided biopsy is excellent especially for peripheral lesions but there is a trend toward lower sensitivity for smaller lesions (<2cm in diameter). Studies using CT guidance had a significantly higher sensitivity than those using fluoroscopy guidance. The data on safety of the flexible bronchoscopy available in some studies suggests that it is a very safe procedure. Although false positive diagnoses are rare, non-diagnostic results are not uncommon.

Age Profile:

Author	Average Age
Cohen & Saha	53 years
Guleria et al	57.2 years
Jindal &Behera	54.3 years
CM Shetty	60.5 years
Present study	57.88 years

Previously lung cancer occurred in middle aged male but now it is also seen in females as well. Average age is 57.88 years. Lung cancer below age of 40 years is rare. In my study 9% were below the age of 40 years. The reason for this age of presentation is mainly increased prevalence of tobacco smoking.

Gender Profile:

Author	Patients	Male	Female	Ratio
Cohen et al	417	383 (91.8%)	34 (8.1%)	11:1
Guleria et al	120	106 (88.3%)	14 (11.6%)	7.6:1
Chhajed PN	73	59 (81%)	14 (19%)	4.2:1
Prasad	400	324 (81%)	75 (19%)	4.3:1
Solanki et al	50	41 (82%)	9 (18%)	4.6:1
Present Study	44	37 (84.09%)	7 (15.91%)	5.1:1

Lung cancer is predominant in males but my study also shows increased rate in females. The higher incidence in males is due to greater habit of smoking and greater exposure to industrial carcinogenic agents. The increasing rates in females are probably due to increased habit of smoking in female population.

Smoking Profile:

Author	Total Cases	Smokers
CM Shetty	81 (100%)	75 (93.0%)
Gupta et al	279 (100%)	227 (81.6%)
Prasad	400 (100%)	284 (71.0%)
Solanki et al	50 (100%)	42 (84.0%)
Present Study	44 (100%)	30 (68.18%)

Smokers have a high risk as compare to non-smokers and direct correlation has been found between cumulative dose of exposure and risk as well as reversal of risk following cessation of smoking. Even after 30 years, risk remains higher for ex-smokers compared to non-smokers or never smokers. In present study 30 out of 44 cancer patients were smokers.

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Symptoms	Cohen et al	Guleria et al	Shetty	Present Study
Chest Pain	76.0%	42.0%	35.0%	68.18%
Cough	78.0%	46.0%	55.5%	88.64%
Dyspnoea	22.0%	48.0%	43.2%	50.0%
Haemoptysis	37.0%	48.0%	35.8%	15.91%
Anorexia & Weight Loss	44.0%	50.0%	82.0%	38.64%

The average duration before consultation is 4 months. Cough, chest pain and dyspnoea are common. Dyspnea is usually due to associated COPD, collapse, tumor, consolidation and pleural effusion. Cough is productive as most have COPD with secondary infection. An ill-defined, intermittent, aching chest pain is also seen.

Radiological Manifestations:

Study	Right Lung			Left Lung	
	Upper Lobe	Middle Lobe	Lower Lobe	Upper Lobe	Lower Lobe
ASY Taha et al	37.14%	11.43%	5.71%	42.86%	2.86%
Present Study	29.55%	13.64%	6.82%	34.09%	11.36%

Cancer involves both lungs equally though there is predominant upper lobe involvement.

Histological Pattern:

Author	Histology		
	Squamous	Adenoca.	Small cell
Shetty CM	44.4%	18.5%	17.2%
Gupta RC	42.0%	20.0%	18.0%
Prasad	46.5%	18.5%	18.2%
Noronha et al	26.2%	43.8%	8.0%
Present Study	36.36%	50%	6.8%

In old studies Squamous cell was the most common cancer. But in recent years adenocarcinoma has replaced it. This is seen in study done by Noronha et al and in the present study.

Complications:

Study	Complications	Mortality
Wlademir et al	1.7%	0.1%
De Blic et al	6.9%	0.0%
Present Study	4.0%	0.0%

Mortality rate is 0%. Thus flexible bronchoscopy is a very safe procedure.

Bronchoscopy yield and comparison of location:

Study	Bronchoscopy Positive			
	Squamous cell ca.		Adenocarcinoma	
	Central	Peripheral	Central	Peripheral
Solanki et al	23 (100.00%)	0	2 (66.67%)	1 (33.33%)
Mac et al	125 (87%)	14 (9.74%)	24 (44%)	30 (56%)
Present Study	15 (93.75%)	1 (6.25%)	6 (31.57%)	13 (68.42%)

Fiberoptic bronchoscopy is very sensitive for central tumors but not for peripheral.

Bronchoscopy Yield:

Study	Biopsy	BAL	Brushings
Liam et al	70.98%	31.1%	37.96%
K. Roth et al	60.70%	6.90%	23.00%
AB Fuladi et al	76.92%	70.76%	61.53%
V H Mak et al	62.77%	45.74%	44.15%
Present study	90.91%	18.18%	70.00%

In our study biopsy showed highest yield (90.91%). According to latest British thoracic society guidelines for fiberoptic bronchoscopy every bronchoscopy unit should try to bring yield above 80%.

SUMMARY

Most common age group is 51 to 60 years. The average age is 57.88 years. 8.09% are male and 15.91% are female. 68.18% patients had duration of symptoms below 4 months. Cough is most common symptom, present in 88.64%. 68.18% patients are smoker. 85.71% of the female cancer patients has exposure to bio-mass fuel fumes. Both lungs are similarly involved by cancer. Upper lobes are most commonly involved (63.64%). 59.09% have central lesion and 49.91% have peripheral lesion. Endobronchial lesion is the most common (70.45%). In HPE of biopsy 90.91% patients were diagnosed cancer. Yield of bronchoscopic biopsy is 90.91%, of BAL is 18.18% and of brushings is 70%. 9.09% Undiagnosed cases which went under CT guided biopsy - 75% were peripherally located adenocarcinoma and 25% were centrally located small cell carcinoma. Adenocarcinoma is the most common type (50%). Squamous cell carcinoma is second most common type (36%). Adenocarcinoma is most common

peripherally located cancer - in 88.89% and squamous cell carcinoma is most common centrally located cancer - in 57.69%. Only 4.54% patients developed complications. Mortality is 0%. Thus flexible fiberoptic bronchoscopy is very safe procedure.

CONCLUSL

In patients having complains of cough, dyspnea, chest pain, hoarseness of voice, anorexia, weight loss and having symptoms of SVC obstruction with history of smoking and having parenchymal lesions on chest x-ray, lung cancer must be suspected. Flexible fiberoptic bronchoscopy with biopsy is very safe procedure for confirming the diagnosis with very high yield.

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