

Utility of Fiberoptic Bronchoscopy at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia

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Research note

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Abstract

Objective Fiberoptic bronchoscopy (FOB) is a widely used tool in the diagnosis and treatment of pulmonary diseases. However, little is known regarding the indications and diagnostic yield of FOB in Ethiopia. The objective of this study was to determine the indications and diagnostic yield of FOB at Tikur Anbessa Specialized Hospital (TASH), the largest public health hospital in Ethiopia. Results In this retrospective chart review, all patients undergoing FOB between January and December 2013 in the bronchoscopy suite were studied. Data included: patient demographics, smoking, HIV status, procedure indications, and microbiologic, cytological and pathologic results. During the study period, 141 patients underwent FOB. The mean age was 42 years; 90(63%) were men. Among those whose smoking status was known, 15% were current or former smokers. The most common indications for FOB were: lung mass (presumed malignancy) 54% (76), tuberculosis 13% (18), and pleural effusion with possible underlying lung cancer 9%(13). 65 patients had endobronchial and/or transbronchial biopsies; 48% (31/65) were diagnostic and of these 68% (21/31) had malignancies. 57 patients had BAL performed; 33% (19/57) were diagnostic and of these 37% (7/19) had tuberculosis. We found that bronchoscopy was a safe and effective tool for diagnosing lung disease in Ethiopia.

Introduction

Fiberoptic bronchoscopy (FOB) is an important and widely used tool in the diagnosis and treatment of various pulmonary diseases (1). It is relatively safe and well tolerated, and can be performed in both an inpatient and outpatient setting (2). Indications, patient characteristics, and diagnostic yield differ from center to center depending on disease prevalence and the skill of the proceduralist and laboratory personnel. There are few studies of FOB in sub-Saharan Africa (3,4).One such study, conducted over 30 years ago at our center, Tikur Anbessa Specialized Hospital (TASH), reported 4 years of experience with FOB (5).The purpose of this investigation is to describe patient characteristics, indications, and diagnostic yield of FOB, comparing and contrasting to the initial study.

Methods

The study was conducted as a retrospective chart review of all patients who had undergone FOB between January and December 2013 in the bronchoscopy suite of TASH, the largest referral hospital in Ethiopia and the main teaching hospital of Addis Ababa University College of Health Sciences. Data collected included: patient demographics, smoking, HIV status, indications for the procedure, findings of FOB, specimens obtained, and microbiologic, cytologic, and pathologic results. At the time of the study, TASH was the only public hospital in Ethiopia performing FOB; therefore, patients were referred from all over the country. After a 2 to 3 year absence, the procedure was reintroduced at TASH in January 2013 as part of the East African Training Initiative, a 2-year training program in pulmonary and critical care medicine.

Specifically, a pulmonary fellow under the supervision of an attending physician performed all FOB procedures, which were done in the Endoscopy Unit at TASH. All patients were evaluated before the

procedure to confirm indications and risks of the procedure. An Olympus BF 20 bronchoscopy with video monitoring was used. Xylocaine 2% oral gel was used to anesthetize the posterior pharynx and Xylocaine nasal gel was used to lubricate the nose. Diazepam 5 to 10 mg IV and Fentanyl 25 to 50 mcg IV were given just before the procedure for sedation. Supplemental oxygen via nasal cannula was applied and oxygen saturation and pulse rate were monitored throughout the procedure. The entire bronchial tree was examined in each patient; endobronchial biopsies were taken for endobronchial masses, except when contraindicated by an anticipated increased bleeding risk as with suspected carcinoid tumors. Transbronchial biopsies were performed for diffuse parenchymal lung infiltrates. Bronchoalveolar lavage was obtained, when appropriate, and analyzed for tuberculosis, bacteria, and fungus; cytology from the specimens were reviewed for malignancy when indicated. Some patients had both biopsies and bronchoalveolar lavage performed (n=43).

Descriptive statistics (frequency tables, percentages) were used for the following variables: indication for the procedure, bronchoscopic findings, and pathology/cytology results. Mean and SD were used for normally distributed variables and median for variables not normally distributed. Categorical data was presented as percentages with 95% CIs when appropriate.

