Journal of Medical and Surgical Practice (JMSP)
Vol. 07, No. 03, July-September, 2021

Analysis of Fiberoptic Bronchoscopic Findings in Al-Hussain Teaching Hospital in Karbala Governorate

Ammar Abbas Neamah[1], Qasim Hussein Jalil [2]*, Husam Abbas Hammadi[3]

1. MBChB, M.Sc. Respiratory physician, Alhussain teaching hospital, Karbala -Iraq.
2. MBChB,CABM(medicine),FICMS(Respiratory), Alhussain Teaching Hospital, Karbala-Iraq.
3. MBChB, M.Sc. Respiratory physician, Alhussain teaching hospital, Karbala -Iraq.

**Corresponding Author* , *contact email : qasimalazzawi496@gmail.com*

Original Article

Summary

Fiber-Optic bronchoscopy is a safe and useful diagnostic and therapeutic tool for the management of many pulmonary diseases. This study aimed to assess the outcome of fiberoptic bronchoscopy among group of Iraqi patients in Karbala city in Iraq. Therefore, a cross-sectional study was conducted included 105 patients who underwent bronchoscopic examination at the respiratory unit of Al-Hussain teaching hospital during the years 2016-2017. Findings revealed that, 54.3% of patients were females, 61% non-smokers, 26.7% and 12.4% were currently smoker and ex-smoker, respectively. Age distribution showed that more than half of patients at or above the age of 60, they contributed for 53.4%. The more frequent indication of bronchoscopy was radiological opacity in 79.05% of patients, followed by productive cough (11.34%) and hemoptysis (9.52%). The most common finding on bronchoscopy was abnormal bronchial mucosa which was found in 65.7% of patients. Malignancy was documented in 29.5% of the cases, while tuberculosis in 17.1%. Neither serious complications nor mortalities were reported among the studied group. In conclusion, fiberoptic bronchoscopy is extremely useful in finding of specific etiologies of various lung diseases

Keywords: *Bronchoscopy, Fiber-Optic, Indications, Contraindications, limitations, Procedure, Complications, outcome*

Article information: Received: June , 2021, Accepted and Published August, 2021
How to cite this article*: Neamah A.A., Jalil Q.H., Hammadi H.A.. Analysis of Fiberoptic Bronchoscopic Findings in Al-Hussain Teaching Hospital in Karbala Governorate. JMSP, 7 (3):228-44*

1. INTRODUCTION

Bronchoscopy is the procedure of passing a telescope or camera into the trachea to inspect the large and medium-sized airways. It may be performed with a flexible scope, using local anaesthetic with or without sedation, favoured by physicians, or under a general anaesthetic with a rigid scope, used mostly by surgeons. Airways can be visually inspected, samples taken, and therapeutic procedures can be performed (1). The Japanese thoracic surgeon Shigeto Ikeda developed the first flexible fiberoptic bronchoscope in the 1966, revolutionizing pulmonary medicine (2-4). Since then, the flexible bronchoscope has enhanced the field of bronchoscopy and became the standardized instrument for diagnosis by the pulmonologists. It is an important advancement in the field of respiratory medicine, particularly for the investigation of haemoptysis or radiological appearances, such as atelectasis or non-resolving opacities. It is an alternative method to aid in diagnosis of infection where non-invasive methods fail to cite the underlying etiology; especially in cases of pulmonary tuberculosis . Bronchoscopy is an important tool in the diagnostic pathway and staging in patients of lung cancer (5,6).

Indications for bronchoscopy

• *Suspected lung cancer* Patients who have a central mass <4cm from the origin of the nearest lobar bronchus, which is likely to be accessible for biopsy at bronchoscopy (1)

• *Suspected pulmonary infection*, such as TB, in a patient who is unable to produce sputum, or in immunocompromised patients, with fever, cough, hypoxia, or CXR changes (induced sputum with hypertonic saline may be an alternative (1).

• *Suspected ILD* if a TBB will provide an adequate sample for diagnostic purposes such as in sarcoid. Only indicated in a limited number of ILD, as more adequate biopsies are often obtained through open lung biopsy, which may be preferable

• Investigation of haemoptysis (1)

• Investigation of stridor (1)

• Foreign body removal if this is located proximally(1)

• Therapeutic indications include central airway obstruction, sputum, Plugging, and possibly emphysema (endobronchial lung volume reduction; and asthma (bronchial thermoplasty) (1).

