Research Article

An Audit of Flexible Bronchoscopy and Bronchial Biopsies in Mayo Hospital, Lahore

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Abstract

Background: Flexible bronchoscopy is a vital tool in respiratory medicine, facilitating both diagnostic and therapeutic interventions. The British Thoracic Society (BTS) guidelines have provided a standardized framework for flexible bronchoscopy procedures, guiding clinical practice and fostering quality assurance through audits.

Objectives: This study aims to evaluate the diagnostic efficacy of flexible bronchoscopy at Mayo Hospital, Lahore, adherence to British Thoracic Society (BTS) guidelines, and the duration between hospital admission and bronchoscopy performance.

Methods: A retrospective descriptive cross-sectional study was conducted at Mayo Hospital Lahore from January 2022 to January 2024, encompassing 88 patients who underwent flexible bronchoscopy. Data collection included demographic details, indications for bronchoscopy, procedural outcomes, and diagnostic yields. Statistical analysis was performed using SPSS version 27, employing descriptive statistics and percentage calculations.

Results: The mean age of the patient cohort was 49.87 years, with males constituting 65.9% of the participants. Suspicion of malignancy emerged as the primary indication for bronchoscopy (61.36%), followed by persistent cough (22.72%) and hemoptysis (4.45%). The majority of procedures (98.9%) were complication-free, with only one instance of minor bleeding. Abnormal bronchoscopy findings were predominantly attributed to malignancy (38.16%) and tuberculosis (38.16%). The overall diagnostic yield was 86.36%, with a malignancy diagnostic yield of 87.87%. The mean duration from ward admission to bronchoscopy was 5.5 days.

Conclusion: Flexible bronchoscopy emerges as a safe and effective diagnostic modality, with diagnostic yields surpassing established standards. However, challenges such as gender disparities and tuberculosis burden warrant attention to optimize patient care delivery and mitigate disease impact.

Keywords: Flexible bronchoscopy, diagnostic yield, indications, complications

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Introduction

Flexible bronchoscopy represents a pivotal tool in both therapeutic and diagnostic realms within respiratory medicine[1]. Since its inception, this technique has played a crucial role in elucidating various respiratory pathologies. By allowing pulmonologists to visually inspect the respiratory tract's interior, flexible bronchoscopy facilitates targeted biopsies of suspicious areas, subsequently enabling histopathological analysis for definitive diagnoses. Notably, its indications span a broad spectrum of conditions, with malignancies and persistent cough ranking among the most clinically significant[2]. The British Thoracic Society (BTS) (pioneered the publication of comprehensive guidelines on flexible bronchoscopy[3]. These guidelines encompass various facets, ranging from preoperative care and anesthesia to postoperative management and complication prevention. Moreover, they offer directives for conducting flexible bronchoscopy in patients with underlying medical conditions, aiming to standardize procedural protocols across medical practice. Additionally, these guidelines serve as a framework for future audits, providing recommendations and benchmarks to gauge procedural efficiency and quality[4]. Despite its widespread use, flexible bronchoscopy faces challenges such as procedural delays, variability in guideline adherence, and differences in diagnostic yield, particularly in resource-limited settings like Pakistan. The British Thoracic Society (BTS) provides standardized recommendations for bronchoscopy indications, safety, and efficiency[4], yet local adherence to these guidelines remains understudied. Given Pakistan's high burden of respiratory diseases, including tuberculosis and malignancies, evaluating bronchoscopy utilization in

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tertiary care centers is crucial.[5]

Audits constitute a fundamental tool for evaluating the efficacy and adherence to established guidelines in medical procedures.[3, 6-8] This study aims to evaluate the diagnostic efficacy of flexible bronchoscopy at Mayo Hospital, Lahore, adherence to British Thoracic Society (BTS) guidelines, and the duration between hospital admission and bronchoscopy performance. Additionally, it seeks to highlight areas requiring improvement in bronchoscopic practice.

