Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i2.5180

INDICATIONS, DIAGNOSTIC YIELD AND COMPLICATIONS OF FLEXIBLE FIBEROPTIC BRONCHOSCOPY

Jagdesh Kumar[1*], Shafi Muhammad khuhawar[2], Bashir Ahmed Chandio[3], Khalil Ahmed sanghro[4], Ambrasha[5]

[1*]Assistant Professor Department of Pulmonology GMMMC Sukkur
[2]Associate Professor, Head of department of pulmonology, GMMMC Sukkur
[3]Assistant Professor of Medicine, Ghulam Muhammad Mahar Medical College Sukkur
[4]Senior Registrar Department of Medicine GMMMC Sukkur
[5]Medical Officer at Hira medical center, Sukkur

***Corresponding Author:** Jagdesh Kumar
*Assistant Professor Department of Pulmonology GMMMC,
Email: Sukkur.jagdesh_11@yahoo.com

Abstract

Background: Flexible fiberoptic bronchoscopy (FFB), is a well-recognised diagnostic and therapeutic method used in the assessment of respiratory problems.

Objectives: The study aims to highlight common indications, diagnostic yield and complications related with FFB.

Methodology: This prospective descriptive cross-sectional study was performed in all patients that underwent flexible fiberoptic bronchoscopy at the Department of Pulmonology GMMMC hospital Sukkur. The study duration was six months from July 2022 to January 2023.

Results: The findings indicate that out of 200 bronchoscopies, 190 (95%) were done for diagnostic purposes and 10 (5%) for therapeutic ones. Out of 200 patients (73% males, 27% females) with a mean age of 55.2 ±10.1 years, and 80% of the patients were smokers. Suspected malignancy was the most common indication for flexible fiberoptic bronchoscopy (32.5%), followed by hemoptysis (30%).

Conclusions: This study showed that FFB has very little risk and is both safe and effective. This study demonstrated how FFB is used to diagnose lungs and respiratory airways issues.

Keywords: Flexible fiberoptic bronchoscopies, respiratory disease, FFB

Introduction

When assessing respiratory problems in patients, flexible fiberoptic bronchoscopy (FFB) is acknowledged as a crucial diagnostic and treatment tool [(1, 2)]. The method was initially introduced in the late 1970s, but since then, improvements in its practicality and safety have allowed physicians to utilize it often for various indications [(3,4)]. The diagnosis of bronchiectasis, recurrent wheezing, and persistent stridor has been made possible by the widespread use of FFB [(5-7)]. Despite being

regarded as a reliable and safe diagnostic technique, bronchoscopy is linked to certain mechanical problems that result from airway damage. Anesthesia, desaturation, laryngeal spasm, and patient comorbidities are additional possible causes of problems [8–10]. Information on problems associated to bronchoscopies in pediatric patients from underdeveloped nations is scarce. Thus, the goals of this study were to assess common indications, diagnostic yield and complications related with FFB.

Methodology

Study Design and Settings This prospective descriptive cross-sectional study was performed in all patients that underwent flexible fiberoptic bronchoscopy at the Department of Pulmonology GMMMC hospital Sukkur. The study duration was six months from July 2022 to January 2023. Study was approved by ethic committee.

Participants: Adult patients older than 15 years, who underwent bronchoscopy with the same method and same device and had no underlying disease, were consecutively enrolled. Patients included outpatients as well as inpatients from our department as well as different departments of the hospital.

Variables: Age, sex, smoking history, indication for the procedure, pre-medication, radiographic findings, suspected diagnosis, bronchoscopy findings, final diagnosis, and complications of bronchoscopy were included in this study as variables. The suspected diagnosis was based on clinical and radiographic findings, whereas the final diagnosis was based on the microbiological and histopathological diagnosis. Data collection was performed by a checklist, and data were extracted from medical documents. Documents with missing data were excluded.

Bronchoscopy procedure: Patients were maintained without oral intake for at least 6 hours prior to the procedure. Platelet count > 60,000/uL was ensured, along with normal prothrombin time (PT) and activated partial thromboplastin time (aPTT), which were required if transbronchial biopsy, endobronchial biopsy, or brushings were performed.The procedure was performed using a flexible fiberoptic bronchoscopy (Storz‹Germany) under local anesthesia, via nasal or oral route with the patient lying in the supine position. In the situation of unstable or intubated patients, the procedure was performed in the intensive care unit (ICU). Just before insertion of the bronchoscope, 2–3 ml of 2% viscous lidocaine was applied to the nose. Midazolam (0.07 mg/kg) was administered intravenously in incremental doses to achieve conscious sedation before and after the insertion of the bronchoscope in some patients. All patients were supplemented with oxygen through a nasal cannula and were continuously monitored with electro-cardiogram and pulse oximetry. Liquid lidocaine 2% was administered through the bronchoscope directly to the vocal cords and the bronchial tree as needed. During the bronchoscopic procedure, diagnostic materials were obtained by bronchial washings, transbronchial needle aspiration (TBNA; lymph nodes or lung), bronchial brushings, endobronchial biopsy or transbronchial biopsy (TBB), as decided by the bronchoscopist on a case-by-case basis.Transbronchial bronchial biopsy (TBB) was performed blindly and as per the international recommendations (British Thoracic Society, 2001).Biopsy specimens were fixed in formaldehyde solution, embedded in paraffin, and sectioned. Post-bronchoscopy chest X-ray was performed routinely 4 hours after TBB.

