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RESEARCH ARTICLE

A STUDY INTO THE DIAGNOSTIC YIELD OF FIBER-OPTIC BRONCHOSCOPY AT RURAL MEDICAL COLLEGE IN THE POST COVID ERA

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Abstract

Introduction: Thefiber-optic bronchoscopy (FOB) has become an integral and essential part of respiratory medicine as diagnostic, therapeutic and interventional modality due to advancement that has occurred during last five decades. FOB facilitates direct visualization of centrally located lung pathology and the biopsies can also be procured from lung parenchyma. The diagnostic yield is variable and depends upon available resources and skill.

Material and Method: 241 cases of FOB that were performed in post Covid-19 era were evaluated for diagnostic yieldat RD Gardi Medical College hospital, Ujjain, India.

Results: 230 cases of FOB done for the diagnosis were considered for study after exclusion of 11 casesin which FOB was performed for therapeutic or other reason. The male predominance was found with > 80% in the patients belonging to age group of 41 yrs and above. The diagnostic yield remained at 82.6% including the inflammatory malignancy, bacterial; TB and fungal infection which were 36.3%, 33.7%, 17.9, 7.4% and 3.2 % respectively.

Discussion: The clinical, radiologic, and pathologic investigations are prerequisite and determine the indication to perform endoscopy for further evaluation and it helps in selecting procedure during FOB. The gross abnormalities are not always seen but TBLB, TBNA and inflammatory cytology of BAL definitely helpful in diagnostic yield. The minor complications during and post procedure are not uncommon. Occasionally the anatomical variations and anomalies of the airways can also be detected during FOB.

Conclusion: The FOB enables to procure tissue and secretions from the airways and also facilitates evaluation of lung parenchyma for diagnosis of underlying pathology. The advancement in multifunctional utility of FOB, supported with basic knowledge of guidelines, with expertise and skill is required for better outcomes.

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Introduction and Aim Objective:-

The first FOB (flexible fiberoptic bronchoscope) was reported by Shigeto Ikeda in 1966 since then it has become an integral part of respiratory medicine. It facilitates visualization of the larger airways and enables to perform biopsy of abnormal endobronchial tissue, sampling of pus or secretions, Brush biopsy, Bronchoalveolar lavage (BAL) fluid for cytology etc. A transbronchial needle aspiration (TBNA) of mediastinal masses or lymph nodes and trans-bronchial lung biopsy can also be done. It has many therapeutic indications like the critical ill patient in ICU setting may require clearing of secretions or mucous plugs and at occasions also help in difficult intubation. [1, 2] So it has dual diagnostic as well therapeutic utility. The central abnormalities including malignant growth are directly accessible and are more suitable to perform foreign body removal, [3] debridement of masses, stent placement, Cryobiopsy, thermal ablation or cauterization, Radiofrequency thermal ablation in bronchial asthma. The one way valve placement and lung volume reduction surgery/ coil placement in COPD and many more could be performed depending upon availability of equipments, skill and expertise. Apart from the simple flexible bronchoscopy advanced and latest scopes are now available in combination with several up-to-date technologies which includethin/ultrathin bronchoscopes, radial probe endobronchial ultrasound (RP-EBUS), and navigation bronchoscopy—including virtual navigation bronchoscopy (VNB) and electromagnetic navigation bronchoscopy (ENB). Recently, newer technologies including robotic-assisted bronchoscopy (RAB), cone-beam CT (CBCT), and augmented fluoroscopy (AF) have been introduced to aid in the navigation to peripheral pulmonary nodules. [3,4]

The process of FOB generates aerosol and to minimize it an infection control protocol is strictly followed. Though the FOB is a mostly a safe procedure with minimal adverse effect in the form of bleeding/ post procedure fever etc. The bronchoscopy practices have wide variations across our country and elsewhere worldwide. [5] In this regard the three major respiratory organizations of our country with the supported of national-level expert group have published a worthy document which was compiled by Anant Mohan, et al. [1] This guidelines cover almost major issues relevant to basic bronchoscopy including the indications for procedure, patient preparation, various sampling procedures, bronchoscopy in the ICU setting, equipment care, and training issues etc. [1,5,6]