Contraindications for Flexible Bronchoscopy

Absolute

• Uncorrectable hypoxemia.

• Lack of patient cooperation

• Lack of skilled personnel

• Lack of appropriate equipment and facilities

• Unstable angina

• Uncontrolled arrhythmias7.

Relative contraindications/take care

• If a patient has saturations below 90% on air at rest or <8kPa, the risk of significant hypoxia during bronchoscopy is increased

• FEV <40% predicted

• Blood clotting abnormalities, particularly platelet level <50,000/mm3

• Uremia, PHT, SVCO, liver disease, and immunosuppression predispose to hemorrhage

• Recent MI may be associated with cardiac ischaemia during bronchoscopy. Wait until 4 weeks after, if possible (otherwise, liaise with cardiology) (1).

The limitations of flexible bronchoscopy

Flexible bronchoscopy is a very powerful diagnostic and therapeutic tool, but has some limitations, some examples are listed as following:

1. The majority of bronchoscopes used in daily practice have an outer diameter of 5–6 mm, which allows inspection up to the 3rd–5th generation. Smaller diameters can visualize deeper but are more prone to obstruction and decrease suction power8.
2. The management of malignant airway obstruction and airway haemorrhage is limited, rigid bronchoscope is easier, faster and saver than flexible.
3. Visualisation is limited to the endoluminal structures and bronchoscopist should therefore be aware of the extraluminal world, which is inhabited by lymph nodes, vascular structures and more (9). Techniques like TBB and TBNA have enabled visualisation of these structures (10).

The flexible bronchoscopes are very vulnerable. Great care should be taken when handling flexible bronchoscopes and whilst performing procedures, especially if needles are involved (TBNA, EBUS, percutaneous tracheostomy) (11).

Complications:

In general, flexible bronchoscopy is very safe with a low rate of complications. However, the risks depend on patient factors, such as clinical stability and patient comorbidity, as well as procedure related factors, most specifically the associated procedures performed through the flexible bronchoscope.

Major complications include: severe airway hemorrhage, pneumothorax, severe hypercapnia or hypoxia, arrhythmias, Seizures, cardiac arrest.

Minor complications of flexible bronchoscopy include: laryngospasm, bronchospasm, epistaxis,transient hoarseness, fever, nausea, cough and mild airway bleeding,

There are no controlled studies of factors that would make a specific patient unfit for bronchoscopy, so the decision to undertake the procedure needs to be based on a combination of factors to include the potential benefit, likelihood of complications, patient preference, and available alternative methods of diagnosis and treatment. Most studies report an incidence of major complications from flexible bronchoscopy of between 1% and 5%, with most major complications related to TBB12. Mortality is rare, at less than 0.04% (13)

Preparing the patient:

Important notes

1. Information Patients should be given written information about the procedure, ideally >24h prior to the procedure. Provide an information sheet for the patient to take home following the bronchoscopy, with advice about the effects of any sedation and possible complications, as well as telephone numbers in case help is needed.
2. Consent The physician performing the bronchoscopy should obtain written consent, with a description of the procedure and its associated risks.
3. Consider stopping anticoagulation Safe to perform if patient is taking aspirin or prophylactic LMWH, but omit clopidogrel for 7 days prior (may require cardiology discussion), and, if on warfarin, wait until INR <1.5 (may require full-dose LMWH on days prior to bronchoscopy for high-risk conditions, e.g. mitral prosthetic metal valve, prosthetic valve and AF, AF and mitral stenosis, <3 months post-VTE, or thrombophilia syndromes).
4. risks may be increased when using combined sedation for patients in respiratory failure, and

caution is recommended in elderly patients and presence of comorbidities are likely to require lower doses of sedatives.

5. Nil by mouth Patients should have no food for 4h beforehand and clear fluids only until 2h beforehand
6. Blood tests Patients do not need routine pre-procedure blood tests, unless there are specific concerns (active bleeding, uremia, deranged LFTs, low platelets)
7. Bedside tests perform an ECG in patients with a history of cardiac disease. Check blood sugar in patients with diabetes
8. Prophylactic antibiotics are no longer recommended for the prevention of endocarditis, fever, or pneumonia
9. In those with asthma, a nebulized bronchodilator should be given before the bronchoscopy.
10. Those at high risk of infection (TB) should be last on the list (1) .