Statistical Analysis: After gathering the required data, a statistical analysis was performed. We used SPSS (version 20) software. Differences were tested by independent-sample-t and chi-square tests and were considered statistically significant at P values less than 0.05.Age was presented as mean ± standard deviation .Due to the descriptive nature of this study, all other data were presented as percentages (%).

Results: A total of 200 patients underwent FB procedures. Their mean age (±standard deviation) was 55.2±10.1 years; 146 patients (73%) were males, and 160 (80%) were smokers. Of 200 bronchoscopies, 190 (95 %) were diagnostic and 10 (5%) were therapeutic.

Indications for bronchoscopy: The most prevalent indication for bronchoscopy was suspected malignancy (32.5 %), followed by hemoptysis (30%), suspected pneumonia (10%) and suspected tuberculosis (7.5%). Indications for bronchoscopy are shown in Table 1.

Table (1). Indications for bronchoscopy

Indication	**No. of patients**	**Percent (%)**
Suspected malignancy	65	32.5%
Hemoptysis	60	30%
Suspected pneumonia	20	10%
Suspected tuberculosis	15	7.5%
Suspected interstitial lung disease (ILD)	10	5%
Atelectasis1	11	5.5%
Pleural effusion	9	4.5%
Mucussuction (therapeutic FB)	10	5%
Total	**200**	**100%**

Pre-procedure sedation: sixty five patients (32.5%) had pre-medication via the intravenous route and received only Midazolam. The remaining 135 patients (67.5%) had a bronchoscopy under local anesthesia.

Bronchoscopy findings and specimen taken: Sixty patients (30%) had endoscopy visible endobronchial tumors, 40 (20%) had erythematous or indurated mucosa, 28 (14%) had external compression, and 72 (36%) had normal bronchoscopy findings. Of 200 bronchoscopies, a total of 97 bronchial biopsy, 100 transbronchial biopsy (TBB), and 150 bronchial wash were performed. Bronchoscopies Characteristics are shown in Table 2.

Table (2).Characteristics of bronchoscopies

Characteristics	**No. of patients**	**Percent (%)**
Pre-procedure sedation		
Venous Midazolam	65	32.5%
Local Anesthesia	135	67.5%
Bronchoscopy findings		
Endobronchial Tumor	60	30%
Indurated/Erythematous Mucosa	40	20%
External compression	28	14%
Normal bronchoscopy findings	72	36%
Specimen taken		
Bronchial biopsy	97	48.5%
Transbronchial biopsy	100	50%
Bronchial wash	150	75%

Complications: Of the 200 patients who underwent flexible fiberoptic bronchoscopy, complications occurred in 13 patients (Table 3). Six patients had bleeding, Hypoxemia occurred in

four patients, laryngospasm in three patients, and hypertension in two patient. No deaths occurred during or 4 hours after bronchoscopy.

Table (3). Complications of bronchoscopies

Complications	No. of patients	Percent (%)
Bleeding	6	3%
Hypoxemia	4	2%
Laryngospasm	3	1.5%
Hypertension	2	1%

Diagnostic yield of bronchoscopy: The overall diagnostic yield was 62.5% (125/200), Table 5. Of 65 patients suspected to have malignancy, 45 (69.2%) patients were confirmed. The results are shown in table 5.

Table (5). Diagnostic yield by indication

Indication	No. of patients	No. of cases diagnosed by bronchoscopy	Diagnostic yield
Malignancy	65	45	69.2%
Hemoptysis	60	25	41%
Suspected pneumonia	20	16	80%
Suspected tuberculosis	15	9	60%
Suspected ILD	10	5	50%
Atelectasis	11	9	81.8%
Pleural effusion	9	6	66.6%
Mucussuction	10	10	100%
Total	200	125	62.5%

Discussion

The introduction of flexible fiberoptic bronchoscopy (FFB) has revolutionized the care and management of patients with pulmonary diseases. It provides excellent visualization of the tracheobronchial tree, thereby allowing for both diagnostic and therapeutic procedures. The chief goal of diagnostic bronchoscopy is to obtain representative pulmonary specimens to diagnose different conditions. This study aimed to determine the indications, complications, and diagnostic yield of flexible fiberoptic bronchoscopy. .