The institutional review board approved the study protocol and all subjects signed informed consent.

Results

During the study period, there were 141 patients who successfully underwent FOB. The mean and median ages were 44 and 45 years, respectively; a majority, 89 patients (63%) were male. Among those whose smoking status was known (n=121), 15% (18 /121) were ever smokers and all these were men. 74% of the patients were recruited from the outpatient setting.

Indications for the procedure were: lung mass (presumed malignancy) 54%(76), tuberculosis 13%(18), pleural effusion with possible underlying lung cancer 9%(13), lung infection 5%(7), and interstitial lung disease(ILD) 2 (1%) and others 25(18%) which include hemoptysis, mediastinal lymphadenopathy.

Endobronchial masses were seen in 32%(45) of patients, extrinsic airway compression in 20%(28), and nonspecific mucosal abnormalities in 9%(12); 39%(56) of patients undergoing FOB had a normal airway examination (Table 1). Bronchoscopic biopsies were obtained in 75 patients, 79%(59/75) were endobronchial and 21%(16/75) were transbronchial biopsies. 48%(31/65) had diagnostic results, 22% (14/65) patients had inconclusive findings, and 31%(20/65) had negative results. No results were available(report couldn't be retrieved from the chart) in 10 of 75 patients who underwent biopsy.

Therefore, the diagnostic yield for a histopathologic diagnosis was 48% (31/65) (Table 1). Of the 31 patients with a positive bronchoscopic diagnosis, 68%(21/31) had malignancies, 16%(5/31) had bronchitis, 10%(3/31) had ILD, and 26%(2/31) had granulomas. Among those 21 patients with a histopathologic report of malignancy, squamous cell carcinoma was found 48%(10/21), adenocarcinoma 19%(4/21), poorly differentiated carcinoma 10%(2/21), and lymphoma 5%(1/21). There

were 19% (4/21) with malignancy that could not be specifically classified (Table 2). There were 4 cases of presumed carcinoid for which endobronchial biopsy was not done. All of these patients were referred to Thoracic Surgery for resection; final pathology revealed carcinoid tumor in all cases (Figure 1).

Fifty-seven patients had BAL results and of these, 33% were diagnostic (19/57). Among those with positive BAL results, TB was diagnosed in 7 patients, bacterial infection in 6 patients, malignancy in 2 patients, and 1 patient had a fungal infection (Figure 2) and 3 of them shows pus cells with BAL results

Discussion

FOB was a highly effective diagnostic procedure in patients with lung disease presenting to TASH in Addis Ababa, Ethiopia. Our overall diagnostic yield was 48% for histopathology and 33% for BAL alone. This diagnostic yield increased to 75% when we combine the histopathology and BAL results, excluding the overlap. This is higher than found in the previous study done at TASH 30 years ago; then, the overall diagnostic yield was only 21% (5). This difference likely reflects improvement in equipment, increased ability of the pathology department to analyze the results, and the greater use of Chest CT to select patients for the procedure.

Our results are similar to those of other low and middle-income countries; a study done in Saudi Arabia found a diagnostic yield of 67% (6). Our diagnostic yield was substantially below the 90% found in Western centers (7), indicating that further improvement in our procedure is possible.

Patients undergoing bronchoscopy in our study were somewhat unique in their characteristics when compared to those from high-income countries. The mean age of our patients was 44 years, which is slightly younger than reported in other investigations (45 years) (8). The overall rate of smokers in our study was very low (15%), but considerably higher than in the general Ethiopian population (4%) (9). Studies conducted in high-income countries have a much higher rate of smokers (>50%) (10). It is then somewhat surprising that the most frequent indication for FOB was lung mass and that lung cancer was detected in ~15% of total patients investigated. In our study, squamous cell carcinoma was most often seen in men who were smokers while adenocarcinoma was more common in women who were non-smokers. These findings suggest that other risk factors such as indoor and outdoor air pollution, occupational exposures, and genetics may be important in causing lung cancer in Ethiopia.