Recommended Category Specific Equipment

Airway: Laryngoscopes: Multiple sizes, endotracheal tubes: Multiple sizes with stylettes, laryngeal airway mask, oxygen source and appropriate tubing, masks, or nasal cannula, bag/mask ventilation device, suction with appropriate suction device, oral and nasal airways (multiple sizes).

Monitoring: Moninvasive blood pressure device, electrocardiograph, pulse oximeter. **Emergency:** Cardiac defibrillator, ACLS medications like atropine, adrenaline, dopamine etc., reversal agents (naloxone, flumazenil)

Intravenous access: Gloves, tourniquets, alcohol wipes, IV cannula: multiple sizes, tape, appropriate IV fluids (14)

Sedatives and anaesthesia

Sedatives should be offered to provide conscious sedation (verbal contact possible at all times). A benzodiazepine, such as midazolam 1–2mg, with 1 mg increments as necessary, may be used with fentanyl/ alfentanil (1). Lidocaine is the most commonly used as Local anaesthetic 2% gel is that applied to the Nostrils and spray (10% lidocaine) to the back of the throat during inspiration to anaesthetize the vocal cords by three actuations , which is also anesthetized by direct instillation of lidocaine solution 2% via the working channel of the bronchoscope as well as the endobronchial tree (15,16).

Procedure

The bronchoscope is high-tech and expensive equipment and should be handled with great care 17. The positioning of the patient either in sitting position, semi recumbent position (45° on the examination couch), supine (lying position).The sitting position is comfortable to the patient, provide face to face contact, and the patient can easily cough. The semi recumbent 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 rigidbronchoscope or endotracheal tube under general anesthesia, the patient will be in lying position 18 Most access the trachea via the nasal route, as this gives increased stability when taking biopsies and allows the patient to cough and spit out secretions more easily. If this is not possible, a mouth guard is used and access obtained through the mouth (1).

Abnormal endobronchial findings:

A-Inflammatory and associated changes*:*

There are different changes can be seen readily through the bronchoscope ; among these, 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. However, these inflammatory changes may be generalized or localized, acute or chronic.

B-Tuberculosis:

It produces 3 main bronchoscopically visible changes; Endobronchial inflammation , Endobronchial distortion and tuberculous granulation tissue

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 lceration of the mucosa. intraluminal eruption of the growth (18-21).

Sampling techniques

1. Bronchial washings are taken by instilling about 10 mL of saline and then collecting it in a container to obtain superficial airway cells (1).

2. Bronchial brushings are taken by inserting a brush into a bronchial segment, rubbing the bronchial wall and later on wiping it on a slide that put in a cell fixing solution (1).

3. Bronchial biopsies are taken with biopsy forceps; 5–7 should be taken to optimize yield. These may be taken blindly or from a visibly abnormal area (1).

4. Bronchoalveolar lavage (BAL) Used to further evaluate lung abnormalities that suggest diffuse infectious, immunologic, or malignant etiology, and done by taking fluid and cells from the peripheral lung tissues (22).

5. Trance bronchial biopsy (TBB) Most helpful in evaluation of diffuse parenchymal lung disease. TBB is diagnostic in lymphangitis carcinomatosis, sarcoidosis, and rejection after lung transplantation, hypersensitivity pneumonitis, and mycobacterial and invasive fungal infection(22). TBNA Typically used for staging cancer, evaluating mediastinal or hilar lymphadenopathy, and increasing the yield of peripheral nodules (1,22).

