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Role of Fiberoptic Bronchoscopy in Pulmonary Diseases

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Introduction

Definitions:

Bronchoscopy- is an endoscopic procedure, which provides direct access to the tracheo-bronchial tree and play an essential role in the diagnosis and treatment of patients with chest problems.

Fiberoptic Bronchoscopes- are flexible bronchoscopes composed of fiberoptic bundles which provide both illumination and visualization pathways. A small channel with a diameter of 1 to 3 mm traverses the fiberoptic scope, through which instruments can be passed. Several manufacturers produce various models, and each model has particular advantages and limitations, and they differ in outer diameter from less than 4mm to more than 6mm and also in the arc of bending from 60 to 180 degrees, while the viewing angles vary from 66 to 100 degrees [(1)]

Ultrathin Fiberoptic Bronchoscopes- are also now available with an outer diameter of 1.8 to 2.2 mm,it is usefull and safe in diagnosis of peripheral pulmonary lesions.

History :

- 1806 Bozzini created an endoscopic instrument utilizing a wax candle as a light source enabled him to examine the oropharynx.
- 1897 Gustav Killian (the father of bronchoscopy) used external light source and a head mirror to remove a pork bone aspirated by a 63 years old farmer under cocaine anesthesia.
- 1904 Chevalier Jackson (the founder of Philadelphia school of broncho-esophagology) incorporated suction at the end of tip- illuminated bronchoscope.
- 1964 Ikeda developed a prototype for the flexible bronchoscope, three years later and after several improvements he introduced the first flexible bronchoscope.
- 1976 Hopkins (rod lens optical telescopes) had revolutionized the optics of endoscopy by providing more efficient light transmission, brighter images, improved resolution, greater depth of field and a wider field of view.[3]

Indications: -

A- Diagnostic indications

1. Suspicion of bronchogenic carcinoma- radiographic findings that suggest the presence of a pulmonary tumor or bronchial obstruction as well as cough, hemoptysis or wheezing.
2. Pulmonary infections - whether bacterial, fungal, tuberculous, viral, and protozoal e.g. ruptured hydatid cyst; especially when these infections occur in patients who are immunocompromized.
3. Interstitial pulmonary diseases- are always investigated by bronchoscopy and transbronchial biopsy of the lung in many centers.
4. In all patients in whom pulmonary resection is contemplated- bronchoscopy must be performed by the operating surgeon before thoracotomy.
5. Monitoring the course of chest diseases.[2]
6. Miscellaneous thoracic indications

a. Undiagnosed pleural effusion.

b. Unexplained pleuritic pain.

c. Bronchiectesis where evaluation of the bronchial tree and selective bronchograms can be performed via the bronchoscope.

d. Severe chest trauma with suspicion of laryngeal injury, tracheal injury, bronchial rupture or aspiration of foreign materials.

e. Inhalation injury.

7. Extrathoracic indications

a. Lymph node enlargement in the neck or axillae.

b. Unexplained erythema nodosum.

c. Superior vena cava obstruction.

d. Hypertrophic pulmonary osteoarthropathy and/or finger clubbing.

e. Endocrine disturbance e.g. inappropriate ADH secretions, gynecomastia, and voice changes.'[4]

B-Therapeutic indications

1. Removal of secretions - fiberoptic bronchoscope has effective therapeutic value in patients developing pulmonary collapse due to thick secretions and mucus plugs.

2. Control of bronchial bleeding- fiberoptic bronchoscope can be used in diagnosing and controlling massive hemoptysis especially in elderly patients or in patients who are not suitable for resection due to inadequate pulmonary reserve or other causes.

3. Removal of foreign bodies especially when it is not within the range of the rigid bronchoscope, although the removal of foreign body by fiberoptic bronchoscope has a serious technical limitation.

4. To open narrowed tracheal or bronchial segments.

5. Brachytherapy- the positioning of an ionizing radiation source in proximity to the target tissue has also helped to treat obstructing lesions of the tracheobronchial tree.Afterloading catheters placed through such lesions with subsequent insertion of **I92lr** beads have proved to be beneficial.

