

A Retrospective Study on Bronchoscopic Findings among Patients Undergoing Bronchoscopy in a Tertiary Care Center in Nepal

Vaidya N,¹ Poudel P,¹ Sapkota P,¹ Adhikari R,¹ Pathak S²

¹Department of Internal Medicine,

²Department of Research and Development,

Dhulikhel Hospital, Kathmandu University Hospital,

Kathmandu University School of Medical Sciences,

Dhulikhel, Nepal.

Corresponding Author

Nirish Vaidya

Department of Internal Medicine,

Pulmonary Unit,

Dhulikhel Hospital, Kathmandu University Hospital,

Kathmandu University School of Medical Sciences,

Dhulikhel, Nepal.

E-mail: drnirish1@gmail.com

Citation

Vaidya N, Poudel P, Sapkota P, Adhikari R, Pathak S. A Retrospective Study on Bronchoscopic Findings among Patients Undergoing Bronchoscopy in a Tertiary Care Center in Nepal. *Kathmandu Univ Med J.* 2026; 96(3): **Online First.**

ABSTRACT

Background

Bronchoscopy is an invaluable tool utilized for diagnostic as well as therapeutic purposes in pulmonary medicine. It allows direct visualization of the tracheobronchial tree and helps clinicians to investigate suspected malignancies, infections, and other lung diseases. Bronchoscopy findings in Nepalese healthcare settings play an important role in decision-making, where infectious diseases such as tuberculosis often coexist with the increasing burden of lung cancer and chronic obstructive respiratory disease.

Objective

To study the demographic profiles, indications, and bronchoscopic findings observed during flexible bronchoscopy in a tertiary care center of Nepal.

Method

A descriptive retrospective cross-sectional study was conducted at a tertiary health care center among patients undergoing bronchoscopy from July 2022 to June 2024, following ethical approval from the Institutional Review Committee. A total population sampling technique was used. The data were entered in Microsoft Excel 2016 and analyzed using IBM Statistical Program for Social Sciences (IBM SPSS Version 25.0).

Result

A total of 70 patients underwent bronchoscopy during the study period. The mean age was 60.2 years $\pm$ 10.4. Among them, 55.71% were males and 44.29% were females. The most common indication was suspicion of malignancy (48.57%), followed by chronic cough or hemoptysis (27.14%). Among the various bronchoscopic abnormalities, visible endobronchial masses were found in 34.29% of patients, bronchial narrowing in 2.86%, and mucosal inflammation in 18.57%. A normal bronchoscopic finding was observed in 26 (37.14%) cases. Most visible lesions were on the right side. No procedure-related complications were reported among study participants.

Conclusion

Bronchoscopy remains a valuable diagnostic tool in resource-limited settings to find pulmonary abnormalities. Most patients had abnormalities on direct visualization, especially endobronchial masses or inflammatory disease. However, many also had normal findings, highlighting the limitations of bronchoscopy for the detection of peripheral or early lesions.

KEY WORDS

Bronchoscopy, Bronchogenic carcinoma, Lung, Nepal

INTRODUCTION

Bronchoscopy, especially flexible bronchoscopy, is an important tool for the diagnosis of pulmonary disease as it allows for direct visualization of the tracheobronchial tree, tissue sampling, lavage, brushing, and transbronchial biopsies to diagnose various lung conditions.¹ Flexible bronchoscopy, which was first used in the 1960s, has emerged as a widely used and indispensable method for diagnosis and management of pulmonary diseases.² Bronchoscopy is now widely used for evaluation of suspected malignancy, infections, interstitial lung disorders, persistent radiographic opacities, hemoptysis, and airway obstruction.^{3,4}

In low- and middle-income countries (LMICs), including Nepal, the role of bronchoscopy is particularly important due to the high burden of respiratory diseases and the late presentation of many conditions.^{5,6} South Asia has a high burden of tuberculosis and COPD, with lung cancer showing distinct epidemiological patterns and an increasing impact across the region.^{7,8} While chest imaging such as Chest X-rays and CT scans are non-invasive and can identify parenchymal and mediastinal abnormalities, they cannot directly visualize the airway mucosa or allow tissue confirmation of endobronchial lesions. In contrast, Bronchoscopy provides real-time visualization of the tracheobronchial tree, allowing mucosal assessment, sampling, and management of central lesions.^{9,10}

Previous studies from Nepal have reported variable diagnostic yields of bronchoscopy, with common findings including mass lesions, endobronchial growths, and mucosal abnormalities.^{6,11} However, despite increasing utilization, detailed data describing bronchoscopic findings in Nepal are limited. This study aims to fill this gap by documenting sociodemographic profiling, indications for bronchoscopy, and bronchoscopic visual findings of patients who underwent bronchoscopy.