2. PATIENTS and METHODS

A cross sectional study was performed for 105 patients in Al-Husseini teaching hospital in Karbala governorate, the study has been started since November_2016 to April_2018. A full history and examination was performed, all of the patients did an anteroposterior and lateral chest x- ray. Chest CT- scan had done for most of the patients in our study. Indications, contraindications, precautions and patient preparation, all of these are considered in our cases. Before the procedure all the patients were informed about the procedure steps then legal consent had taken from each patient. Patient oxygen saturation, blood pressure and pulse rate have been monitored before, during and after the procedure. Midazolam is used for conscious sedation; Xylocaine spray 2% is used through oral cavity to locally anesthetize oropharyngeal and laryngeal mucosa and trans- nasal to anesthetize nasal and laryngeal mucosa too. Xylocain gel 5% has been used intranasal and put on the probe of the bronchoscope to give more local anesthesia with lubrication. Bronchoscopy (STORZ flexible bronchoscope) has done through trans- nasal route with continuous oral oxygen supply 7 to 10 liters/ minute. The specimen has obtained by bronchoalveolar wash, brush, and/ or biopsy according to a decision made during full bronchoscopic visualization of the tracheobronchial tree. Cold saline and adrenalin solution 1/10000 were available if bleeding has happened.

Statistical analysis

SPSS version 23 was used for data entry and analysis. Frequency, percentage and figures were used for representation of categorical data. Chi-square test (fisher exact test if not applicable) tests were used to confirm significance≤ 0.05 considered significant.

3. RESULTS

The results of current study revealed that the mean age of studied sample was 56.8±9.4 SD years, 54.3% of was female and 45.7% was male, 59% belonged to age group of > 60 years,61% was nonsmoker and 26.7% currently smoker as seen in table.1.

Our data indicated that the highest percentage (30.5%) of partiptants fall to age group of 60-69 years followed by age group 0f 70-79 years (22.9%), 50-59 years (17.1%) and the remains fall to other age groups in lower percentages as seen in fig.1. The results of present study showed that the main indication for FOB was radiological opacity (79.05%) followed by productive cough (11.34%) and hemoptysis (9.52%) as illustrated in fig.2. The results demonstrated there was no significant association (p> 0.05 for all) between the indication of FOB and each of gender distribution or age groups of the participants as they distributed in nearly equal manner for all indications as seen in table2. The finding of present study showed that chronic cough (90.5%, n=95) was the main presenting feature of the participants followed by dyspnea (53.3%, no.=56), fever (34.3%, no.=36), weight loss (30.6%, no.=32) and hemoptysis (28.6%, no.=30) as displaced in table 3. The analysis of our data showed there was no significant association between the clinical presentation and ender of participant where the frequency of participants with all symptoms were distributed in nearly similar percentage for males and females even that the fever, hemoptysis and weight lose were more with females but the difference did not reach the significant level (p>0.05) as showed in tale 4.

The same non-significant association(p>0.05) was found when the data analyzed according to age groups of participants and their main presenting clinical features as seen in table 5.The result of FOB examination showed that the majority of patients (92.4%) had normal vocal cord and 3.8% either had abnormal shape or unilateral paralysis, 94.3% had normal carina and 5.7% had wide carina, only 29.5% had Endobronchial growth and 65.7% had abnormal mucosa as displaced in table.6. The findings demonstrated that biopsy was taken

from16% of the patient as seen in fig 3. The results demonstrated that squamous cell carcinoma, adenocarcinoma and small cell carcinoma were represented 47, 41, and 12% respectively of detected lung tumors as seen in fig.4. The safety of FOB was proved as that 93.3% of the patients were not showed any complications and just 3.8% had hypoxia, 1.9% had epistaxis, 1.0% had Endobronchial bleeding as seen in table 8 and fig. The results of cytological examination showed that 53.3% of patients had nonspecific cytological findings, 29.5% had malignant changes and 17.1% had acid fast bacilli growth as seen in table.7.

Table 1. Socio-demographic characteristics and indications of FOB of studied group (N=105)

Variable		No.	%
Gender	Female	57	54.3
	Male	48	45.7
Age groups/year	<40	20	19
	40-59	23	21.9
	>60	62	59
Smoking status	Non	64	61
	Current smoker	28	26.7
	Ex-smoker	13	12.4
Indication for FOB	Productive cough	12	11.4
	Hemoptysis	10	9.5
	Radiological opacity	83	79.1

Table 2. Distribution of Indications of FOB according to age and gender of patients (N=105)