6. It is effective in the transbronchial drainage of pulmonary abscess.

7. Localized management of tumors with phototherapy, laser cautery, or cryotherapy.[2]

Disadvantages :

1. The view obtained with the fiberoptic bronchoscope is easily obscured which might need removal of the instrument and reinsertion.

2. Sometimes thick secretions cannot be sucked because of small lumen.

3. It is not possible to feel rigidity of the bronchial tree; this can be sensed easily with a rigid tube or forceps.

4. For Most importantly the control of significant hemorrhage caused by

instrumentation may prove impossible.

5. In bronchitic patients or in patients with tight tracheal stricture, passing the fiberoptic bronchoscope alone simply can derange blood gases.

These limitations are only relative and minor in a statistical sense but can lead to disaster in the individual case, particularly if the operator ignores precautions and meticulous care.[4]

6. Foreign body removal is limited.

Complications:

1. Adverse reaction to premedications-
a. Respiratory depression.
b. Transient hypotension.
c. Syncope.
2. Adverse reaction to local anesthetics-
a. Respiratory arrest.
b. Cardiac arrest.
c. Seizures.
d. Laryngospasm.
3. Complications related to the procedure-
a. Laryngospasm.
b. Bronchospasm.
c. Respiratory compromise.
d. Cardiac arrest.
e. Cardiac arrythmias.
f. Postprocedure fever.
g. Pneumonia.

4 Complications related to transbronchoscopic lung biopsy or brushing.
a. Pneumothorax.
b. Hemorrhage.[5]

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The Procedure:

/preparing the patient

1. Explanation of the procedure to the patient.
2. Premedication- if premedication is to be used then atropine (0.6-1.2 mg) is injected i.m. 30-40 minutes before starting the procedure in order to prevent vasovagal events and reduce secretions. Short acting benzodiazepines e.g. midazolam do relieve anxiety and provide a degree of amnesia for the procedure. Opiates e.g. alfentanil help to suppress cough as well as anxiety. Naloxan can reverse respiratory suppression if happened.
3. Positioning of the patient. — [6,7] The procedure is done either in sitting position, semirecumbent position (45° on the examination couch), or supine (lying position).

The sitting position is comfortable to the patient, provide face to face contact, and the patient can easily cough.

The semirecumbent position is not very comfortable or stable position because the patient might slide down the couch unless an adjustable footboard is provided.

If the flexible bronchoscope is to be passed through a rigid bronchoscope or endotracheal tube under general ane

II - Precautions

1. Check that the patient has received premedication and he is fasting at least 6 hours before the procedure.
2. Resuscitative drugs and apparatus including rigid bronchoscope should be available.
3. Any doubt about the patient hemostasis should have led to investigations and appropriate corrective precautionary measures.
4. Pulse oximetry is recommended if there is any doubt about the patient oxygenation and additional oxygen should be given through nasal catheter in patients with hypoxaemia,IV line access.
5. Patients with asthma should receive 5mg of nebulized salbutamol prior to procedure.
6. Protection of the operator should be considered, transmission of infection from patient to operator is highly unlikely but possible through inhalation, conjunctival inoculation, or through minor abrasions or cuts on the hands. Vaccination of Hepatitis B and BCG should be recommended, theatre gowns, theatre cap, mask, goggles and rubber gloves should all be worn.[4]

III- Topical Anesthesia

Lignocaine 2-4 % is considered much safer and is the most widely used agent.

It can be used as spray from a hand atomizer, pressurized aerosol container, nebulizer, and in a gel form. It is advised that a total of 400 mg. should not be exceeded though sometimes more doses are required.
In the pernasal insertion mucosal anesthesia can be obtained in the nose either by inhalation of lignocaine solution from a nebulizer, by spraying with a hand atomizer, or by introducing lignocaine gel.

In the peroral route anesthesia is employed by pressurized spray, which provides adequate topical anesthesia. An alternative technique increasingly used is to inject quickly about 5ml. Of 2-4 % Lignocaine through the cricothyroid membrane.[8]

IV- Methods of insertion

A-Pernasal insertion

The tip of the bronchoscope is inserted through the chosen nostril. The shaft can be lubricated with lignocaine gel. The largest passage is the inferior meatus below the inferior turbinate along the floor of the nose and passing the fiberoptic bronchoscope backwards and not obliquely upwards should follow this. As the back of the nose is reached the bronchoscope should be angled much more caudally about 60-80° to pass through the nasopharynx into the space behind the tongue.

