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COMPARATIVE STUDY OF IN-OFFICE FIBER-OPTIC BRONCHOSCOPY AND MICROLARYNGOSCOPY FOR LARYNGEAL MASS DIAGNOSIS

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Abstract

Background: Microlaryngoscopy (MLscopy) and direct laryngoscopy have been the traditional choice for diagnosing laryngeal masses among ENT surgeons, whereas transnasal fiber-optic bronchoscopy (FOB) is preferred by pulmonologists for various in-office endo-bronchial pathologies. The comparative accuracy and cost-effectiveness of these methods in diagnosing laryngeal masses have remained uncertain. **Objective:** The study aims to compare the histopathologic accuracy, diagnostic effectiveness, and cost-effectiveness of in-office FOB with MLscopy and direct laryngoscopy in patients with laryngeal masses. **Methods:** This study involved 70 patients with suspicious laryngeal or vocal cord masses. Patients with significant comorbidities underwent FOB, while others underwent MLscopy. FOB was performed under local anesthesia in an office setting, and MLscopy was conducted under general anesthesia with required hospitalization. The study compared the histopathologic accuracy, duration of hospital stay, and costs between the two methods. **Results:** FOB proved to be less time-consuming and more cost-effective, with patients spending about three hours for the procedure at a cost of □4600, as compared to those undergoing MLscopy, who were hospitalized for at least 12 hours at a cost of □22000. While both methods showed high histopathologic accuracy, FOB was slightly less accurate than MLscopy. **Conclusion:** Both in-office FOB and MLscopy are effective in diagnosing laryngeal masses. However, FOB offers a more cost-effective and efficient alternative, particularly suitable for patients with comorbidities or in settings where reduced hospital stay and cost are priorities. The study underscores the importance of adopting patient-friendly, cost-effective diagnostic procedures in healthcare, especially in resource-constrained settings like India. Future recommendations include broader studies to further validate these findings and potentially integrate more advanced technologies for enhanced accuracy and patient comfort.

Introduction

The diagnosis and management of laryngeal masses have long presented a clinical challenge, necessitating the development and refinement of various endoscopic techniques. Microlaryngoscopy (MLscopy) and fiber-optic bronchoscopy (FOB) are two such methods that have revolutionized the approach to visualize and treat disorders within the laryngeal

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structure. This study aims to compare the efficacy, accuracy, and cost-effectiveness of in-office FOB with the more traditional MLscopy in diagnosing laryngeal masses.[1]

Microlaryngoscopy, a procedure characterized by the use of a laryngoscope to obtain a magnified view of the larynx, has been the mainstay diagnostic tool for ENT surgeons. It offers direct visualization and the ability to perform biopsies or surgical treatments under general anesthesia. However, its invasiveness and the need for hospitalization pose significant drawbacks.[2]

On the other hand, fiber-optic bronchoscopy, introduced in the mid-20th century, has gained prominence due to its flexibility, decreased patient discomfort, and the ability to perform under local anesthesia in an office setting. The advent of FOB has allowed for more extensive visualization of the airways, including the laryngeal structure, and the collection of tissue samples with minimal patient downtime.[3]

Given the distinct advantages and limitations of both techniques, this comparative study seeks to provide a comprehensive analysis of their performance in a clinical setting, focusing on diagnostic accuracy, patient safety, and overall cost-effectiveness. This research is imperative for guiding ENT surgeons and pulmonologists in choosing the most appropriate, patient-centered approach in the diagnosis of laryngeal masses.[4]

Aims and Objectives

1. To compare histo-pathologic accuracy of specimens obtained via in-office FOB with those of ML Scopy or direct laryngoscopy,
2. to assess the accuracy of FOB as a diagnostic tool,
3. to evaluate cost effectiveness of the procedure.

Materials and Methodology

Study Design and Setting: This comparative study was conducted in a controlled clinical environment where 70 patients presenting with suspicious laryngeal or vocal cord masses were enrolled. The study aimed to compare the efficacy, safety, and cost-effectiveness of in-office Fiber-Optic Bronchoscopy (FOB) and Microlaryngoscopy (MLscopy) in diagnosing laryngeal masses. Each procedure's setup, execution, and follow-up were documented and analyzed.

Participant Selection: Patients aged 18 and above, presenting with symptoms indicative of laryngeal masses such as hoarseness, dysphagia, or dyspnea, were considered for the study. Exclusion criteria included patients below 18, those with critical comorbidities not suitable for endoscopy under local or general anesthesia, and those who declined to participate in the study. The patients were then categorized into two groups based on their comorbidities and preference: one for FOB and another for MLscopy.

Intervention Procedures: Fiber-Optic Bronchoscopy (FOB): Patients selected for FOB underwent the procedure in an office setting under local anesthesia (nebulized Lidocaine). The fiber-optic bronchoscope was carefully introduced, typically through the nose or mouth, to visualize the laryngeal area and conduct necessary biopsies. The entire process, patient response, and recovery time were recorded.

Microlaryngoscopy (MLscopy): This group of patients underwent MLscopy under general anesthesia in an operating theater. The procedure involved inserting the laryngoscope for a detailed examination and biopsy of the larynx. Post-operative recovery in the hospital, including the duration of stay and any complications, were documented.

Outcome Measures

- **Histopathologic Accuracy:** Biopsy specimens obtained from both procedures were sent to the pathology lab. The diagnostic accuracy was determined by comparing the histopathological findings with the initial clinical diagnosis.

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- **Duration of Hospital Stay and Recovery:** The time from admission to discharge was recorded for MLscopy patients. For FOB patients, the duration included the procedure time and recovery period in the office.
- **Cost Analysis:** Total costs incurred for each procedure, including procedural fees, anesthesia, hospital charges, and any additional costs, were compiled and compared.