		Indications						P. value
		Productive cough		Hemoptysis		Radiological opacity		
		No.	%	No.	%	No.	%	
Gender	Female	4	33.3	4	40	49	59	0.100
	Male	8	66.7	6	60	34	41	
Age (year)	<40	2	16.7	2	20	16	19.3	0.800
	40-59	2	16.7	1	10	20	24.1	
	>60	8	66.7	7	70	47	56.6	

Table 3. Distribution of presenting clinical features of patients (N=105)*

	No.	%
Chronic cough	95	90.5
Dyspnea	56	53.3
Fever	36	34.3
Hemoptysis	30	28.6
Wight loss	32	30.5
*some patients had more than one presentation		

Table 4. Association between gender and clinical presentations (N = 105)

Presentation	Female		Male		P. value
	No.	%	No.	%	
Chronic cough	52	54.7	43	45.3	0.700
Dyspnea	31	55.4	25	44.6	0.800
Fever	22	61.1	14	38.9	0.300
Hemoptysis	17	56.7	13	43.3	0.700
Wight loss	17	53.1	15	46.9	0.800

Table 5. Association between age of patients and clinical presentation (N = 105)

	Age (year)						P. value
	<40		40-59		>60		
	No.	%	No.	%	No.	%	
Chronic cough	18	18.9	21	22.1	56	58.9	0.600
Dyspnea	10	17.9	11	19.6	35	62.5	0.400
Fever	16	44.4	9	25	11	30.6	0.010
Hemoptysis	7	23.3	4	13.3	19	63.3	0.300
Wight loss	6	18.8	7	21.9	19	59.4	0.900

Table 6. Frequency distribution of bronchoscopic findings of patients (N=105)			
		No.	%
Vocal cord	Normal	97	92.4
	Paralysis	8	7.6
Carina	Normal	99	94.3
	Wide	6	5.7
Endobronchial growth		31	29.5
Abnormal mucosa		69	65.7

Table 7. Distribution according to cytological findings		
	No.	%
Non-specific	56	53.3
Malignant	31	29.5
Acid fast bacilli	18	17.1
Total	105	100.0

