Role of Fibreoptic Bronchoscopy in Abnormal Chest X-Rays-A Prospective Study

Dr.Sumanth.A[1], Dr.P.Chakradhar Reddy[2], Dr Suresh Kumar[3]

ABSTRACT

Aim- To study the role of fiberoptic bronchoscopy in abnormal chest x-rays. **Design**- A prospective study done at Department of Pulmonary medicine, Santhiram Medical college from 2013 june to 2015 march. **Materials and methods**- Once a presumptive diagnosis was made, a fiberoptic bronchoscopy was done in all these patients. Bronchial washings, endobronchial brushings, biopsy were performed in relevant patients and sent for investigations. **Results**- Out of 206 bronchoscopies performed,48% were for Non-resolving pneumonias, Structural lung diseases 16.9%,mass lesions included 10.6%,collapse 9.7%,pleural disease 8.2%, mediastinal and hilar disease 3.3%, SPN included 2.9%. In NRP, yield of bronchoscopy was 82.83%. Most common etiology in NRP is bacterial followed by malignancy, tuberculosis, fungal and foreign body. In lung mass patients 70% had diagnostic yield with bronchoscope. In lung collapse patients bronchoscopy was useful in 80 % cases. In patients with structural lung disease, mycobacterium tuberculosis was isolated in 20 % patients and among bacteria most common bacteria were klebsiella, pseudomonas. In patients with pleural disorders, bronchoscopy had diagnostic yield in 17.6 % patients. In mediastinal and hilar disorders, yield of bronchoscopy was 42.8 %. In our study bronchoscopy had only diagnostic yield of 16.6 % in patients with SPN. **Conclusion**- Fibreoptic bronchoscopy is a high yield procedure in diagnosing lung diseases.It is highly recommended in patients with Nonresolving pneumonias, Lung mass, Lung collapse, Structural lung diseases, Mediastinal and Hilar disorders. Comparatively low yield was observed in patients with undiagnosed pleural diseases,SPN.

Keywords: Bronchoscopy, Fibreoptic bronchoscopy, non-resolving pneumonia, tuberculosis

[1 2 3] Department of Pulmonary Medicine, Santhiram Medical college and General Hospital, Nandyal, Andhra Pradesh

Corresponding author mail: drsumantha@gmail.com

Conflict of interest: Nil

INTRODUCTION

Endobronchial examination was first carried out in the last decade of nineteenth century for the purpose of removing inhaled foreign bodies, and as long as 1904 a rigid bronchoscope with provision for suction & illumination came into use [1]. Technologic advances during the next century facilitated development of bronchoscopy as a pivotal diagnostic tool in pulmonary medicine. Although a number of bronchoesophagologists contributed to refinement of the technique based upon use of rigid instrument, Broad application of bronchoscopy took place only following the development of flexible instruments that could be easily introduced under local anesthesia ,the advent of flexible fiberoptic bronchoscopy, pioneered by Shigeto Ikeda [2], opened new horizons to clinicians.

Since the introduction in 1967 the fiberoptic bronchoscope has become the instrument most widely used for routine diagnostic purposes The ease of application and of access beyond the central airways opened vast opportunities for introduction of new optical, diagnostic, and therapeutic techniques, starting with TBLB, performed by Anderson and Zavala [3]after Ikeda's visit to the United States.

It is a safe and minimally invasive procedure that has limited contraindications and few complications. It can be safely used in all age groups including the elderly8. Retrospective studies of fibreoptic bronchoscopy have found a major complication rate of 0.08-0.3%,'a major complication having been defined as one considered to endanger life or requiring urgent therapeutic intervention. Prospective studies report higher major complications rate of 1.7-5% [4].The two most important complications of fibreoptic bronchoscopy are hemorrhage and pneumothorax, attributable mainly to biopsy procedures.

The two most important determinants of the need for bronchoscope are clinical parameters and chest roentgenographic abnormalities. Chest radiographic abnormalities that require diagnostic bronchoscopy include mass lesions (solid or cavitating), hilar opacities, unresolving pneumonia, peripheral pulmonary opacities, collapse, hemidiaphragmatic paralysis, recurrent pulmonary infiltrates and diffuse parenchymal lung disease.

Since very few Indian studies regarding diagnostic yield of fiberoptic bronchoscope have been done, hence in this study an attempt has been made to analyze the role of fiberoptic bronchoscopy in the diagnostic application of abnormal chest x-rays.

MATERIALS AND METHODS :

The study was conducted at Santhiram Medical College and General hospital, Nandyal during 2013 June to 2015 March.