Data Collection and Analysis: Data were systematically collected, including patient demographics, procedure details, histopathologic reports, duration of stay or procedure, and cost. Statistical analysis was performed to compare the outcomes between the two groups. Measures of central tendency (mean, median) and dispersion (standard deviation, interquartile range) were calculated for quantitative data. Comparative analysis was conducted using appropriate statistical tests (e.g., Chi-square test for categorical data, t-test for continuous data), with significance set at $p<0.05$.

Ethical Considerations: The study was approved by the institutional review board and ethics committee. All patients provided informed consent, understanding the nature, benefits, and risks of the procedures. Patient confidentiality and data protection were strictly maintained throughout the study.

Results

Table 1: Number patients for study

	Number of patents in the study group	**Co-morbidities**	**Time spent in hospital**
FOB	20	12	3 hours
MLscopy	50	10	12-24 hours
Total	70	22	

Table 1 provides an overview of the patient demographics and procedural details for the study. It records that a total of 70 patients were divided into two groups based on the diagnostic procedure they underwent: 20 patients underwent Fiber-Optic Bronchoscopy (FOB), while 50 underwent Microlaryngoscopy (MLscopy). In the FOB group, 12 patients had significant co-morbidities and the average time spent in the hospital or clinic was about 3 hours per patient. Conversely, in the MLscopy group, 10 patients had co-morbidities, with each spending a longer duration in the hospital, ranging from 12 to 24 hours. The table effectively captures the distribution of patients, their health complexities, and the time implications of each procedure.

Table 2: Expenses incurred for the procedure after basic work up.

FOB	**MLscopy**
4600	22000

Table 2 outlines the expenses incurred for each type of procedure after the basic patient workup. It compares the cost-effectiveness between Fiber-Optic Bronchoscopy (FOB) and Microlaryngoscopy (MLscopy). The table indicates that the cost of undergoing FOB is significantly lower, at □4600 per procedure, compared to MLscopy, which is considerably higher at □22000 per procedure. This concise financial comparison highlights the economic disparity between the two diagnostic methods, suggesting that FOB is a more cost-effective option for patients requiring laryngeal mass diagnosis.

Table 3: Time spent in hospital for biopsy

	Average Time spent in hours
Fibre optic Bronchoscopy	03
MicroLaryngoscopy	12

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Table 3 compares the average time patients spent in the hospital for biopsy procedures using two different methods: Fiber-optic Bronchoscopy (FOB) and Microlaryngoscopy (MLscopy). Patients undergoing FOB spent an average of 3 hours in the hospital or clinical setting, which indicates a relatively short duration likely due to the less invasive nature and quicker recovery of the procedure. In contrast, patients who underwent MLscopy spent an average of 12 hours, reflecting a longer hospital stay typically required for more invasive procedures and post-operative monitoring. This table succinctly demonstrates the time efficiency of FOB compared to MLscopy in the context of hospital stays for biopsies.

Table 4: Histopathology reports were obtained (as per lab protocol) at the 5th day.

	ML scopy (%)	**Fibre-optic broncoscopy (%)**
Pathologic results	50/50	20/20
Accuracy (as a diagnostic)-clinical and radiological	50/50 (100%)	18/20 (90%)
Cost	22000	4600
Morbidity (complications)	10/50	1/20

Table 4 provides a comprehensive summary of the outcomes and efficiency of Microlaryngoscopy (MLscopy) and Fiber-optic Bronchoscopy (FOB) based on histopathology reports obtained on the 5th day post-procedure. It shows that both methods yielded pathologic results in all cases (100% yield), with MLscopy and FOB having 50/50 and 20/20 cases respectively. However, the accuracy as a diagnostic tool differed slightly; MLscopy had a 100% accuracy rate, while FOB had 90%. The cost comparison reiterates that MLscopy is more expensive (□22000) than FOB (□4600). Lastly, the morbidity or complication rates were higher in MLscopy (10 out of 50 cases) compared to FOB (1 out of 20 cases), suggesting a lower risk associated with FOB. This table effectively encapsulates the diagnostic efficiency, cost, and safety profile of the two procedures.

Discussion

Patient Distribution and Co-morbidities (Table 1): The study involved 70 patients, with a higher proportion undergoing MLscopy. A notable aspect is the significant co-morbidities among the FOB group. This might reflect a preference or suitability of FOB for patients with complex health profiles due to its less invasive nature. Comparative studies often show a trend towards minimally invasive procedures for high-risk patients, correlating with our findings.[1][2]

Cost-Effectiveness (Table 2): The stark contrast in costs between FOB and MLscopy is consistent with literature emphasizing the economic advantage of office-based, minimally invasive procedures. Lower costs associated with FOB are attributable to reduced hospital stay, anesthesia, and equipment expenses. Future studies might further dissect the cost components to provide a deeper understanding of potential savings.[3][4]

Procedure Duration (Table 3): The shorter time requirement for FOB aligns with its designation as a minimally invasive, office-based procedure. This is a critical factor in patient throughput and satisfaction. Comparatively, literature indicates that longer procedure and recovery times for MLscopy are due to its invasive nature and need for general anesthesia.[5][6]

Outcomes and Morbidity (Table 4): While both procedures are effective, the slightly lower diagnostic accuracy and significantly lower morbidity rates for FOB suggest it as a safer alternative. The 100% accuracy of MLscopy, however, underscores its reliability. These

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findings should be balanced with literature emphasizing the importance of operator experience and technique sophistication.[7][8]

Conclusion

All patients with suspected malignant lesions were referred for definitive diagnosis. The histo-pathology of the specimens from in-office fiber-optic bronchoscopy and Micro-laryngoscopy were comparable. Costing of the in office procedure was significantly less as compared to the conventional. Time required was also less.

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