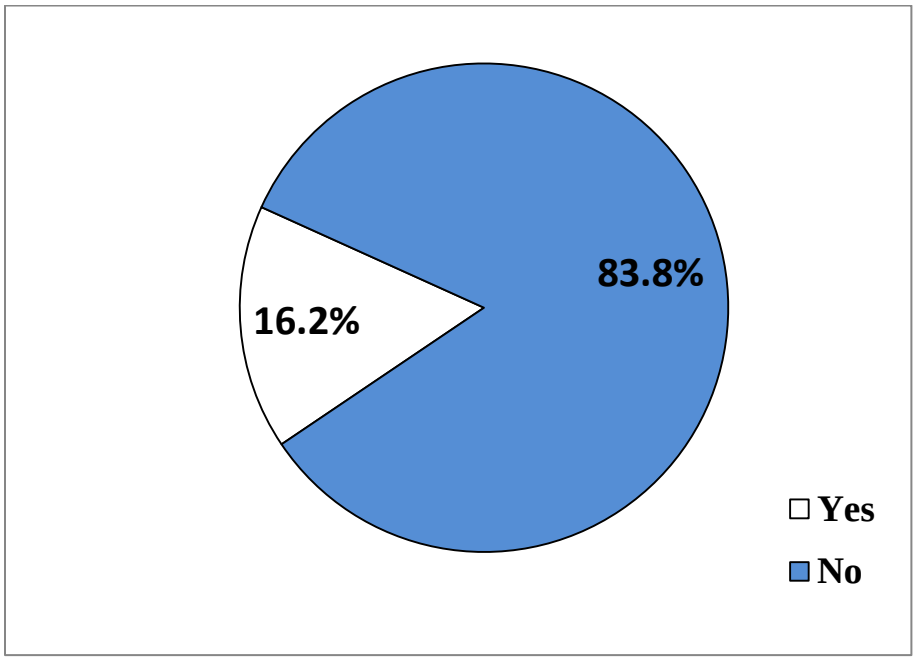

Figure 3. Distribution of patients according to biopsy taken

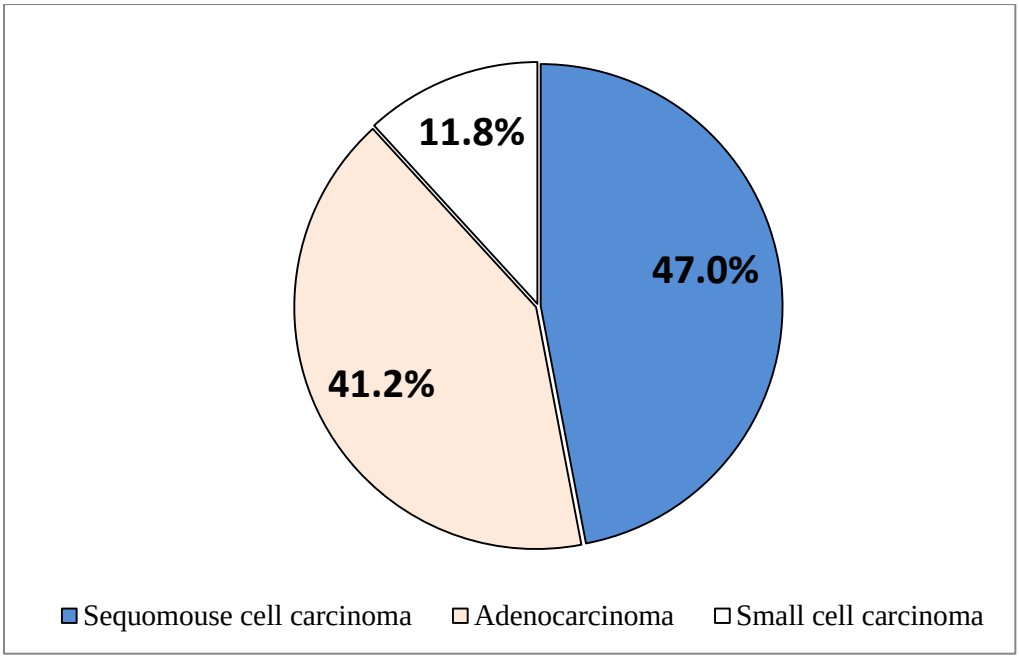

Figure 4. Distribution of histological types of detected lung tumors

Table 8. Distribution of patients according to reported complications

complications	No.	%
Non	98	93.3
Epistaxis	2	1.9
Endobronchial bleeding	1	1.0
Hypoxia	4	3.8
Total	105	100.0

4. DISCUSSION

In our study, cough was the commonest clinical presentation (90.5%), which is similar finding of study that conducted by Prakash UB et al. (23) as they also found that the chronic chough was the main presenting symptoms that make the treating physician arranged for bronchoscopic examination. Bronchial wash and post bronchoscopic sputum was done for all the patients and were sent for cytological examination and acid fast bacilli staining.

In the present study, the main indication for FOB was radiological opacity (79.05%) followed by productive cough (11.34%) and hemoptysis (9.52%) and these finding concerning the first indication are in line what was reported by Indian studies conducted by Garg et al and Jindal et al (24-25) where they reported in their studies that the radiological opacity is the main indication for bronchoscopic examination to explore the nature of this opacity and reaches the final diagnosis.

Our finding showed that 7.6% of patients have vocal cord palsy and 5.7% had wide carina, this finding is comparable with Hussen W.M (26) where he found that the widening of the carina and vocal cord palsy seen in 8.8% and 5.2% respectively.

Abnormal mucosa was reported in 65.7% of total patients as well as 29.5 % of patients had endobronchial growth. Biopsy had taken from 54.8 % of those with endobronchial growth as it is important tool for increasing diagnostic yield by histopathological confirmation of the lesion, we couldn't take biopsy from all of these patient because of presence of features that increase awareness and avoidance of impending bleeding like large clot size or high vascularity tumor and profuse bleeding may happen when taking biopsy, also the unavailability of forceps biopsy instrument sometimes is another obstacle that prevent taking biopsy. The result of current study regarding histopathological and/or cytological examination reveals that 29.5% had lung neoplasm and 70.5% had non-neoplasmic laboratory results, this is comparable with studies of Hansen et al who report 31% of cases have neoplasm and 62% as non-neoplastic, Abdul Aziz et al found 28% neoplasm and 72% cases were non-neoplastic disease (27-28). The detected lung tumor demonstrated that squamous cell carcinoma represented 47% of cases followed by adenocarcinoma (41%) and small cell carcinoma (12%), our result is similar to many Iraqi studies like Muhammed W. et al, Abdul Redha K. et al (29-30).