Inclusion Criteria; All patients undergoing Diagnostic Fiberoptic bronchoscopy in our institute who met the following criteria were included :

- ✓ Sputum smears for AFB negative with suspected pulmonary Koch's.
- ✓ Sputum for malignant cytology negative with suspected malignancy
- ✓ Presence of abnormality in chest x-ray

Exclusion Criteria:

- ➢ Patients unable to maintain adequate oxygenation during the procedure
- ➢ Patients undergoing repeat Bronchoscopy for other than diagnostic reasons.
- ➢ Patients with recent myocardial infarction (MI) and angina
- ➢ Patients not willing to participate in the study.

Procedure

- ➢ Once a presumptive diagnosis was made, a fiberoptic bronchoscopy was done in all these patients for confirmation of the diagnosis after taking an informed consent. After an overnight fasting, prebronchoscopic medication was given with injection Atropine(0.6 mg) and injection phenergan. Patients were also sprayed with 4% Xylocaine with an atomizer over the oropharynx before the bronchoscopy.
- ➢ The bronchoscopic procedure was done transnasally with the patient lying in supine position and under pulse oxymetry and electrocardiographic monitoring. After passing the tip of the bronchoscope up to the level of the vocal cords, 1 ml of 2% Xylocaine was instilled to anaesthetize the vocal cords and the scope was advanced below the vocal cords into the trachea.

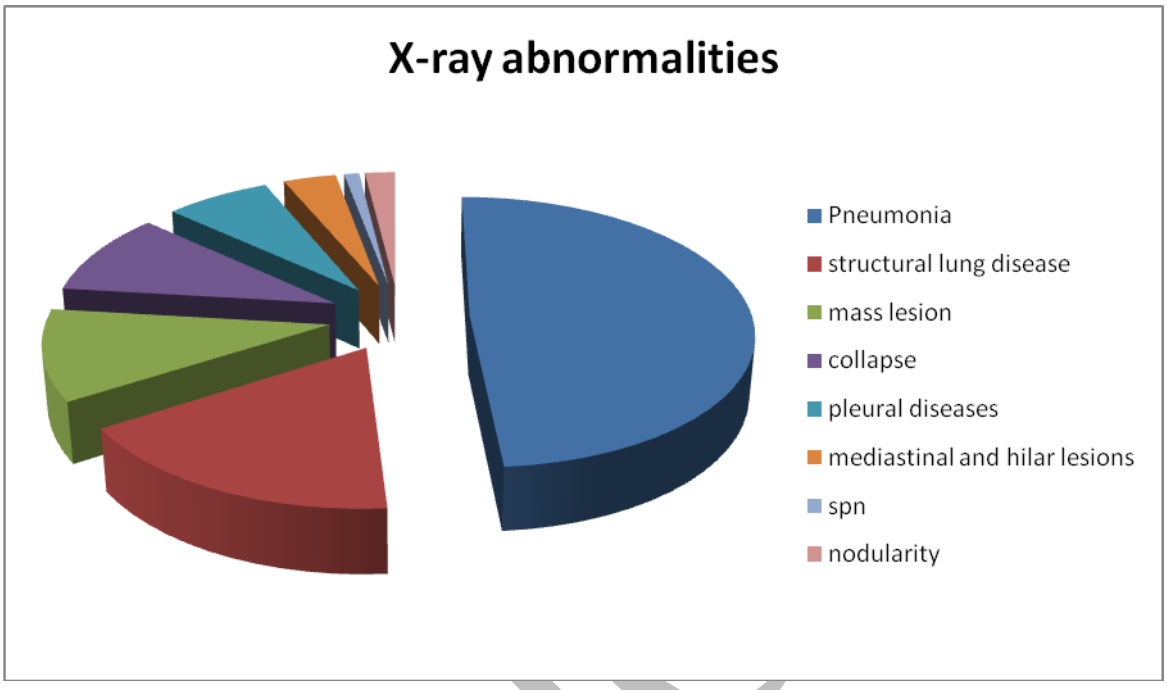
- At the level of the carina, 2 ml of 2% Xylocaine was again instilled. Meanwhile a thorough examination of the nasopharynx, vocal cords and tracheobronchial tree was done. In most of the cases, bronchial washings of the diseased lobe was done with about 10 – 15 ml of 0.9% sterile saline (instilled with a syringe) and by application of 50-80 mm Hg negative pressure from a suction apparatus and the fluid was collected into 75 ml disposable sterile specimen traps.
- BAL collected by instilling around 150-200ml Normal saline by advancing scope to distal end of segmental bronchi. In the patients who did not have a localized disease, on chest roentgenogram, bronchial washings were taken from the right middle lobe and the lingula. The collected fluid was sent for bacteriological, fungal, parasitic and cytological studies.
- When intrabronchial lesions / growths were found, endobronchial brush and forceps biopsies were done.
- Following bronchoscopy, the patients were closely observed for a certain period of time which varied from patient to patient depending on the general medical status. The patients were instructed to be nil oral till 3-4 hours after bronchoscopy and to be alert for the development of symptoms suggesting late complications. Postbronchoscopic sputum samples were collected in selected patients and the collected specimens were examined for acid fast bacilli.

