Original Research Article

Role of Fiberoptic Bronchoscopy in Histopathological Analysis of Lung Lesions

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Abstract

Introduction: Bronchogenic lesions are undoubtedly one of the most common diseases worldwide. Pulmonary cytology and biopsy are simple and resourceful methods of early diagnosis of respiratory diseases. The use of bronchoscope has increased the variety of diagnostic specimen obtainable and extended the scope of cyto-pathology. Fiberoptic bronchoscopy has an excellent result in diagnosis of lung diseases when combined with brushing cytology and biopsy. The present study aims to ascertain the yield of diagnostic bronchoscopic procedures in lung lesions and to calculate the incidence of various types of malignancies.

Materials and methods: This hospital based observational study was carried out in the Pathology department of Geetanjali Hospital. A total of 110 patients of clinically suspected lung lesion were included and bronchoscopy was carried out in all patients. Various samples such as bronchial brushing, bronchial biopsy and bronchial washing were taken as and when required and samples were given to pathology and microbiology department for reporting. Data was analysed by SPSS ver. 21.

Results: Out of 110 biopsies 61 were found to be malignant, 20 were inflammatory lesions, 16 were non-malignant, 11 were inadequate material and 2 were inconclusive. Overall diagnostic yield of bronchial biopsy was 88.2%.The most common type of malignant was Squamous cell carcinoma (34.5%) Adenocarcinoma (9%) and Small cell carcinoma (7.2%).

Conclusion: Bronchial biopsy is a valuable tool and helps in the diagnosis of lung lesions.

Key words

Bronchial biopsy, Bronchial brushings, Fiberoptic bronchoscopy, Lung lesions, Squamous cell carcinoma.

Introduction

Bronchogenic lesions are undoubtedly one of the most common diseases worldwide. Lung cancer is currently the most frequently diagnosed and the common cause of cancer related mortality worldwide. The increasing incidence could be due to increase in smoking, change in life style, increased environmental pollution and also the availability of different modern diagnostic modalities to detect lung cancer [1, 2].

Similarly, pulmonary tuberculosis still remains a leading cause of death in developing countries. To treat the disease successfully, it should be diagnosed at earliest possible stage. For early diagnosis different diagnostic modalities are available which include; radiology, bronchoscopy, bronchial biopsy, brushing, washing cytology. It is not possible to perform all techniques in each patient because each has specific advantages and disadvantages. However their combined use yields the best results [1-3].

Bronchial biopsies cannot be performed in more peripheral sites or in patients at risk of haemorrhage. So, alternative methods for diagnosis are sometimes required. Bronchoscopic washing, brushing may complement tissue biopsies in the diagnosis of lung lesions [4, 5]. There is still disagreement as to the value and reliability of wash and brush cytology in comparison with histology for the diagnosis of malignancy. An attempt has been made to determine whether a combination of biopsy procedure is more effective than cytological methods in both neoplastic and non-neoplastic lung lesions [6, 7].

Present study aimed at to ascertain the diagnostic yield of bronchoscopic procedures in lung lesions and to calculate the incidence of various types of malignancies.

Material and methods

This hospital based observational study was carried out in the Pathology Department of Geetanjali Hospital. A total of 110 patients referred (during study period) for pulmonary consultation for suspected lung lesions was considered for fibreoptic bronchoscopy. The size of the lesion in case of discernible lesions (e.g., mass, nodule, infiltrate) was determined by taking the greatest diameter as seen on postero-anterior or lateral view. Cytologic examination of spontaneously produced sputum was negative for malignant cells for at least three specimens in all patients.

Technique of bronchoscopy

After obtaining well-informed written consent, all the bronchoscopies were performed as an elective procedure. Food and drinks were withheld at least 6 hours prior to bronchoscopy. Pre-bronchoscopy screening was done with history, physical examination, BT, CT, PT, platelet count, fresh X-ray chest PA and lateral views and ECG, sputum smear for AFB on three consecutive days, xylocaine sensitivity test. Injection atropine 0.6 mg intramuscularely was given 30 minutes prior to the procedure. Local anaesthesia was achieved by spraying the orophayrnx with 4-5 ml of 4% xylocaine. The total dose of xylocaine never exceeded 400 mg. Small amount of additional 2% lignocaine was used during bronchoscopy to suppress coughing. All bronchoscopies were performed by a single operator and were done with the patient lying supine on the operation table with the operator standing at the head end. Trans-nasal passage was used for bronchoscopy. Thorough examination of nasopharynx and larynx was done. Nasal passage functions as a stint for the passage of flexible fibreoptic bronchoscope, permitting leisurely inspection of upper airways and observation of the glottis and trachea under dynamic or static conditions. The brush and biopsy instrument are withdrawn through internal channel. The same fibreoptic bronchoscope – PentaxFB15P – was used throughout the study.