From the remaining (74 patients) who diagnosed as not having malignancy, 18 patients were confirmed by direct Zheen-Nelsen stain and /or by GEN-XPERT technique as having tuberculosis and they form about 17.1% of total patients. In the remaining 56/74 patients, the laboratory results revealed non-specific findings, so according to that, we are in strong need to more advanced bronchoscopic techniques to solve the problem of diagnosis of this category of patients like transbronchial biopsy (TBB), endobronchial ultrasound (EBUS) and trasbronchial needle aspiration (TBNA).

The safety of FOB by our study was proved where 93.3% of the patients had no complications and only 3.8% had hypoxia, 1.9% had epistaxis, 1.0% had Endobronchial bleeding. There were no serious complications like pneumothorax or cardiac arrest during the procedure.

5. CONCLUSIONS

Fiberoptic bronchoscopy is a very valuable method for diagnosis of different pulmonary malignant or non-malignant conditions. It is of great value in the diagnosis of TB, in patients with pulmonary infiltrates with negative sputum. Combination of endobronchial biopsy or bronchial brush with bronchial wash increases the diagnostic yield. The results in cases of visible lesions are very high. Fiberooptic bronchoscopy is easily and quickly done under local anesthesia with very low rate of complications and in our series there was no mortalities. Hence we recommend the use of fiberoptic bronchoscopy in diagnosis of pulmonary diseases as an effective and relatively safe procedure. Additionally, adequate tissue sample should be taken to decrease the percentage of non-conclusive results. We are looking forward to use the Trans -bronchial needle aspiration cytology and trans-bronchial biopsy to improve our results in invisible lesions.

Ethical Clearance: Ethical clearance and approval of the study are ascertained by the authors. All ethical issues and data collection were in accordance with the World Medical Association Declaration of Helsinki 2013 for ethical issues of researches involving humans, informed consent obtained from all patients. Data and privacy of patients were kept confidentially.

Conflict of interest: Authors declared none

Funding: None, self-funded by the authors

REFERENCES

1. *Stephen C, Grace R, John S, Sophie W, John W.oxford handbook of respiratory medicine:Practical Procedures. 2014; Third edition:748-755.*
2. *Becker HD. Bronchoscopy: the past, the present, and the future. Clin Chest Med 2010;31(1):1–18.*
3. *Ikeda S, Tsuboi E, Ono R, et al. Flexible bronchofiberscope. Jpn J Clin Oncol 1971;1(1):55–65.*
4. *Ikeda S, Yanai N, Ishikawa S. Flexible bronchofiberscope. Keio J Med 1968;17(1):1–16.*
5. *Jaiswal AK, Kulpati DDS, Jain NR, Singh MM. Role of bronchoscopy in the early diagnosis of suspected smear negative cases of pulmonary tuberculosis. Ind J Tub. 1989;36:233.*
6. *Rivera MP, Mehta AC. Initial diagnosis of lung cancer. Chest. 2007;132:131Se148S.*
7. *Robert J, Joel D, Talmadge E, Stephen C, John F, Jay A, Arthur S. Murray & Nadel,S Textbook Of Respiratory Medicine. 2016: Sixth edition :372*
8. *Eberhardt R, van der Horst J. Navigational bronchoscopy in solitary pulmonary nodules. In: Herth FJF, Shah PL, Gompelmann D, eds. Interventional Pulmonology (ERS Monograph). Sheffield, European Respiratory Society, 2017; pp. 162–175.*
9. *Kemp SV. Biopsy techniques. In: Herth FJF, Shah PL, Gompelmann D, eds. Interventional Pulmonology (ERS Monograph). Sheffield, European Respiratory Society, 2017; pp. 103–120.*
10. *Hegde PVC, Liberman M. Minimally invasive endosonographic techniques: combined EBUS and EUS. In: Herth FJF, Shah PL, Gompelmann D, eds. Interventional Pulmonology (ERS Monograph). Sheffield, European Respiratory Society, 2017; pp. 121–140.*
11. *Johannes M.A Daniels. Chapter (1): Flexible bronchoscopy. In: Felix J F, Pallav L S, Gompelmann D ERS monograph. Interventional Pulmonology. 2017 ; pp. 14-15.*
12. *Pue CA, Pacht ER. Complications of fiberoptic bronchoscopy at a university hospital. Chest 1995;107(2):430–2.*
13. *Du Rand IA, Blaikley J, Booton R, et al. British Thoracic Society guideline for diagnostic flexible bronchoscopy in adults: accredited by NICE. Thorax 2013;68(Suppl 1):i1–44.*
14. *Pawlowski J Chapter 5: Anesthesia for Bronchoscopy. In: Ernst A , Herth F. J. Introduction to Bronchoscopy: Second Edition. Cambridge University Press 2017:PP 62.*