RESULTS

Total study group was 206. Majority of patients were in the age group of 40-60 yrs. Males constituted to 66.9 % and females were 32.1 %. 72.33 % of patients had at least one co-morbid illness. 37.37 % patients were smokers and all of them were males.

Out of 206 bronchoscopies performed,48.05% were for Non-resolving pneumonias, Structural lung diseases 16.99%,mass lesions included 10.67%,collapse 9.70%,pleural disease 8.25%, mediastinal and hilar disease 3.39%, ,SPN included 2.91%.(Figure No 1).

Figure 1: Chest X -ray abnormalities

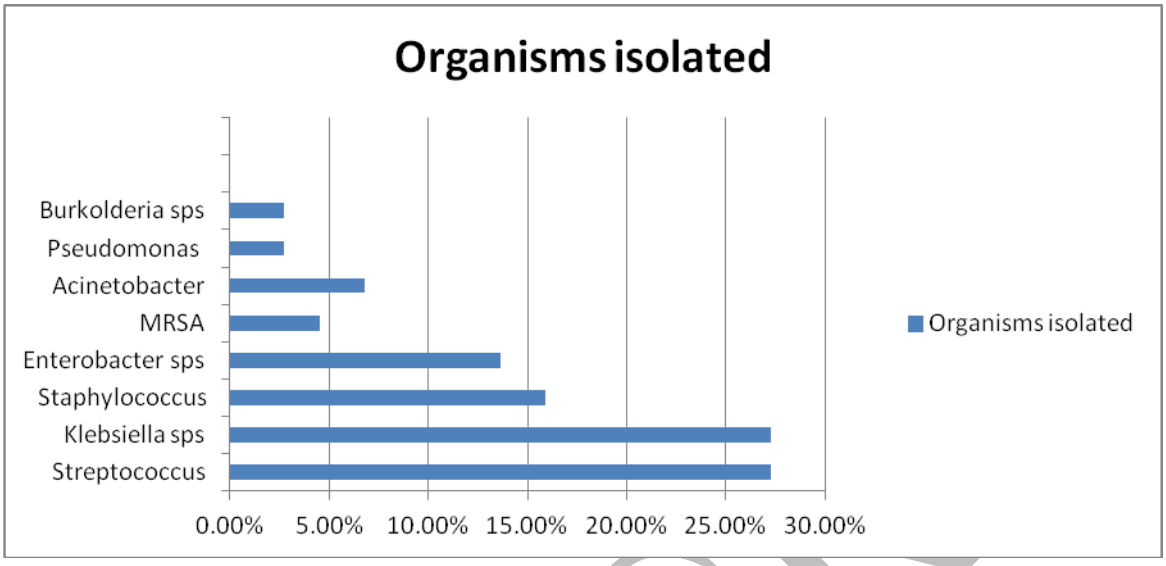


Out of total of 99 patients for whom bronchoscopy was done for underlying nonresponding pneumonias majority ie 44.44% of patients had bacterial etiology,followed by 14.14 % patients had malignancy, 13.13 % of patients had tuberculous etiology, 8.08 % patients with fungal etiology, 3.03 % patients had foreign body and in 17.17 % patients bronchoscopy was inconclusive.(Table No 1).