Ethiopia remains a high burden country for tuberculosis and most cases are smear negative (58.9%) (11). Gene Xpert has increased the diagnostic yield in smear negative patients (12), however, a significant number of patients still undergo tuberculosis treatment based on clinical observation alone. In our patient population, 7 of 18 patients suspect of TB but who were originally smear negative had tuberculosis confirmed with BAL.

We have shown that FOB was a useful diagnostic tool in the evaluation of pulmonary disease in Ethiopia. We further believe that procedural training in low-income countries, similar to what occurred in Ethiopia

with the East African Training Initiative, will greatly improve the management of pulmonary patients throughout Africa and beyond.

Limitations: There were several study limitations. The sample size was relatively small and missing data precluded certain analyses. TASH is a tertiary referral center with a strong oncology service which may have skewed the study population and prevent generalizability of our results to other parts of the country.

List Of Abbreviations

FOB	Fiberoptic Bronchoscopy
TASH	Tikur Anbessa Specialized Hospital
BAL	Broncho-alveolar lavage
SD	Standard Deviation
CI	Confidence Interval
CT	Computed Tomography
TB	Tuberculosis
ILD	Interstitial lung disease
EATI	East African Training Initiative

Declarations

Ethics approval and consent to participate: The institutional review board of Addis Ababa University approved the study protocol and all subjects signed informed consent.

Consent for publication:Not applicable.

Availability of data and materials: All data generated or analyzed during this study are included in this published article.

Competing interests:The authors declare that they have no competing interests.

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Authors' contributions:FO had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.MJP, AB, TB, OB, NWS, and CBS contributed substantially to the study design, data analysis and interpretation, and the writing of the manuscript.

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Authors' information: FO, AB, and TB are all graduates of the East African Training Initiative (EATI), a two year pulmonary and critical care medicine training program, located at Addis Ababa University and Tikur Anbessa Specialized Hospital. EATI is the first of its kind in East Africa and continues to improve the healthcare of patients with lung disease and critical illness across Ethiopia.

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Table

Table 1: Indication, Visual finding, Biopsy type and diagnostic yield of histopathology and BAL

Indication	Lung mass	76(54%)
	Tuberculosis	18(13%)
	Pleural Effusion	13(9%)
	Pneumonia	7(5%)
	ILD	2(1%)
	Others(hemoptysis, mediastinal lymphadenopathies)	25(18%)
Visual finding	Endobronchial mass	45(32%)
	Extrinsic Compression	28(20%)
	Mucosal abnormalities	12(9%)
	Normal	56(39%)
Biopsy type (N=75)	Endobronchial biopsy	59(79%)
	Transbronchial biopsy	16(21%)
Histology (N=65)	Positive	31(48%)
	Negative	20(31%)
	Inconclusive	14(21%)
BAL (N=57)	Positive	19(33%)
	Negative	38(67%)