METHODS

This descriptive cross-sectional study was conducted among patients undergoing bronchoscopy in the Pulmonary Unit of Internal Medicine at Kathmandu University Hospital, Dhulikhel, Kavre, Nepal, after obtaining ethical approval from the Institutional Review Committee of Kathmandu University School of Medical Sciences (Reference number: IRC-KUSMS). Data from July 2022 to June 2024 were collected between April 2024 and July 2024 from medical records. Patients aged 18 years and above undergoing bronchoscopy were included in the study. All patients with a previous diagnosis of bronchogenic carcinoma and patients with missing or incomplete data in the hospital's medical records of the hospital were excluded. The total population sampling method was used. A total of 70 individuals undergoing bronchoscopy were included in the study.

The patient underwent bronchoscopy in the pulmonary unit of the Department of Internal Medicine. Further, the biopsy was taken from different required sites, and the HPE reports were traced. A minimum of three to five biopsy specimens are recommended to increase the rate of diagnosis in an endobronchial biopsy.¹² We took 5 biopsy specimens during each bronchoscopy to increase the rate of diagnosis in endobronchial biopsy. Biopsy specimens were sent for histopathological analysis, and additional tests such as Ziehl-Neelsen staining and microbiological culture were performed when clinically indicated.

Demographic variables (age, sex), indications for bronchoscopy, and detailed procedural findings were extracted. Bronchoscopic findings were categorized into visible mass, bronchial narrowing, mucosal abnormalities, excess secretions, and normal appearance. Data were entered in Microsoft Excel and analyzed using IBM Statistical Package for Social Sciences (SPSS) version 25.0. The point estimate was calculated with a 99% Confidence Interval (CI).

RESULTS

Out of 70 patients, the mean age was 60.2 years (SD ±10.4), ranging from 28 to 85 years. Males constituted 39 patients (55.71%), while females comprised 31 (44.29%). In this study, the most common indication for bronchoscopy was suspicion of malignancy, accounting for 34 patients (48.57%), as shown in table 1. This was followed by chronic cough or hemoptysis in 19 patients (27.14%), and bronchoalveolar lavage (BAL) in four patients (5.71%).

Table 1. Clinical indications for flexible bronchoscopy among patients undergoing bronchoscopic evaluation at a tertiary care center

Indications for Bronchoscopy (n=70)	Frequency (n)	Percentage (%)
a) Suspicion of Malignancy	34	48.57
- Left lung mass	17	24.29
- Right lung mass	17	24.29
b) Chronic Cough / Hemoptysis	19	27.14
- Hemoptysis	10	14.29
- Chronic cough	9	12.86
c) Infectious or Inflammatory Conditions	12	17.14
- BAL for microbiology	4	5.71
- Pulmonary tuberculosis	3	4.29
- Lung cavity (unilateral or bilateral)	3	4.29
- Bronchiectasis (including post-TB)	2	2.86
d) Others	5	7.14
- Lung collapse	1	1.42
- Pleural effusion	1	1.42
- Dysphagia	1	1.42
- Fever of unknown origin	1	1.42
- Vocal cord palsy	1	1.42
Total	70	100

Bronchoscopic evaluation revealed endobronchial mass lesions in 24 (34.29%) patients, while bronchial narrowing was observed in 2 patients (2.86%). Mucosal inflammation was present in 13 patients (18.6%), and excessive endobronchial secretions or mucus were seen in 8 (18.6%) cases. A normal bronchoscopic appearance was found in 26 patients, accounting for 37.14% of the total cases, as shown in table 2. No procedural complications such as bleeding or pneumothorax were noted in the study participants.

Table 2. Findings in Bronchoscopy among patients undergoing

Bronchoscopic Finding (n=70)	Frequency (n)	Percentage (%)
Endobronchial Mass Lesions	24	34.29
– Left side	10	14.29
– Right side	13	18.57
– Distal trachea	1	1.43
Inflammatory Findings	13	18.57
Bronchial Narrowing	2	2.86
Other Abnormalities	5	7.14
– Bronchial bleeding	3	4.29
– Healed ulcer	2	2.86
Normal Bronchoscopic Findings	26	37.14
Total	70	100

DISCUSSIONS

This is a retrospective study of 70 patients who underwent bronchoscopy. The mean age of the patients in our study was 60.2 ± 10.4 years, which is slightly higher than the mean age reported by Pant et al., who found a mean age of 55.02 years among 238 patients undergoing bronchoscopy.⁶ The higher mean age observed in our study may be explained by the exclusion of pediatric patients and the relatively higher proportion of patients evaluated for suspected malignancy. The mean age in our study, around 60.2 years, is also consistent with the age group most commonly affected by pulmonary malignancies and chronic infection.¹³ In the same study, the majority were males (55.71%), and the most common indication for bronchoscopy was suspected malignancy (42.9%). These findings are similar to our study, with a higher proportion of male patients (55.7%) and suspected malignancy being the most common indication (48.57%).⁶ In a retrospective study done in Nepal, the commonest indication for bronchoscopy was radiological opacity(90.2%), followed by diffuse pulmonary infiltrates (4.3%) and hemoptysis(1.7%).¹⁴