The diagnostic yield of central air ways and lung lesions with endobronchial biopsy is near 80% which may further improve with brush, endobronchial needle aspiration, TBNA, and post procedure BAL. [3] The transbronchial lung biopsy is another simple procedure which enable diagnosing various parenchyma lung disease, which includes sarcoidosis, Pneumonitis, lymphangitic carcinomatosis, hypersensitivity pneumonitis, cryptogenic pneumonitis etc. [4]

The imaging (Chest X-Ray or CT Thorax) is prerequisite for the FOB to locate the site, size, and nature of abnormality. A complete clinical and histopathological profile i.e. multidisciplinary approach is required for better diagnostic yield. Hence we have under taken this study after a decline in the Covid cases, to know the utility of FOB in a rural based tertiary hospital with limited resources. However our institution served as a **Dedicated Covid Hospital** (DCH) during covid-19 period. So the study period commenced from post covid-19 era till June 2023.

Material and Method:-

A total of 241 FOB were performed, and considered for retrospective study among the admitted patients in the department of respiratory medicine at a rural tertiary hospital (RDGMC Ujjain, MP and India). FOB was carried out with video bronchoscope (Olympus) under local anesthesia and attached mulipara monitoring system. The 6 cases (2.5%) were excluded from the study due to various reasons as they were unfit due to being non cooperative and cardio respiratory insufficiency/ desaturation etc. Another 5 cases (2.1%) the FOB was carried out for therapeutic utility i.e. difficult to in-tubate (fiberoptic intubation) for mechanical ventilator support [1,2] and for clearing of secretions or mucous plugs in emergency at the bed side in the Intensive Care Unit, were also excluded. The remaining 230 cases the FOB was performed for the diagnostic purpose were considered for the present study. Among these 230 cases the study aims to identify the diagnostic yield of FOB so broncho alveolar lavage (BAL), brushing and biopsy including post bronchoscopy sputum were collected for detailed histopathology and microbial investigations.