2- Anaesthesia, the patient will be in lying position.[4,6,7] Peroral insertion
The patient is put either in sitting or supine position and the back of the tongue should be included by anesthesia. An annular bite-guard is threaded over the bronchoscope and held in readiness near the control head. The scope is introduced as far as the back of the tongue and the tip is then deflected caudally by 50-60°. The bite-guard is now threaded down the scope shaft and placed in position.

3- Other methods of insertion
Fiberoptic bronchoscope can be inserted through an endotracheal tube, tracheostomy tube, or through rigid bronchoscope. Sometimes the scope can be introduced alongside a smaller endotracheal tube with the cuff temporarily deflated to allow its passage.
When the procedure of fiberoptic bronchoscopy is done under general anesthesia, a standard cuffed endotracheal tube is introduced and one of various available adapters added to allow closed circuit inhalation anaesthesia with fiberscope in situ.[4]

V- Negotiating the larynx

Once the larynx is in view, the vocal cord movement must be studied during phonation. The pharynx, epiglottis and cords are inspected for abnormalities particularly tumors. Adequacy of anaesthesia must be investigated by gently trickling lignocaine solution on the cords, and if coughing is provoked then 2 minutes must pass before more lignocaine is applied, and this should be repeated until no immediate response is obtained.

During a quiet inspiration the bronchoscope is passed slowly and very gently through the glottis.'[4]

VI -Examination of the bronchial tree

Once the glottis is passed, 2% lignocaine solution can be given according to the patient sensitivity and reflex in order to complete the anesthesia.

Trachea should be examined carefully while the secretions are removed with sucker. Touching of the bronchial wall should be avoided as much as possible so that to proceed smoothly. The operator should always think of the bronchial tree in three-dimensional terms.

It is a good plan to examine the side which is likely to be abnormal at the last because any investigations (particularly biopsy) can produce bleeding which may well interfere with any further examination.[4]

VII - Cleansing

1 Physical cleansing of the scope and its attachments: The suction valve should be dismantled) and the different parts with the bronchoscope completely immersed in fresh detergent. The equipment must then be thoroughly washed and brushed including all parts and channels.

2. Soaking of the bronchoscope and its accessories in 2% glutaraldehyde, which is known to kill all the encountered agents. The time of required contact varies considerably, from an hour for mycobacterium tuberculosis to less than 5 minutes for the HIV virus.

Thorough rinsing with sterile water or 70% alcohol is essential followed by complete drying.[4]

Bronchial Anatomy: -

A thorough knowledge of the anatomy and branching of the normal bronchus is necessary to fully comprehend endoscopic findings.

1- Extrapulmonary bronchus

This includes the trachea, left and right main bronchi, and bronchus

intermedius. They have horseshoe- shaped cartilages, 16-20 in the trachea, 9-12 in the left main bronchus, 6-8 in the right main bronchus, and 4-6 in the bronchus intermedius. In the trachea. The posterior wall of the bronchus, which is free of cartilage crescents, has a large amount of smooth muscle and is referred to as the membranous portion.

2- Intrapulmonary bronchus

This includes the lobar and segmental bronchi. The cartilage crescents disappear and diminish to intermittent plates of cartilage at the point of transition. The layers of elastic fibers between the mucosal epithelium and the submucosa is gradually replaced by smooth muscle, which extends in rings surrounding the entire circumference of the bronchus. Grossly the elastic fiber bundles appear as ridges running in longitudinal direction.[9]

3. Endobronchial Findings:

4. 1- Normal endobronchial findings
5. The knowledge of normal endobronchial findings is indispensable

The **trachea,** which is entered after passing the glottis, ends by dividing at the carina into the right and left main bronchi.

The **carina** should be sharp and keel-like as its name implies; it usually appears nearly vertical to the bronchoscopist though wide variations occurs.

Just beyond the carina the **right main bronchus** gives off the right upper lobe bronchus which immediately or very shortly branches into three, the apical, the anterior, and the posterior bronchi.

The lower part of the right main bronchus **(bronchus intermedius)** gives origin to the anteriorly directed middle lobe bronchus with its lateral and medial segmental bronchi.