Figures

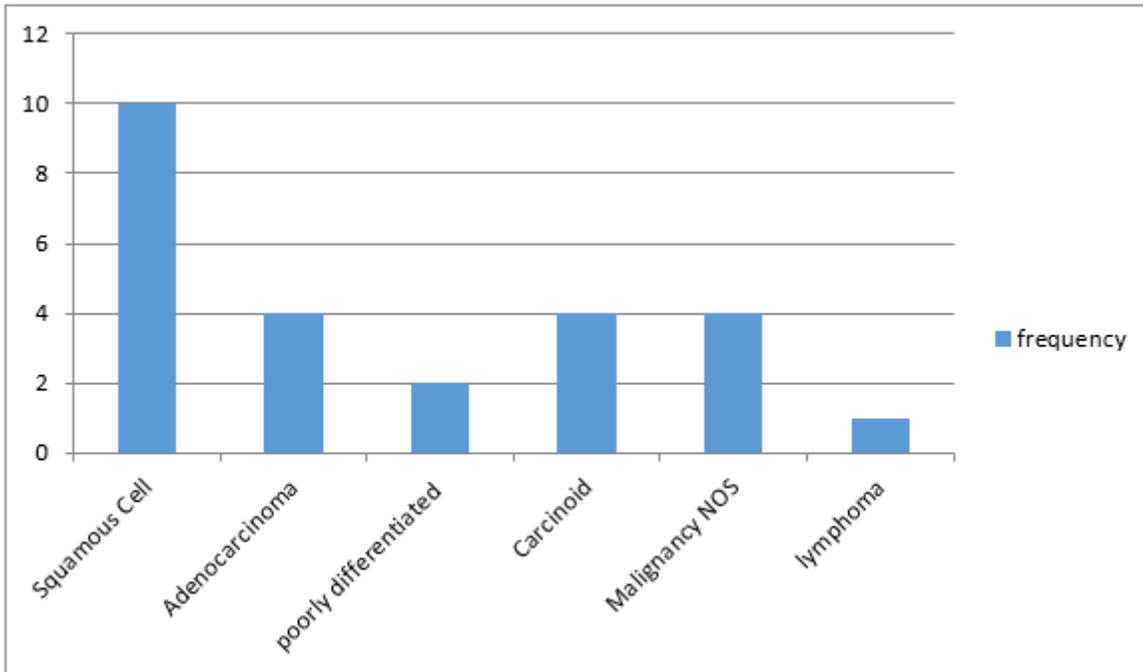


Figure 1

Histogram of the histopathology of the cases of malignancy

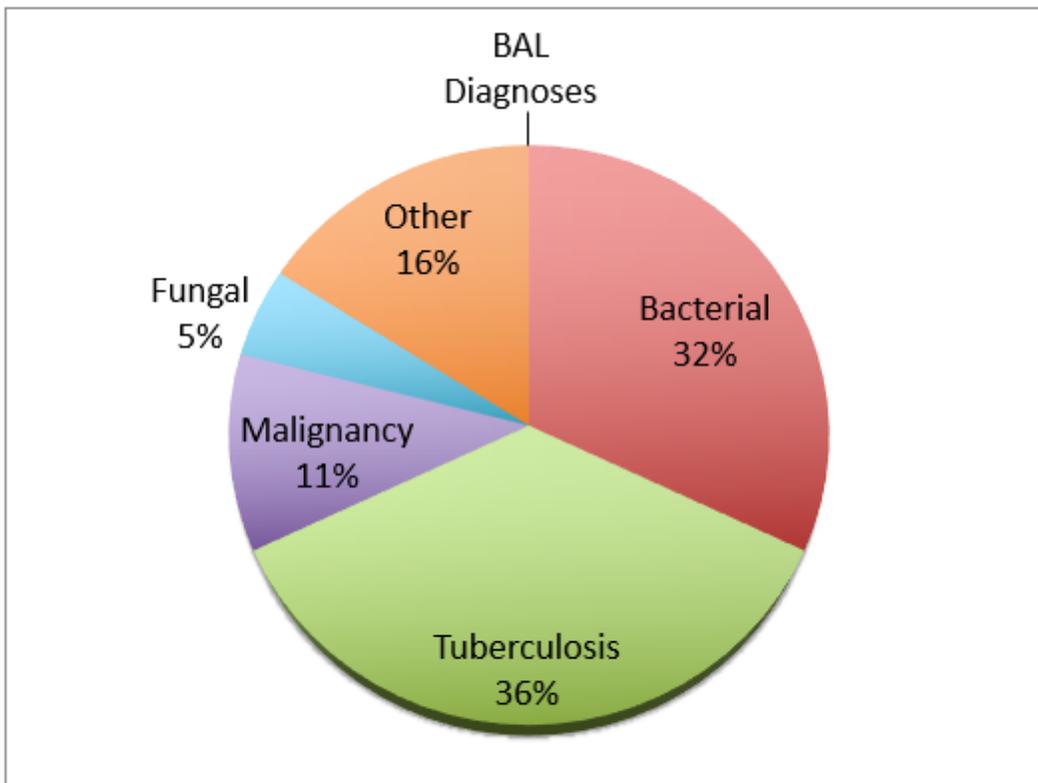


Figure 2

Bronchoalveolar Lavage (BAL) Results