The study included 200 patients (73% males, 27% females) with a mean age of 55.2 years, and 80% of the patients were smokers. Suspected malignancy was the most common indication for flexible fiberoptic bronchoscopy (32.5%), followed by hemoptysis (30%). Although the indications for diagnostic bronchoscopy remained, the same, different regions may have different priorities. While suspected malignancy was the most common indication in most studies, suspected lung infection was the most common indication in others. A study in China [(11)] reported that the most common indication for bronchoscopy was suspected malignancy (60%), followed by pulmonary infection (16.9%) and cough (14.7%). Another retrospective study [(12)] showed that out of 3980 bronchoscopy, reported that the most common indication for bronchoscopy was suspected malignancy (47%), followed by pulmonary infection (23.8%) and hemoptysis (14%). A retrospective study in Saudi Arabia [(13)] that included 720 bronchoscopy, the most common indication for bronchoscopy was pulmonary infection (35.9%), followed by suspected malignancy (25.9%), suspected interstitial lung disease (12.2%), and hemoptysis (9.8%). Another study from Saudi Arabia [(14)] showed that the most common indication for bronchoscopy was pulmonary infection (47.5%), followed by suspected malignancy (17.2%), immunodeficiency associated infiltrates (14.6%), and hemoptysis (11.1%). Suspected malignancy, being the most common indication for FB in our records, can be explained by the observations that 71.6% and 80.7% of our cohorts were males, and cigarette smokers, respectively.

Conclusions:

This study showed that FFB has very little risk and is both safe and effective. This study demonstrated how FFB is used to diagnose lungs and respiratory airways issues.

References

1. Navarro Rojas AA. Bronchoscopy in children in South America. *Paediatr Respir Rev*. 2006;**7**(4):288-92. [PubMed ID: 17098644]. https://doi.org/10.1016/j.prrv.2006.04.011.
2. Nicolai T. Pediatric bronchoscopy. *Pediatr Pulmonol*. 2001;**31**(2):150-64. [PubMed ID: 11180692]. https://doi.org/10.1002/1099-0496(200102)31:2<150::aid-ppul1024>3.0.co;2-6.
3. Wood RE, Fink RJ. Applications of flexible fiberoptic bronchoscopes in infants and children. *Chest*.1978;**73**(5Suppl):737-40.[PubMed ID: 639589]. https://doi.org/10.1378/chest.73.5_supplement.737.
4. Webster I, Goussard P, Gie R, Janson J, Rossouw G. The indications and role of paediatric bronchoscopy in a developing country, with high prevalence of pulmonary tuberculosis and HIV. *Expert Rev Respir Med*. 2017;**11**(2):159-65. [PubMed ID: 28107788] . https://doi.org/10.1080/17476348.2017.1280397.
5. Vega-Briceno LE, Holmgren NL, Bertrand P, Rodriguez JI, Barriga F, Contreras I, et al. [Utility of bronchoalveolar lavage in immunocompromised children: Diagnostic yield and complications]. *Arch Bronconeumol*. 2004;**40**(12):570-4. Spanish. [PubMed ID: 15574271]. https://doi.org/10.1016/s1579-2129(06)60377-7.
6. Rosenthal M. Bronchoscopy and infection. *Paediatr Respir Rev*. 2003;**4**(2):143-6. https://doi.org/10.1016/s1526-0542(03)00025-3.
7. Rodriguez Martinez C, Sossa MP. [Factors associated with complications caused by bronchoscopy in pediatric patients]. *Arch Bronconeumol*. 2003;**39**(11):501-6. Spanish. [PubMed ID: 14588203]. https://doi.org/10.1016/s0300-2896(03)75440-4.
8. Schnapf BM. Oxygen desaturation during fiberoptic bronchoscopy in pediatric patients. *Chest*. 1991;**99**(3):591-4. [PubMed ID: 1995213]. https://doi.org/10.1378/chest.99.3.591.
9. Schellhase DE, Tamez JR, Menendez AA, Morris MG, Fowler GW, Lensing SY. High fever after flexible bronchoscopy and bronchoalveolar lavage in noncritically ill immunocompetent children. *PediatrPulmonol*. 1999;**28**(2):139-44. [PubMed ID: 10423314]. https://doi.org/10.1002/(sici)1099-0496(199908)28:2<139::aid-ppul10>3.0.co;2-2.
10. Pue CA, Pacht ER. Complications of fiberoptic bronchoscopy at a university hospital. *Chest*. 1995;**107**(2):430-2. [PubMed ID: 7842773]. https://doi.org/10.1378/chest.107.2.430.
11. Faguang J, Deguang M, Dongling C, Enqing F, Yonghong X, Tonggang L (2008). Severe Complications of Bronchoscopy. Respiration, 76:429–433
12. Sherif A.A., Mohamed M.A. and Metwally N (2013). Diagnostic utility and complications of flexible fiberoptic bronchoscopy in Assiut University Hospital: A 7-year experience.Egyptian Journal of Chest Diseases and Tuberculosis.62: 535–540.
13. Alzeer, A.H. and Al-Otair, M.S. (2008). Yield and complications of flexible fiberoptic bronchoscopy in a teaching hospital.Saudi Med. J, 29: 477–481.
14. Qanash S, Hakami O A, Al-Husayni F, (2020). Flexible Fiberoptic Bronchoscopy: Indications, Diagnostic Yield and Complications. Cureus 12(10): e11122.