Methods

The research was conducted within the pulmonology department of Mayo Hospital, Lahore, spanning from January 2022 to January 2024. Mayo Hospital stands as the largest healthcare facility in Punjab, catering to patients from across the province. This study is a retrospective descriptive cross-sectional study utilizing secondary data for analysis. A non-probability consecutive sampling technique was employed. The Inclusion criteria included patients undergoing flexible bronchoscopy for diagnostic purposes and availability of complete medical records and bronchoscopy reports. All patients with incomplete medical records and all those who underwent bronchoscopy solely for therapeutic reasons were excluded. As this study was designed as a retrospective audit rather than a prospective trial, all eligible patients undergoing flexible bronchoscopy for diagnostic purposes within the defined timeframe (January 2022 to January 2024) were included, following a non-probability consecutive sampling method. This approach allowed us to include the maximum number of cases available during the study period, resulting in a final sample size of 88 patients. While a formal calculation was not employed, this number aligns with sample sizes used in comparable studies assessing the diagnostic yield ofbronchoscopy in similar tertiary care settings.[5, 9] As per Hulley et al. (2013), retrospective studies often utilize all available data within a defined period, making a formal sample size calculation unnecessary in such contexts.[10] As this study is an audit utilizing retrospective data, obtaining informed consent from patients was not required. Ethical considerations align with international and institutional guidelines for retrospective studies where patient confidentiality is maintained, and no direct intervention is performed. As per the Declaration of Helsinki (WMA, 2013), informed consent may be waived in retrospective studies using medical records without direct patient contact, provided confidentiality is maintained and the study poses minimal risk.[11]

A structured data extraction sheet was devised using Microsoft Excel (2016) to systematically gather pertinent data from patient records. Variables included demographic and social information, presenting complaints, dates of hospital admission and bronchoscopy procedures, and final diagnoses. This form was supplemented by bronchoscopy reports for comprehensive data collection. Data was analyzed using SPSS version 27.

Results

The mean age was calculated to be 49.87 (±19.16) years. Among the 88 patients enrolled in the study, 36 (40.91%) were aged below 50, while 15 (17.04%) fell within the age range of 50 to 59 years. Additionally, 20 (22.73%) were aged between 60 and 69 years, and 17(19.32%) were 70 years old or above. Gender distribution showed that 30 (34.1%) were female, while 58 (65.9%) were male. The primary indication for flexible bronchoscopy was suspicion of malignancy (n = 54, 61.36%) followed by persistent cough (n = 20, 22.72%) and hemoptysis (n =