The right lower lobe bronchus then gives the right apical lower bronchus, which immediately arises posteriorly almost opposite the middle lobe bronchus and from a little lower; the medial basal bronchus arises medially. Finally the lower bronchus ends by dividing into right anterior, lateral, and posterior basal bronchi.

The left bronchial tree present fewer visible orifices than the right. The **left main bronchus** makes more of an angle with the trachea and descends further into the lung before dividing than does the right main bronchus. The primary division with a well-defined secondary carina is divided into left upper bronchus and left lower bronchus.

The left upper bronchus quickly divided into upper division and lingular bronchi. The upper division divides into anterior and posterior branches. The

lingular bronchus is equivalent to the middle lobe bronchus on the right side and can often be seen dividing into its superior and inferior branches.
The left lower lobe bronchus is longer than the right and this together with the somewhat higher origin of the posteriorly placed left apical lower bronchus gives a greater distance between this branch and the left
basal bronchi, these basal branches form a mirror image of those on the right (anterior, lateral, and posterior) except that there is no separately arising medial basal bronchus.
The fiberoptic bronchoscope provides a more peripheral view of the bronchial tree; the most commonly used 5.0-5.5mm diameter flexible instrument allows inspection routinely to the 4th division and usually to the 5th.

Bronchial mucosa —the color of the bronchial mucosa can vary greatly with the intensity and type of lighting used in the bronchoscope, and each operator must familiarize himself with normality under his own standardized conditions. The mucosa throughout the bronchial tree is normally a pale pink or flesh tint, and often fine vessels can just be seen creating a delicate tracery particularly around the carina and in the main bronchi.(4)

2. Abnormal endobronchial findings

A- Inflammatory and associated changes*.
There are few ways in which the bronchial mucosa and submucosa can react to irritation but since the mucosa forms a thin surface membrane open to inspection over a wide area the following changes can be seen readily through the bronchoscope:

- Increased vascularity.
- Reddening.
- Swelling.
- Irregularity
- Increased mucus secretion
- In the presence of microbial infection, pus formation and occasionally ulceration is added.
- Long standing chronic conditions may lead to the formation of granulation tissue.
- Healing process can produce contractive scarring.

Inflammatory changes may be:

- Generalized (usually in chronic bronchitis).
- Localized (e.g. around a foreign body).
- Acute (associated with segmental pneumonia).
- Chronic (e.g.tuberculosis).

But the degree of different changes varies considerably in individual patients with the same condition. Conversely since the mucosa can only react in the limited ways stated above, it is thus often difficult, or indeed sometimes impossible to state a cause for the nonspecific inflammatory changes found.[4]

B-Tuberculosis:

It produces 3 main bronchoscopically visible changes:

- Endobronchial inflammation—which includes inflamed and swollen mucosa, blood or purulent secretions, granuloma, and ulceration. Healing may lead to bronchial scarring. Miliary tuberculosis may be seen with multiple deposits.
- Endobronchial distortion—due to extrabronchial lymph nodes enlargement causing bronchial compression.
- Tuberculous granulation tissue may erupt through the mucosa to form a tumor like mass.

C-Tumors:

Bronchoscopically tumors or metastatic lymph nodes may produce visible changes of 3 main types:

- Simple distortion of the normal anatomy by external pressure on the bronchial tree.
- Involvement of the bronchial wall with local distortion or ulceration of the mucosa.
- Intraluminal eruption of the growth.

Taking Specimens:

1. **Secretions**—

Gross specimens of secretions can be obtained directly via the aspirating channel of the fiberoptic bronchoscope. Maximum yield is obtained by drawing a little normal saline through the instrument at the end of the operation.

For aspirating individual samples from selected small bronchi a more refined method is to employ a syringe attached to a very fine polythene tube that will pass through the aspirating channel, the tube containing the secretions is then cut into short lengths and send to the laboratory in a dry specimen container. In this way the specimen remain remarkably fresh and undiluted.

2. **Brushings-**

Brushings taken from the surface of areas suggesting tumor tissue frequently give positive diagnosis. The method is particularly useful in small bronchi where a tumor beyond vision is suspected.