Brush biopsy

Re-usable brush with nylon bristles was used for brushing. This was cleaned carefully between procedures to maximise collection of satisfactory material for cytological study. Once the tumour

was brushed, brush was withdrawn and the material cells were transferred directly onto glass slides. The bristles of the brush were pressed against the slide with the aid of pressure from a needle. Air drying was avoided. Air drying is more likely to occur at the edges of the smear, so circular motion was preferred to a back and forth stroking of the brush against a glass slide. The diameter of circular application to the slide was confined to 1.5 to 2 cm. Slides were immersed in a jar filled with 95% ethyl alcohol for fixation as quickly as possible. (Never more than 5 sec.) Two slides were prepared from each brushing, and lesion was brushed twice for a total of 4 slides.

Forceps biopsy

For lesions which were visible through bronchoscope and located straight ahead, biopsy was not difficult. For tumours in difficult locations, (e.g., lateral wall), the tip of the bronchoscope was flexed as far as possible so that opened forceps could be jammed against the surface of tumour. 3 or 4 biopsies were taken in each visible lesion. The biopsy material obtained by forceps was transferred to a test tube/jar containing 10% formalin and sent for histopathological examination.

Bronchial washings

Washings were obtained by lavage with 20-40 ml of normal saline, and subsequent aspiration into a trap connected to the suction tubing. They were obtained after performing forceps and brush biopsies so as to increase the number of cells present in the specimen. If the tumour was visible, the tip of the bronchoscope was positioned next to the tumour similarly as was done for the washings. Washings were aspirated when the lesion was peripherally located by wedging the tip of the bronchoscope into the segment where lesion was located. The specimen was sent in sterile container for cytological examination.

All the data was entered in Microsoft Excel sheet 2013 and analyzed using SPSS software ver. 21.

Results

Out of the total 110 subjects recruited for the study, 88.2% were males (**Table - 1**). Overall yield of diagnostic bronchoscopic procedures was 88.2% with over half of the subjects were having neoplastic lesion (55.5%) while 18.2% and 14.5% were having non neoplastic and non-specific inflammatory lesions (**Table - 2**). Squamous cell carcinoma (**Figure - 1**) was the most common condition observed among neoplastic cases (62.3%) followed by adenocarcinoma (**Figure - 2**) (16.4%) and small cell carcinoma (13.1%) (**Table - 3**). Tuberculosis was the most common non-malignant condition observed (56.3%) followed by aspergillosis (25%) (**Table - 4**).

Table – 1: Distribution of subjects based on Gender.

Gender	N	%
Males	97	88.2%
Females	13	11.8%
Total	110	100.0%

Table – 2: Distribution of subjects based on Type of lesion.

Type of Lesion	N	%
Neoplastic	61	55.5%
Non Specific Inflammation	20	18.2%
Non-neoplastic	16	14.5%
Inconclusive/ Inadequate	13	11.8%
Total	110	100.0%

Table – 3: Distribution of subjects based on type of neoplastic lesion.

Neoplastic lesion	N	%
Squamous Cell Carcinoma	38	62.3%
Adenocarcinoma	10	16.4%
Small Cell Carcinoma	8	13.1%
Others	5	8.2%
Total	61	100.0%

Discussion

Lung tumors are the most common cause of death due to cancer in men and are now emerging as an important cause of cancer related

mortality in females [8]. The male to female ratio in this study was 8:1 which is closer to other studies [9]. Majority of these cases were found in their 5th and 6th decades. This could be due to higher prevalence of smoking in males in our society. The objective of present study is to ascertain the diagnostic yield of bronchoscopic procedures in lung lesions and to calculate the incidence of various types of malignancies

Table – 4: Distribution of subjects based on type of non-neoplastic lesion.

Non - neoplastic lesion	N	%
Tuberculosis	9	56.3%
Aspergillosis	4	25.0%
Others	3	18.8%
Total	16	100.0%

Figure – 1: Squamous Cell Carcinoma.