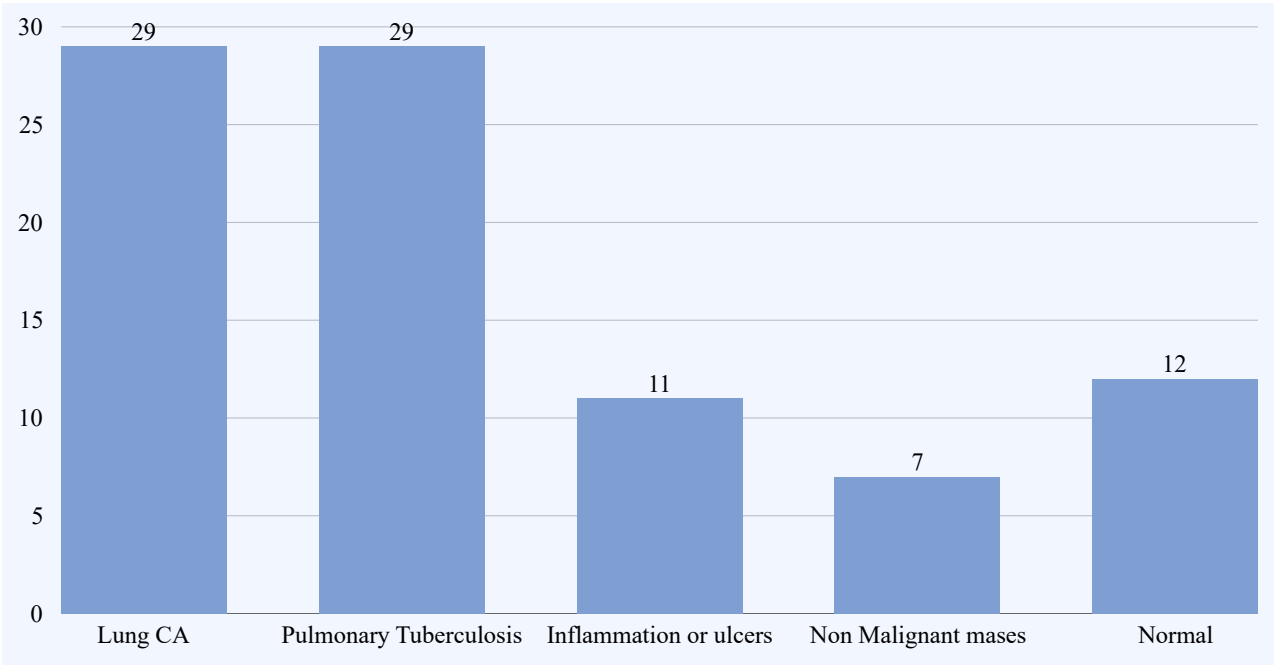

Figure 1: *Final Diagnosis Bronchoscopy*

44.45%). Notably, almost all of the procedures (n = 87, 98.88%) were complication-free, with only one instance of minor bleeding which was promptly managed. Out of the total 88 samples collected, 76 yielded positive diagnoses, resulting in an overall diagnostic yield of 86.36% (Figure 1). Of the 76 bronchoscopies yielding abnormal findings, the predominant causes, as confirmed ,by histopathology, were malignancy and tuberculosis, each accounting for 29 cases. Other abnormal findings included non-malignant masses (n = 7) and inflammation or bleeding ulcers (n =11). Macroscopically visible masses were observed in 33 cases, with 29 of these cases diagnosed as malignant, leading to a malignancy diagnostic yield of 87.87%. Furthermore, the audit assessed the duration from ward admission to bronchoscopy date, revealing a mean duration of 5.5 days. We employed frequency-based descriptive analysis to explore trends in post-bronchoscopy diagnoses across different age groups. Age was categorized into clinically relevant groups (≤49, 50–59, 60–69, ≥70 years) to explore age-specific diagnostic trends. In individuals below the age of 50 years, tuberculosis (58.33%) was identified as the predominant diagnosis followed by malignancy (16.66%). In the age group of 50-59 years, the diagnosis of tuberculosis and malignancy was almost comparable with 33.33% and 26.66%, respectively. Notably, malignancy emerged as the prevailing diagnosis in age groups of 60-69 and 70 above, underscoring a notable shift in disease prevalence towards malignancy in advanced age. These findings underscore an age-dependent variation in disease prevalence, with tuberculosis demonstrating a higher incidence in younger cohorts and malignancy exhibiting an increased prevalence with advancing age. Age-specific post-bronchoscopy diagnoses are given in the following table (Table 1).