Table No 1: Outcome of bronchoscopies for patients with underlying pneumonia

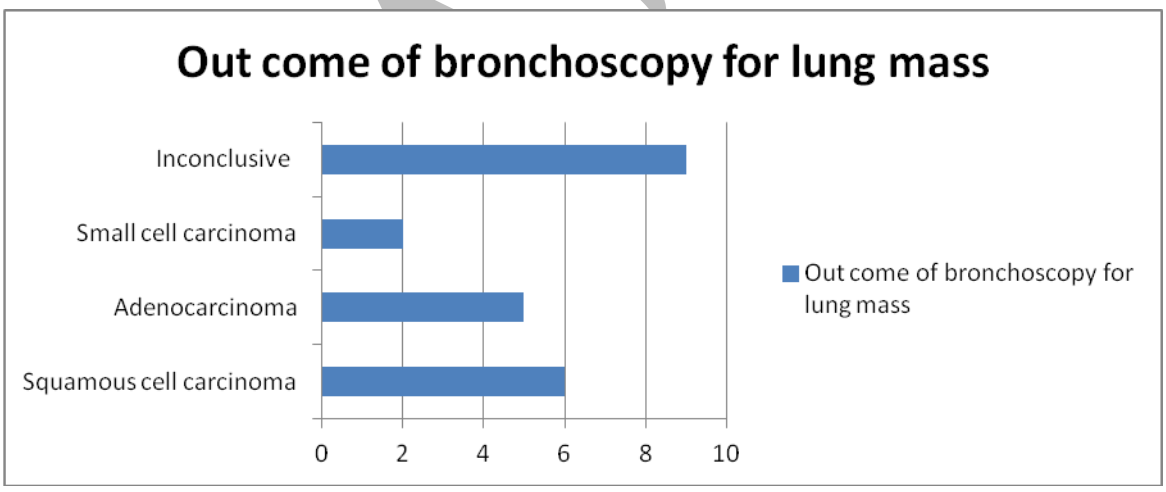
	NO OF PATIENTS	PERCENTAGE
Bacterial etiology	44	44.44 %
TB etiology	13	13.13 %
Fungal etiology	8	8.08 %
Malignancy	14	14.14 %
Foreign body	3	3.03 %
Inconclusive	17	17.17 %

Figure 2: Organisms isolated in patients with non-resolving pneumonia of bacterial etiology.



Out of 22 patients with lung mass, bronchoscopy was diagnostic in 55.10% patients and most common malignancy was squamous cell carcinoma followed by adenocarcinoma and small cell carcinoma (figure 3).

Figure No 3: Outcome of Bronchoscopy for lung mass



Out of 20 patients of lung collapse bronchoscopy was useful in 80 % patients out of whom 30 % had malignant etiology.

In patients with underlying structural lung disease, even fungal infections were equally common as bacterial infections, both of which were constituting to 25.71 % each.

Most common bacterial organisms in patients with structural lung disease were klebsiella and pseudomonas. Incidence of tuberculosis in patients with structural lung disease is 20 %.

The diagnostic yield of bronchoscopy in pleural disorders is about 17.6% in establishing malignant etiology.

In 7 patients bronchoscopy was done with underlying mediastinal and hilar disorders, 2 patients had malignant etiology and 1 had granulomatous pathology.

In 6 patients of SPN were included and in only 1 patient malignant etiology could be established which was malignant.So yield of bronchoscopy in SPN was 16.6 %.

DISCUSSION

Flexible bronchoscopy is a minimally invasive procedure, which is commonly performed in clinical respiratory practice for various indications.

The diagnostic yield of bronchoscopy is regarded high, however it varies considerably depending on indication and techniques used during bronchoscopy [5,6].

The last decades have seen introduction of several diagnostic innovations in the bronchoscopy suite which include endobronchial ultrasound, autofluorescence bronchoscopy and electromagnetic navigation [7,8] .However, such innovations are mainly limited to specialised centres and do not reflect the application of this technique in routine clinical practice.

In a study period of 2 years, a prospective study was conducted regarding the role of bronchoscopy in abnormal x-rays in the Department of Pulmonology in Santhiram medical college and General hospital.

In the present study, 48% of patients constituted Non-resolving pneumonia, out of whom FOB had a high diagnostic yield of 83%. In case of non-resolving pneumonia, 44% patients had resistant bacterial infections and 14% had malignancy, followed by tuberculosis, fungal diseases and foreign body in remaining cases, which were comparable with study conducted by Srivasta B et al [9]& Feinsilver SH et al.[10]

In case of Pleural diseases, FOB had a diagnostic yield of 17.6% which was low and comparable with Kelly P, Fallouh M et al. [11]

FOB had a very high diagnostic yield of 80% (including diagnostic and

therapeutic as well) in case of lung collapse.Out of 20 patients of lung collapse, 4 had mucus plugging and 1 patient had foreign body, these patients even had therapeutic benefit. Present study has a high efficacy rate than compared to study done by Robert poe et al. [12]

In case of lung mass, yield was 59% which was comparable with Bandoh et al [13], McDougall and Cortese et al[14].Our study has higher incidence of squamous cell carcinoma, probably due to higher number of males participating in this study.

In patients with underlying structural lung disease, FOB had yielded positive outcome in 71% of patients and bacterial flora in these patients was klebsiella, pseudomonas, streptococcus (in decreasing order). Where as in a study done by Angril et al [15], most common bacterial flora were H.influenza, streptococcus, pseudomonas. This variation of colonisation could be due to change in underlying lung pathology, as the present study even included COPD and ILD patients.