The brushes are either disposable or not. If it is disposable its head in a short length of tube can be cut off and send to the laboratory for immediate processing. Alternatively, smear may be prepared directly in the operating room by spreading the material onto glass slides and immersing it in fixative.

3. **Endobronchial biopsy-**

It is the most critical bronchoscopic maneuver. The specimen taken by fiberoptic bronchoscope is very small but usually adequate because its source can be clearly chosen.

4. **Needle aspiration-**

Sometimes the best chance of reaching a diagnosis bronchoscopically when no intraluminal lesion is found is to obtain biopsies from enlarged lymph nodes that are obviously distorting bronchi. Transbronchial needle aspiration is the safest technique here, through either the rigid or flexible bronchoscope particularly if confined to the widened carina.

5. **;Transbronchial lung biopsy-**

Bronchoscope provides one of the safest ways of obtaining small biopsies of the lung parenchyma. It helps in elucidating diffuse diseases which have defied diagnosis by other means e.g. pneumocystics carini infection in immunosupressed patients.

The precautions that should be taken in this procedure are to avoid hemorrhage and reduce its risk by checking the blood urea, platelet count and clotting factors, which should all be normal. Also the blood group must be known . Sometimes instillation of 10 ml of 1/50000 adrenaline solution into the peripheral area to be biopsied and also a prior endobronchial biopsy may be done to reveal unsuspected poor hemostasis. Sometimes fluoroscopy is a valuable aid to control the placement of the biopsy instrument.

The possible complications in this procedure include:

a. Pneumothorax that occure in about 10-15 % of cases,therefore samples shoud be taken from one lung.

b. hemorrhage though significant bleeding is uncommen.

The right lower lobe is the safest place from which to obtain biopsies because the basal bronchi are the most directly accessible to the forceps both for biopsy itself and for subsequent control of heamorrage .

6. Bronchoalveolar lavage (Bronchial Wash)-

This technique allows the collection of fluid and cells from peripheral lung tissue. Cell counts and estimates of various proteins in these specimens may help in differential diagnosis of diffuse pulmonary lesion.

Aim of The Study:

To assess the role of fiberoptic bronchoscopy in diagnosis of different lung diseases.

Patients And Methods

This Retrospective study was carried out on 100 patients suspected to have pneumonia, pulmonary tuberculosis or lung cancer attending the Outpatient department of AL-SADER TEACHING Hospital in AL BASRA from January 2014 to January 2015. Patients who had undiagnosed opacities on chest radiographs in the form of consolidation, hilar mass, collapse and cavity etc were also included. Detailed clinical history, physical examination and routine investigations were carried out in all the participants. All the patients were subjected to sputum examination (acid fast bacilli (AFB) staining, gram staining, culture/sensitivity, KOH staining, malignant cells), haematological examination, coagulation profile. Contraindications, if any were ruled out. Chest X-rays in both PA and lateral views were obtained in all the patients before the procedure to define the location of the lesion. CT scan thorax was performed in some cases. . All the patients were then subjected to fiberoptic bronchoscopy. Flexible bronchoscopy was performed with fiberoptic scope through transnasal route under topical anesthesia (2% lignocaine).

Oxygenation was monitored throughout the procedure with pulse oximetry. Appropriate samples such as bronchoscopic aspirate, brushing and biopsy were obtained depending on the lesion after thorough evaluation of endobronchial tree. Samples were subjected to cytology and histopathology depending upon the clinical diagnosis and bronchoscopic findings.

Results

In the study, 100 patients underwent bronchoscopy and results were formulated. Amongst the 100 patients, commonest indication of bronchoscopy was radiological opacity found in 80% of patients, followed by diffuse pulmonary infiltrates in 6% of patients. Six patients presented with hemoptysis with normal X-RAY. In the remaining nine (9%) patients, bronchoscopy was done for evaluation of the cause of unexplained, persistent cough.