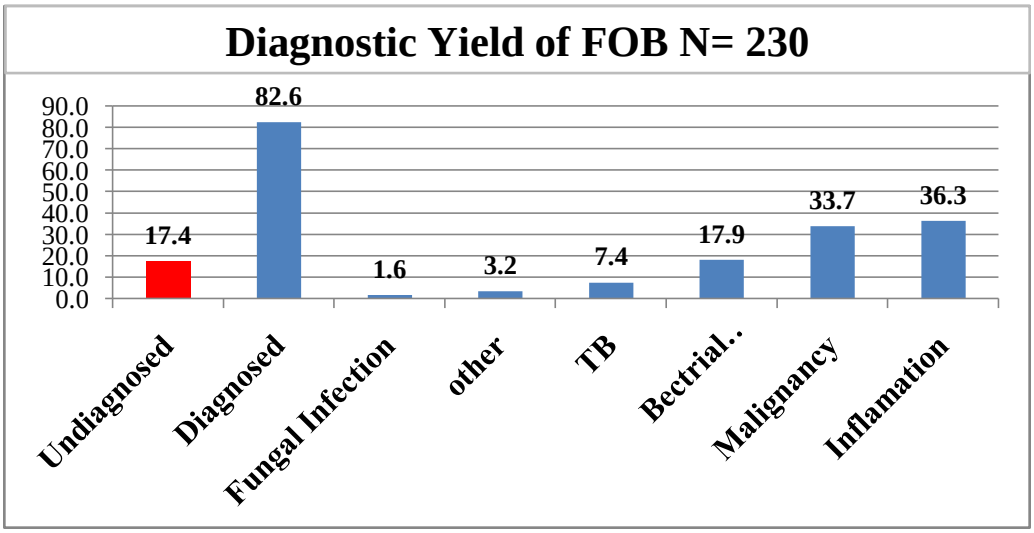
Results:-

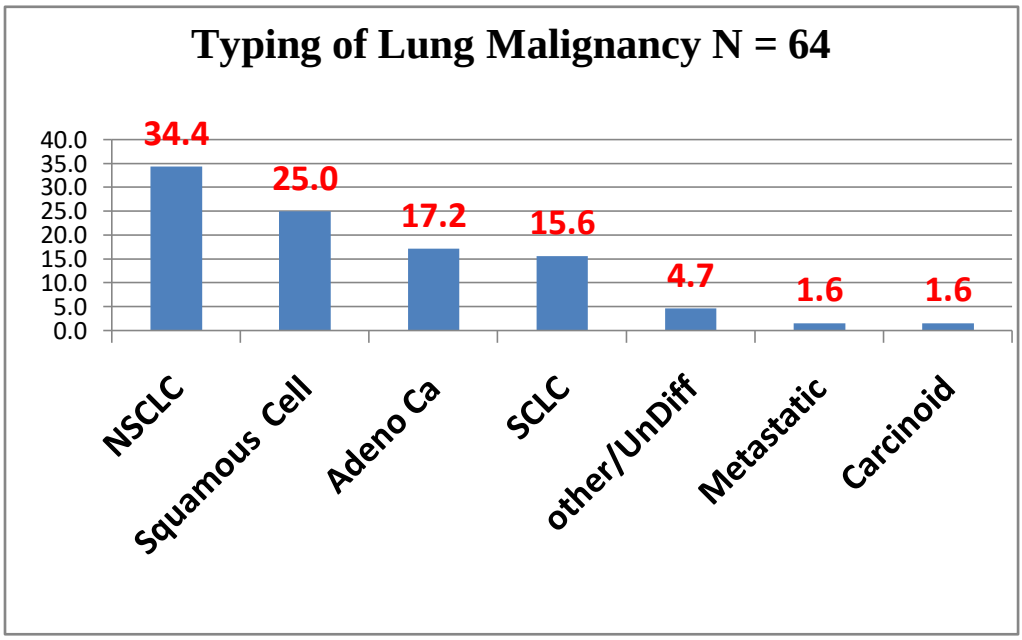
The observations with interpretation and possible inference are given in tabulation form:

Parameters	Results	Interpretation/Inference

Total Patients	Out of total 241 FOBs only 230 were included and 11 cases excluded from study. 241-6-5 = 230 cases	6 cases (2.5%) excluded due to non cooperation/ cardio respiratory insufficiency. 5 cases (2.1%) excluded due to FOB done for therapeutic reasons
Male : Female Ratio	180 : 50	Male were with 3.6 time predominance
Age Group **21 to 30** **31 to 40** **41 to 50** **51 to 60** **>60**	M + F = Total (± %) 09 + 14 = 23 (10%) 16 + 07 = 23 (10%) 33 + 14 = 47 (20%) 60 + 08 = 68 (30%) 62 + 07 = 69 (30%)	More than 80 % cases belongs to >41 age and that too with significant raised male prominence (84:16) of > 5 Times
Mean age **Age range**	54.2 Yrs 16 to 85	Majority belongs to productive age group.
Diagnostic samples; BAL Biopsy Brush TBNA TBLB	Total: 230 cases 230 100.0 % 158 68.7 % 071 30.9 % 029 12.6 % 054 23.9 %	BAL was collect in all the cases, and other operational procedures were selected or adopted in accordance with the assessment of clinical, radiological and provisional diagnosis of individual case to case.
Diagnostic Yield: **Undiagnosed:** **Diagnosed:** Fungal Infection Other TB Bacterial Infection Malignancy Inflammatory	Total 230 cases 40 (17.4 %) 190 (82.6 %) of which: 3 case…… 1.6 % 6 Other…… 3.2 % 14 cases 7.4 % 34 case 17.9 % 64 case 33.7 % 69 case 36.3 %	The diagnosis of Malignancy, Infective and inflammatory including diffuse lung diseases were the main target. However histo-pathologic, biochemical, inflammatory biomarker, and immune histopathology with multi disciplinary support/ team work are required.
Microbial Report: **Bacteria & TB** **Fungus**	Pseudomonas, Ecoli, Klebsiella and Mycobacterium tuberculosis. Aspergillous two case Mucor Mycosis one case	Total microbial detection in 51 (26.8%) cases.
Ca Typing: 64 cases NSCLC (Undifferentiated) SQCC Adeno-carcinoma SCLC other/Undifferentiated Metastatic Carcinoid	64 (33.7 %) of which: • 22 case 34.4 % • 16.case 25.0 % • 11 case 17.2 % • 10 case 15.6 % • 03 4.7 % • 01 case 1.6 % • 01 case 1.6 %	More than 1/3 cases were diagnosed as malignancy. Over all NSCLC was > 76 % as against 17 % SCLC. 34.4 % cases of NSCLC could not be further classified due to limited resources i.e. lack of biomarkers and non availability of Immuno-histochemistry **(IHC)**