15. Teale C, Gomes PJ, Muers MF, et al: Local anesthesia for fiberoptic bronchoscopy: comparison between cocaine and lidocaine. Respir Med 84:407–408, 1990.

16. British Thoracic Society guidelines on diagnostic flexible bronchoscopy. Thorax 56(Suppl 1):i1–i21, 2001.

17. Johannes M.A Daniels. Chapter (1): Flexible bronchoscopy. In: Felix J F, Pallav L S, Gompelmann D ERS monograph. Interventional Pulmonology. 2017 ; pp. 8 .

18. Peter Stradlings. Diagnostic bronchoscopy a teaching manual. Sixth edition. Edinburgh. Churchill Livingstone. 1993.

19. Johannes M.A Daniels. Chapter (1): Flexible bronchoscopy. In: Felix J F, Pallav L S, Gompelmann D ERS monograph. Interventional Pulmonology. 2017 ; pp. 11-12..

20. Abal Area J,Parente I,Almazan RL.Lung cancer and chronic obstructive pulmonary disease. Lancet 1977; 2:523-36.

21. Hansen R, Zavala DC, Rhodes ML.Transbronchial lung biopsy via flexible fiberoptic bronchoscopy.Am Rev Respir Dis 1986; 114:112-28.

22. Clough S.Y., Common Respiratory Symptoms, Pulmonary Imaging, & Procedures chapter 8 In: Le T., Khosa S., Pasnick S. et al ATS Review for the pulmonary boards. first edition. american thoracic society 2015; pp 390-391.

23. Prakash UBS, Offord KP, Stubbs SE.Bronchoscopy in North America: The ACCP survey.chest 1991; 100:1668-75.

24. Garg B ct al .lndian J Chest Dis Allied Sci 2013;55:145-l48.

25. Jindal SK,Behera D,Dhand R, kashyap S, Malik SK.Flexible bronchoscopy in clinical practiceza review of 100 procedure. Indian J Chest Dis Allied Sci 1985; 27:153-8.

26. Hussen, W.M. and Mansour M.M. Role of fiberoptic bronchoscopyin the diagnosis of bronchogenic carcinoma. A thesis submitted tothe scientific Council of Thoracic & Cardiovascular Surgery inpartial fulfillment of requirements of the degree of follow ship ofthe Iraqi Board for Medial Specializations. Baghdad 2013:21-22

27. Abdul al Aziz, Fedullo PF: Trans bronchial needle aspiration in the diagnosis of submucosal and peribronchial bronchogenic carcinoma. Chest. 1985; 88:49.

28. Hansen R, Zavala DC, Rhodes ML.Transbronchial lung biopsy via flexible fiberoptic bronchoscopy.Am Rev Respir Dis 1986; 114:112-28.

29. Al obaidy, Muhammed waheeb, Atheer. A .: Analysis of Fiberoptic bronchoscopy findings in

respiratory unit at Al diwanyah teaching hospital in 2014-2015. A Thesis Submitted to the College of Medicine and the Committee of Postgraduate studies of Baghdad University in Partial Fulfillment of the Requirements for the Degree of Diploma in Respiratory Medicine. September 2017.

30. *Al-Khafajy, abdul Redha K.:Lung Cancer In Iraq (2001 – 2003). unpublished thesis for the degree of diploma in respiratory medicine, Baghdad University, 2004. (Unpublished).*