Table (1): Indications of bronchoscopy:

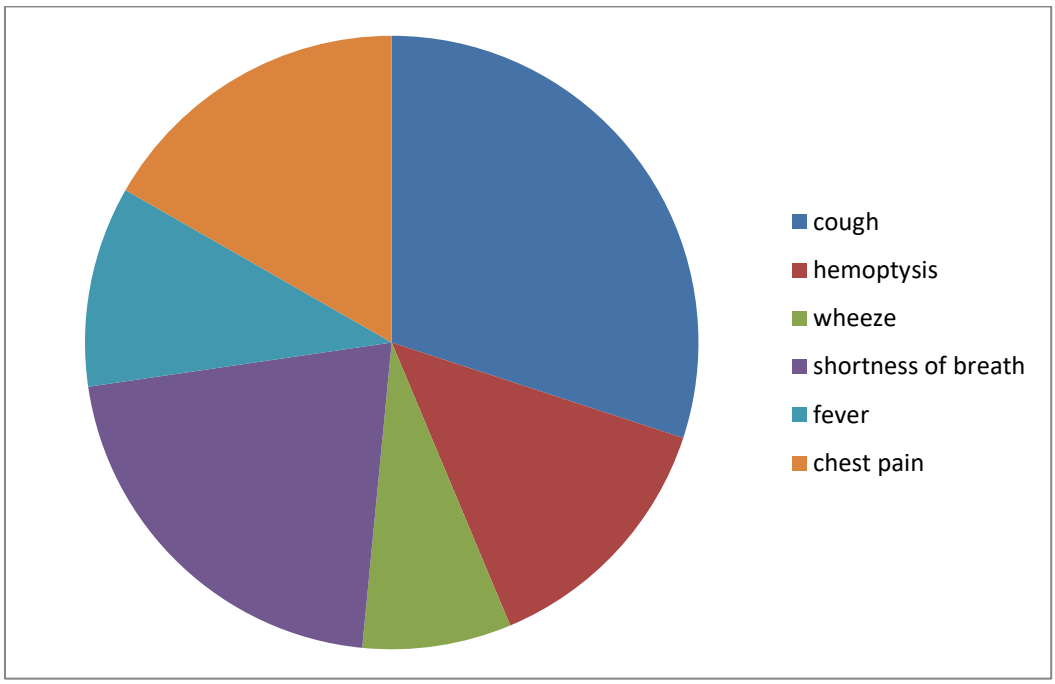
Indication Of Bronchoscopy	NO.	%
Opacity On XRAY(Suspicion Of Malignancy	80	80
Diffuse Pulmonary Infiltration	6	6
Hemoptysis	5	5
Other (Unexplained Cough)	9	9

Out of 100 patients, 72 (72%) were males and 28 (28%) were females. The age group of maximum patients was above 50 years. Mean age was 48.8 years. Out of 100 patients, 79% patients were smokers (present and past) and 21% were non-smokers. Most common clinical presentation of the patients was Cough (88%). Hemoptysis, wheeze, shortness of breath were other common symptoms found in 40%, 23% and 62% of patients respectively.

Fever and chest pain were other complaints found in 31% and 49% of patients respectively. Maximum patients presented with more than one symptom and some more than two symptoms.

Table(2): Clinical presentation of patients

Clinical Feature	%
Cough	88
Hemoptysis	40
Wheeze	23
Shortness Of Breath	62
Fever	31
Chest Pain	49



Figure(1):

Bronchoscopy was performed and findings were tabulated. The most common finding on brochoscopy was Endobronchial growth found in about 45% of patients. Endobronchial growth without suspected growth was found in 6% of patients. 11% of patients had features of non-specific inflammation on bronchscopy. Bronchoscopy was normal in 8% of patients and inconclusive in about 30% of patients.

Table (3): Finding of bronchoscopy

Bronchoscopic Findings	%
Endobronchial Growth	45
Suspected Growth (Endobronchial Abnormality Without Obvious Growth)	6
Non-Specific Inflammation	11
Inconclusive	30
Normal	8

Pathological examination of samples obtained while bronchoscopy was done in the hospital and all samples were subjected to cytological and histopathological analysis. On cytology, Malignancy was seen in 20% cases while in 13% patient's cytological analysis depicted suspected malignancy. Cytology was inconclusive in 9 % of cases while no malignancy was detected in 58% of cases.