Discussion

The extensive clinical audit conducted at Mayo Hospital Lahore provides a thorough examination of bronchoscopy's role in respiratory medicine. Through frequency-based descriptive analysis of patient demographics, procedural outcomes, and diagnostic yields, the study unveils valuable insights into procedural efficacy, safety, and disease epidemiology. By delineating patient demographics, including age, gender, and comorbidities, the study offers a nuanced understanding of the population undergoing bronchoscopic procedures. Furthermore, the investigation scrutinizes procedural outcomes to identify areas of strength and potential improvement in clinical practice. Additionally, the study highlights healthcare disparities in access to bronchoscopic services and disease burden, emphasizing the need for targeted interventions to ensure equitable healthcare delivery. A study by Iqbal et al. highlights the significant role of Flexible Fiberoptic Bronchoscopy (FFB) in diagnosing pulmonary infections, malignancies, and other respiratory conditions at Lady Reading Hospital, Peshawar, with a diagnostic yield of 51%. It emphasizes the importance of bronchoscopy in regions with high rates of smear-negative tuberculosis and malignancies, underlining its value [5] in managing respiratory diseases in similar populations. In the study by Suleman et al., flexible fibreoptic bronchoscopy was primarily performed for diagnostic purposes in 100 patients, with radiographic abnormalities (60%), unexplained hemoptysis (25%), and suspected tuberculosis with negative sputum AFB (13%) being the most common indications. Complications were minimal and manageable, including hypoxemia (4%), atrial tachycardia (3%), and pneumothorax (1%) [9].

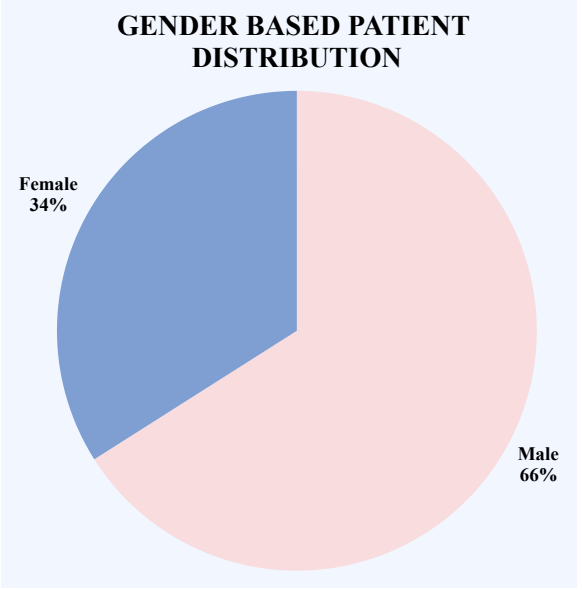

Figure 2: *Gender-based patient distribution suggesting gender disparity*

Age groups	Frequency (n) N = 88	Percentage (%)	Diagnosis	
			Tuberculosis	Malignancy
<50	n=36	40.91	n=21	n=6
50-59	n=15	17.04	n=5	n=4
60-69	n=20	22.73	n=1	n=13
≥70	n=17	19.32	n=2	n=6

Table 1: *The presented data delineates the distribution of tuberculosis and malignancy among distinct age cohorts in the studied population*