Other Therapeutic Procedure: Total 5 cases *Tracheal Intubation *Airway Clearing	FOB for therapeutic purpose was also done amongst the 5 Cases other than 230 series of the study cases,. 2 case 3 case	Exclusively perform at bed site in emergency for difficult intubation 2 cases (fiberoptic intubation) and another 3 cases who were not maintaining saturation due to mucous plugs or secretions in the ICU.
Complications	During procedure: 32 (14%) Post procedure: 19 (08%)	Bleeding & Tachycardia Mild fever & coughing





Discussion:-

There were 180 male and 50 female, with age range of 16-85 years with mean age of 54 yr. The maximum patient (>80%) belong to higher age group of above the 40 years with > 5 Times male predominance. The indication of FOB depends upon many factors including clinical findings, pathologic, radiologic, laboratory reports for further confirmation of diagnosis. FOB also helps in evaluating even unexplained haemoptysis (8-9) or shortness of

breathing are some examples. These informations are prerequisite and help in selecting procedure during FOB. The diagnostic yield of FOB in the present study remained 82.6% among the total 230 cases (Graph 1). Amongst the 190 diagnosed group of cases the lung cancer, bacterial Infection, TB, and fungal were detected in 34%, 18%, 7% and 2% respectively by various sampling procedures i.e. BAL, Brush and biopsy etc. (10, 11) A gross visual abnormality could not be detected in 109 (47%) of cases, which include undiagnosed cases group 17.4% (N=40) and in rest of the cases inflammatory pathology 36.3% (N=69) was reported. The BAL fluid was invariably collected in all the cases and the bacterial infection was detected in 18% (N=34) with predominance of Pseudomonas, followed by Ecoli and Klebsiella. The fungal growth in 3 cases was found of which 2 with Aspergillous and a single case of Mucormycosis. The cases of SCLC were diagnosed in 15.6% as against 76.6% of NSCLC with all inclusive sub types is comparable with other studies. (12,13) However 34.4 % cases of NSCLC could not be further classified or identified according to cell typing due to non availability of immuno-histochemistry facility in our institution.

June Hong Ahn et al mentioned in reference to a large retrospective FOB study with a mortality rate of 0.02% with other complication in the form of Pneumothorax, Pulmonary haemorrhage and respiratory failure in 0.5% - 0.8 % of cases. (7) He further mentioned about the minor complications like vomiting, laryngo and or bronchospasm, vasovagal syncope and epistaxis. He also separately mentioned about the complications due to TBNA and EBUS (1% to 5%). (7) In the present series no serious complication occurred during FOB except in 22%. We observed minor bleeding, tachycardia and post procedure mild fever and coughing which were managed well with assurance and minimal nonspecific treatment. The post procedure expectoration was also routinely collected and examined, however none had contributed to increase in diagnostic yield. It is not unusual to observe anatomical variation in trachea bronchial branching pattern and other anomalies. We find 2 cases with right upper lobe airway branching in two segments and another with combined apical and posterior segments without having any clinical significance. Philips Antony et al studied 192 cases and mentioned that in most of the FOB the airway branching was found to be normal. (3)

Conclusion:-

FOB is an integral part of respiratory specialty. The centrally located airways lesions can directly be approached for diagnosis and or therapeutic interventions. The sputum smear negative for TB or who fail to produce any sputum can be diagnosed by BAL fluid obtained during FOB. The transbronchial lung biopsy and TBNA help in sampling of undiagnosed parenchymal lung diseases. The advancement in multifunctional utility of FOB, supported with basic guidelines knowledge, with expertise and skill is required for better outcomes in diagnosis and safety in procedures.

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