Table (4): Diagnosis on cytology

Finding Of Cytology	%
Malignancy Confirmed	20
Malignancy Suspected	13
Inconclusive	9
No Malignancy	58

Samples of 72 suspected patients were sent for histopathological analysis and results were tabulated. Out of 72 patients, 11.1% patients had normal histological results while the result was inconclusive in 5 (6.94%) patients. Neoplastic changes were found in 22 (30.5%) of cases while non neoplastic changes were found in 48.6% of cases that included Tuberculosis (13.8%), Pneumoconiosis (8.3%), Non –specific inflammation (18.05%), Sarcoidosis (6.94%), Aspergillosis (1.38%) .Inadequate sample was obtained in 2 cases (2.7%) Table 5

Table (5): Diagnosis on histopathology

Finding On Histopathology	No.(N=72)	%
Normal	8	11.1
Inconclusive	5	6.94
Neoplastic Non-Neoplastic		
1) Tuberculosis	10	13.8
2)Pneumoconiosis	6	8.3
3)Non-Specific Inflammation	13	18.05
4)Sarcoidosis	5	6.94
5)Aspergillosis	1	1.38
Neoplastic	22	30.5
Inadequate Sample	2	2.7

Discussion

Of the total patients who had undergone bronchoscopy, majority 72 (72%) were males and 28 (28%) were females. The age group of maximum patients was above 50 years. Mean age was 48.8 years. Bronchogenic carcinoma was found to have association with increasing age of the patients.

In our study, radiological opacity was commonest indication for performing bronchoscopy keeping in mind suspected malignancy in the patients. It correlated with the studies conducted by Garg B et al(12) and Jindal et al (13)

In the present study, Cough was the commonest indication (88%) for bronchoscopy, which is similar to a study conducted by Prakash UB et al (18).Epidemiological studies suggest majority of patients with bronchogenic carcinoma have signs and symptoms of COPD.10, 14

The most common finding at bronchoscopy was endobronchial growth, seen in 45% of cases and 6% patients had suspected malignant growth on bronchoscopy and 30 cases (30%) had inconclusive reports. In our study, adequate tissue, sufficient for reporting, was obtained in 70 (98%) cases. These findings are in concordance with a study performed by Hansen et al(11) in which adequate tissue was obtained in 93% cases which substantiates the fact that with FOB an adequate tissue can be attained and a diagnosis can be established in majority of the cases.

On histopathological analysis, non-neoplastic lesions constituted the majority in 35 patients (48.6%) and neoplastic in 30.5% cases. In other studies, Hansen et al (11) reported 31% cases of neoplastic category and 62% as non-neoplastic, Abdul Aziz et al (12) found 28% neoplasm and 72% cases were non-neoplastic disease

Out of 48.6% of non-neoplastic conditions, Tuberculosis constitutued (13.8%), Pnemoconiosis (8.3%), Non –specific inflammation (18.05%), Sarcoidosis (6.94%), Aspergillosis (1.38%).Inadequate sample was obtained in 2 cases (2.7%) Gupta et al(13) reported granulomatous diseases in 33% cases followed by interstitial lung disease in 28% cases and non-specific inflammation in 25% cases. Kalra et al(15) in their study of parenchymal lung diseases diagnosed interstitial fibrosis in 76% cases and granulomatous lesions in 32% cases.

Bronchoscopy is a safe and useful tool for making the diagnosis of a variety of pulmonary diseases like bronchogenic carcinoma, pulmonary tuberculosis and some interstitial lung diseases.

Conclusions

1. Fiberoptic bronchoscopy is a very valuable method for diagnosis of different pulmonary conditions whether malignant or non-malignant.

2. Its value in the diagnosis of T.B is vital in patients with pulmonary infiltrates with negative sputum.

3. Taking a good bronchial brush and wash is very successful method to achieve cytopathological diagnosis without subjecting the patient to the risks of taking biopsy.

4. The results in cases of visible lesions are very high.

5. We look forward to use the transbronchial needle aspiration cytology and transbronchial biopsy to improve our results in invisible lesions.

6. It is easily and quickly done under local anesthesia without need for premedications.

7. It has very low rate of complications and in our series there was no mortality.

Recommendations

1. We recommend the use of fiberoptic bronchoscopy in diagnosis of pulmonary diseases because it is effective and relatively safe procedure.

2. Adequate tissue sample should be taken to decrease the percentage of inconclusive results.

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