The above two studies[5,9] and our present analysis, collectively underscore the diagnostic significance and safety of flexible bronchoscopy in tertiary care settings especially in identifying smear-negative TB, malignancies, and other respiratory pathologies. A striking observation emanating from this audit is the gender disparity among participants, with males comprising a substantial majority of the cohort (Figure 2). This demographic skew underscores the intricate interplay between socio-economic factors and healthcare access, particularly prevalent in regions with limited resources like Pakistan.[12] The differential healthcare utilization between genders not only underscores the need for gender-sensitive healthcare policies but also unveils potential avenues for targeted health interventions aimed at promoting equitable access to care.[13] Within the pulmonology department of Mayo Hospital, the bronchoscopy procedures were predominantly overseen by seasoned pulmonologists, reflecting a commitment to adherence to established guidelines, notably those delineated by the British Thoracic Society.[3] This adherence not only ensures procedural standardization but also underscores the pivotal role of clinical expertise in optimizing patient outcomes and minimizing procedural complications. While the overall diagnostic yield of bronchoscopy in this study exceeded the minimum standards set by guidelines, the yield was slightly lower than the yield reported by Toori et al[14] in a study carried out in the same region.[3, 14] However, the robust diagnostic capabilities of bronchoscopy, particularly in the detection of malignancies, underscore its indispensable role in the diagnostic armamentarium of respiratory diseases.[15] The variations in diagnostic trends underscore the dynamic nature of disease epidemiology, with tuberculosis emerging as a prevalent diagnosis, indicative of the persistent burden of infectious diseases in resource-constrained settings as reported by Colin D et al.[16] The indications for bronchoscopy in this study resonate with other studies reported by Ibrahim et al[2] and Sinha et al,[17] with malignancy, persistent cough, and hemoptysis ranking among the most common indications. However, the notable inclusion of tuberculosis as a prevalent diagnosis unveils the complex interplay between infectious and non-infectious respiratory pathologies in the local disease landscape.[18,19] Addressing the burden of tuberculosis necessitates a multi-faceted approach, encompassing targeted screening programs, improved access to healthcare services, and enhanced public health interventions.[18,20] Despite variations observed in diagnostic trends, our audit revealed tuberculosis, in conjunction with malignancy, as the two predominant final diagnoses. This finding contrasts with research conducted in other regions reported by Mohamed et al,[21] where tuberculosis was not among the most common diagnoses following histopathological examination of bronchial biopsies. Such disparities underscore the significant burden of tuberculosis within economically disadvantaged regions like Pakistan, emphasizing the imperative for prompt attention and intervention. Despite concerted international efforts aimed at tuberculosis control, the disease remains a formidable menace to public health in nations such as Pakistan.[22] Despite the potential for procedural complications as reported by Dang et al[23] and Alamoudi et al,[24] the safety profile of bronchoscopy remains commendable, with no major complications reported in this study. The occurrence of minor bleeding in a solitary instance serves to underscore the manageable nature of procedural complications, thereby reaffirming the safety and clinical utility of the bronchoscopy procedure within contemporary medical practice. This observation provides clinicians and patients alike with reassurance regarding the overall safety profile associated with bronchoscopy.

Moreover, a meticulous assessment of the temporal relationship between patient admission and the performance of bronchoscopy reveals a noteworthy area warranting further investigation and optimization within patient management protocols. The observed variations in waiting times between admission and procedural intervention shed light on potential inefficiencies in healthcare delivery systems. These discrepancies underscore the imperative for streamlined care pathways and the enhancement of resource allocation strategies to mitigate delays and ensure the prompt provision of diagnostic interventions. Such optimizations are crucial for fostering timely access to essential medical procedures, thereby contributing to improved patient outcomes and the overall efficacy of healthcare delivery.

The use of established BTS guidelines as a benchmark enhances clinical relevance of the study. Additionally, the high diagnostic yield underscores bronchoscopy's utility in diagnosing malignancies and tuberculosis. However, the retrospective nature of the study limits the ability to establish causal relationships. The single-center setting may restrict external validity, making it necessary to conduct multi-center research for broader applicability. Furthermore, the study lacks long-term follow-up data, preventing an assessment of post-bronchoscopy patient outcomes

Conclusion

Fiberoptic bronchoscopy emerges as a safe and reliable diagnostic procedure, contingent upon stringent adherence to precautionary measures. With a commendable overall diagnostic yield and a particularly robust performance in malignancy detection, exceeding the prescribed minimum standards delineated by BTS guidelines, bronchoscopy reaffirms its pivotal role in clinical practice. This study not only highlights the procedural efficacy but also underscores critical areas warranting improvement, including gender disparities in healthcare access. The notably high burden of tuberculosis, as revealed by the study, necessitates urgent attention and targeted interventions to mitigate its impact on public health. By illuminating these key insights, this study lays the foundation for informed decision-making and strategic interventions aimed at optimizing patient care, reducing healthcare disparities, and addressing prevalent respiratory disease burdens in resource-constrained settings.

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Authors Contribution:
MA, KA: Conceptualization, methodology and writing the original draft.
AH, NZ, SFHB: Investigation, data collection and analysis.
MA, KA, AA, AH, NZ, SFHB: Study design, revise critically and final review of the manuscript.
all authors have made substantial contribution to the manuscript, have reviewed and approved the final version.

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