In patients with SPN, only one patient out of 6 had positive yield which constitutes to 16.6%. This was comparable with study done by Walid A. Baaklini et al[16], who had yield of 14%. In our study and above mentioned studies, most of the patients had lesions of size <2cms which could be the reason behing low diagnostic yield.

More over diagnostic capability of bronchoscopy in SPN even depends on whether the lesion is in centre / intermediate / periphery and in our study, all the patients had peripheral lesion.

In our study out of 7 patients with mediastinal and hilar disorders, 3 patients had a positive diagnostic yield following bronchoscopy.

Our study is in par with previous studies one by Linda Green et al [17] who had a diagnostic yield of 61 % following bronchoscopy.

In our study out of 7 patients 2 patients turned out to be having malignant etiology and in 1 patient there was granulomatous inflammation following TBNA (sarcoidosis).

REFERENCES

1. Kollofrath O. Entfernung eines Knochensucksaus dem rechten Bronchus auf naurlichem Wegeund unter Anwendung der directen

Laryngoskopie. MMW Munch Med Wochenschr. 1897;38:1038–1039.

2. Ikeda S, Yanai N, Ishikawa S. Flexible bronchofiberoscope. Keio J Med 1968;17:1-16.
3. Zavala DC schoell JE : Ultrathin needle aspiration of the lung in infections and malignant disease. Am rev R3spir Dis 123:125,1981.
4. Pereira W, Kovnat D,Snider G (1978) A prospective cooperative study of complications following flexible fiberoptic bronchoscopy. Chest 73:813 816.
5. Mak VH, Johnston ID, Hetzel MR, Grubb C. Value of washings and brushings at fibreoptic bronchoscopy in the diagnosis of lung cancer. Thorax 1990;45:373–6.
6. Gellert AR, Rudd RM, Sinha G, Geddes DM. Fibreoptic bronchoscopy: effect of multiple bronchial biopsies on diagnostic yield in bronchial carcinoma. Thorax 1982;37:684–7.
7. Yasufuku K, Chiyo M, Sekine Y, Chhajed PN, Shibuya K, Iizasa T, et al. Real-time endobronchial ultrasound-guided transbronchial needle aspiration of mediastinal and hilar lymph nodes. Chest 2004;126:122–8.
8. Chhajed PN, Lee P, Tamm M. Advances in bronchoscopy – new and upcoming bronchoscopic methods at the dawn of the 21st century. J Assoc Physicians India 2004;52:970–4.
9. Srivasta B, Khunjeli R, Singh, singh S.K , Eva piya, The value of Fiberoptic bronchoscopy in the diagnosis of various pulmonary conditions A review of 100 initial bronchoscopies PMNJ,VOL-8,NO-2;2009
10. Feinsilver SH, Fein AM, Niederman MS, et al. Utility of fiberoptic bronchoscopy in nonresolving pneumonia. Chest 1990; 98: 1322-1326.
11. Kelly P, Fallouh M, O'Brien A, et al. Fiberoptic bronchoscopy in the management of lone pleural effusion: a negative study. Eur Respir J 1990; 4: 397-398.
12. Poe RH, Levi PC, Israel RH, et al. Use of fibreoptic bronchoscopy in

the diagnosis of bronchogenic carcinoma. A study in patients with idiopatic pleural effusions. Chest 1994; 105: 1663-1667.

13. Bandoh S, Fujita J, Tojo Y, et al. Diagnostic accuracy and safety of flexible bronchoscopy with multiplanar reconstruction images and ultrafast Papanicolaou stain: evaluating solitary pulmonary nodules. Chest 2003; 124:1985–1992
14. McDougall JC, Cortese DA. Transbronchoscopic lung biopsy for localized pulmonary disease. Semin Respir Dis 1981; 3:30–34
15. Angrill J, Agusti C, de Celis R, et al: Bacterial colonization in patients with bronchiectasis: Microbiological pattern and risk factors. Thorax 57:15, 2002.
16. Walid A. Baaklini, MD; Mauricio A. Reinoso, MD, FCCP; Arnold B. Gorin, MD; Amir Sharafkaneh, MD; and Prasad Manian, MD, FCCP Diagnostic Yield of Fiberoptic Bronchoscopy in Evaluating Solitary Pulmonary Nodules (CHEST 2000; 117:1049–1054)
17. Amir Sharafkhaneh, Walid Baaklini, Arnold B. Gorin and Linda Green Yield of Transbronchial Needle Aspiration in Diagnosis of Mediastinal Lesions Chest 2003;124;2131-2135