The male predominance in our patient group aligns with broader global patterns in lung disease, where men continue to have higher rates of conditions such as lung cancer and tuberculosis, largely attributed to greater tobacco use and exposure to occupational hazards.¹⁵ The mean age in our study, around 60.2 years, is also consistent with the age group most commonly affected by pulmonary malignancies and chronic infections.¹³

Flexible bronchoscopy is a common method to visualize and diagnose endobronchial lesions. In addition to that, it has a therapeutic value.¹⁶ According to the GLOBOCAN 2022 report, more than 2.48 million new cases of lung cancer, along with 1.82 million deaths due to lung cancer, were found in 2022.¹⁷ In Nepal, the burden of lung cancer remains substantial; however, the trend between 2020 and 2024 shows a notable decline. The age-standardized incidence rate decreased from 10.4 in 2022 to 5.5 in 2024, while the age-standardized mortality rate declined from 9.5 in 2022 to 5.1 in 2024. Lung cancer was the most common cancer among males in Nepal in 2020, but by 2024, it had dropped to the fifth most common. Similarly, among females, lung cancer declined from the third most common cancer in 2020 to the seventh most common cancer in 2024.^{18,19}

For patients evaluated for suspected lung cancer, flexible bronchoscopy alone has around 74% diagnostic yield, when the endobronchial component is visible and forceps biopsy is performed.⁹ Therefore, flexible bronchoscopy is recommended for patients suspected of having lung cancer.²⁰ It has a sensitivity of approximately 88% for detecting central airway lesions, while the overall sensitivity for diagnosing peripheral lung lesions is around 78%, varying from 36% to 88% depending on the biopsy technique used.²⁰ Endobronchial mass lesions, accounting for over one-third (34.29%) of all findings, were the most common abnormality, followed by inflammatory findings and bronchial narrowing. The high frequency of mass lesions aligns with studies from India, where malignancy accounts for a significant proportion of bronchoscopic abnormalities.²¹ In a similar study from Nepal, Devkota et al. reported endobronchial growths in 47.8% of patients undergoing bronchoscopy, which is a bit higher than our findings.¹⁴ The visibility of tumors on bronchoscopy varies depending on the tumor location and the stage at which bronchoscopy is performed.²² Peripheral pulmonary lesions are usually not directly visible with regular flexible bronchoscopy.²³ In a study from India, Patil et al. reported visible endobronchial growths in 25% of patients and mucosal abnormalities in 22%.²⁴

Findings such as bronchial narrowing and mucosal inflammation underscore the utility of bronchoscopy in detecting not only tumors but also infectious and inflammatory airway diseases.²⁵ In our cohort, mucosal erythema and congestion were often seen in 18.6% of patients. One of the studies also highlighted the need for bronchoscopy for diagnosis of endobronchial tuberculosis while suspected for malignancy.²⁶

An interesting observation in our study was that 37.14% of patients revealed no visible abnormalities, despite having clinical symptoms or radiological abnormalities. This finding highlights an important limitation of standard bronchoscopy, particularly in the detection of peripheral

pulmonary lesions, submucosal tumors, or diseases located beyond the visible bronchial tree.²³ Thus, the diagnostic yield is very low for small < 2 cm pulmonary nodules due to lack of direct visualization.²³ Similar rates of normal findings have been described in several studies, which emphasize the need for complementary advanced bronchoscopic techniques to improve diagnostic yield.^{19,20}

This study has a few limitations. As the study was done in a single tertiary care center, this study may not reflect a large geographic area. Also, since it is a descriptive cross-sectional study, it lacks the ability to establish causality or temporal relationships. In addition, we did not follow the histopathological findings; thus, this study signifies that there is a need for a larger prospective study comparing histopathological findings among such patients. An important strength of our study is that it provides recent local data regarding the indications and bronchoscopic findings among patients undergoing bronchoscopy in a tertiary care center.

CONCLUSION

Bronchoscopy plays an essential role in the diagnostic algorithm of pulmonary diseases in Nepal. Nonetheless, a significant proportion of normal bronchoscopic appearances underscores the need for adjunct techniques to improve diagnostic accuracy. Also, multicentric prospective studies incorporating histopathology and imaging correlation are needed to optimize the role of bronchoscopy in the regional context.

ACKNOWLEDGEMENTS

We express our gratitude to the Pulmonary Unit of Dhulikhel Hospital for providing access to patient records and clinical insights. We also want to thank Dhulikhel Hospital and Kathmandu University School of Medical Sciences for institutional support and their assistance.

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