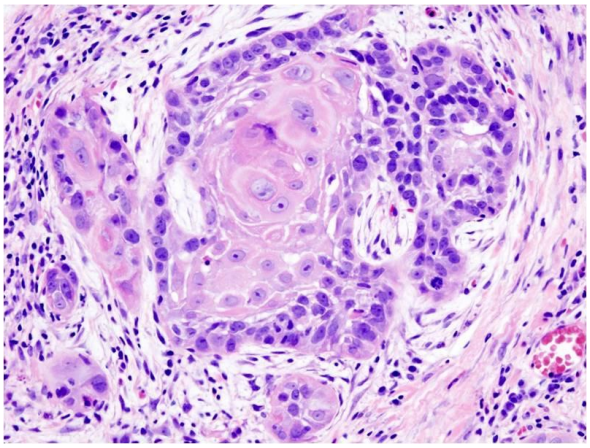
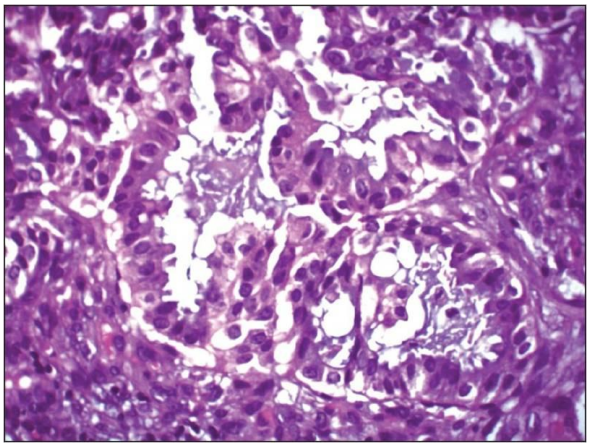


Figure – 2: Adenocarcinoma.



The first realization that cancer of the lung could be accurately diagnosed and typed by the microscopic study of expectorated cells is generally attributed to Dudgeon and Barret [10]. Fibreoptic bronchoscopy was introduced in 1968 as a diagnostic procedure. Since then, it has been in regular use for investigating patients with suspected lung cancer. Nevertheless, no definitive conclusion has been made and in many units the most common combination of procedures is cytological brushing and biopsy.

The specimens collected by fiberoptic bronchoscope yield a higher positive rate. The sensitivity of bronchial aspirates in diagnosing lung cancers has been 75 to 88.1 % by various studies [7, 11]. The bronchial secretion smear cytology that was used previously was discontinued because of lack of representative smears. Now bronchial brushings are favoured for the cytological investigation of proximal lung cancers. From management point of view, lung tumors are generally separated into small cell carcinomas and non-small cell carcinomas. For small cell carcinomas intensive chemotherapy is advised whereas the non-small cell carcinomas are better treated surgically. More than 80% cases have been correctly typed by Truong and co-workers with sputum, washing or brushing cytology [12].

In present study, yield of diagnostic bronchoscopic procedures was 88.2%. Varying results have been reported by various authors such as by Buirski, et al. [13] 80%, Quorian, et al. [14] 58%, Ono, et al. [15] 97.8%, Matsuda, et al. [16] 93.7%, Chajjed, et al. [17] 50%. The reason for this variance is use of different techniques for retrieval and processing of cytological specimens, use and non-use of fluoroscopy, different number of biopsy specimens, and different practices with regard to suspicious cytological appearance. In this study, bronchoscopy was performed without fluoroscopic guidance and the number of biopsy specimens taken was confined to 3 or 4. Gellert, et al. [18] showed that at least five biopsy specimens were required to give more than 90% probability of obtaining a positive specimen and Popovich [19] found that the maximum yield was reached after the fourth specimen. In our study, a

consistent number of biopsies have been taken and the yield therefore can be considered as optimum.

In several studies, washings offered no advantage over brushings. Though Stringfield, et al. [20], Lam, et al. [21]; and Rosell, et al. [22] did find that washings conferred an additional yield. Only few of these studies, however, used all three techniques – that is, biopsy, brushing, and washing. Most of the studies used biplanar or uniplanar fluoroscopy during bronchoscopy. But this is not routinely available in many respiratory units in India.

The main finding of the present group is that a good diagnostic yield is obtained by combining biopsy with both the cytological procedures of brushing and washing. The additional benefit of performing both cytological procedures is substantially more for peripheral lesions. Mak VHF, et al. [23] had similarly recommended combination of biopsy with cytology using both washing and brushing for maximum diagnostic yield.

Conclusion

Bronchoscopic procedures are a valuable tool and helps in the diagnosis of lung lesions. It is quite safe, economical and an experienced cytopathologist is necessary for interpretation of smears. It is also useful in patients with evidence of obstruction or risk of haemorrhage. To optimize the analysis of limited tissue available for biomarker testing, it is important that the pathologist be involved in the multidisciplinary team. It is equally important that the respirologist, interventional radiologist, and thoracic surgeon understand the importance of obtaining a satisfactory amount of material, because the specimens obtained ultimately affect the patient's management and prognosis.

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