

Evaluation of the results of surgery treatment in patients with benign lung tumors

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ABSTRACT

Background: Lung tumors are among the common tumors and can be benign or malignant. Benign lung tumors are less common compared to the malignant types. Recognition of the clinical symptoms, types of tumors, paraclinical findings, and treatment approaches can bring better therapeutic results. The present study aims to evaluate the characteristics, diagnosis methods, and therapeutic approaches of different benign lung tumors. **Materials and Methods:** In this retrospective study, 32 patients with a diagnosis of benign lung tumor, who had been referred to the Mashhad University of Medical Sciences between 1981 and 2009, were studied. Some of the studied variables were symptoms, the pulmonary location involved, surgery technique, pathology findings, recurrence, and surgery complications. Data were analyzed by SPSS package version 16. **Results:** The average age of the patients was 51.69 ± 20.5 years. Prevalence of benign lung tumors was equal in both genders. The most common symptom was cough (31.2%); right lung involvement was more common (71.9%), and the most common sampling technique was transbronchial lung biopsy (TBLB) (62.5%); 53.1% of the patients were operated on by thoracotomy and the wedge resection technique. In 78.1% of the patients, no complications occurred after surgery. There was no recurrence. Most operations were performed in one month after the start of the symptoms (68.8%). **Conclusions:** Benign lung tumors are commonly diagnosed by routine radiography because most of them are asymptomatic. The most common finding in radiography is the presence of mass in the lungs. Transbronchial lung biopsy is a valuable technique to be used for diagnosis. We chose thoracotomy and wedge resection for the treatment of patients. We recommend this approach as a useful method.

KEY WORDS: Benign lung tumor, diagnosis, treatment

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INTRODUCTION

Lung tumors are one of the most common tumors. They are divided into two groups of benign and malignant tumors. Benign lung tumors are very rare compared to malignant lung tumors.^[1] Less than 1% of the pulmonary neoplasms and 8-18% of pulmonary solitary nodules are comprised of benign neoplasms. They are categorized into five groups: Epithelial, mesodermal, unknown origin or developmental, inflammatory, pseudotumors or polypoid lesions.^[2]

The patients are in the age range of 17-77 years with the average age of 56.2 years.^[3] Presentation of a benign lung tumor depends on its size and location. Generally, peripheral lung tumors are asymptomatic and only diagnosed by radiography. Symptoms are always nonspecific. These lesions must be diagnosed by histology to choose an appropriate therapeutic method. Respiratory symptoms occur generally due to obstruction of trachea and secondary pneumonitis. These symptomatic lesions are mostly central and can act as a check valve based on their size and mobility. This allows the air to fill the lungs by inhalation, but obstructs the airways in exhalation and causes lobar or segmental emphysema. Relative obstruction may cause audible wheezing and a mechanical defect in the removal of secretions leading to pneumonia, recurrent bronchitis, bronchiectasis, and abscess formation. Progress to complete obstruction of the bronchus usually causes atelectasis and necrosis of the lung tissue. Hemoptysis seldom occurs with a

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reported frequency of 3%. Tracheal lesions also tend to cause symptoms such as cough, dyspnea, and wheezing. Diagnosis of a benign lung tumor is only based on histology. If fibroscopy is possible, it can examine lesions of the tracheobronchial tree up to the level of segmental bronchi. In lesions such as tracheal hemangioma and some adenoid carcinomas, biopsy cannot be done due to uncontrollable hemorrhagia. Alternative methods are a cytological study of the wire brush sample or biopsy with fluoroscopic guidance. As most lesions are peripheral, radiography plays an important role in diagnosis. Laminography yields better results on the presence of calcification, lesion form, and its relation to large bronchi. Calcifications (especially with a popcorn view) are usually seen in hamartoma. However, it does not always indicate benignity because it occurs in some malignant lesions as well. A number of benign lesions have sharp borders and may be slightly lobulated. Evidence of low growth is still applicable to a benign tumor and it is seen in hamartoma. Generally, a tumor is considered benign in the presence of these factors: (1) Advanced nuclear organization; (2) well-differentiated cells; (3) low mitotic rate; (4) no local invasion, and (5) no distant metastasis.^[4]

Total excision of the lesions is the treatment of choice due to a malignant potential in some of these lesions and their related morbidity. The operation technique is selected distinctly for each patient. In all cases, the extent of surgery is determined during the operation. Peripheral lesions can be usually removed by a wedge resection. In large bronchial tumors, lung tissues can be preserved by sleeve-type resection and reanastomosis of the area behind that, which does not involve the tumor. When pneumonia or atelectasis exists, the degree of destruction of the lung impedes preservation of the lung tissues. In this situation, usually segmentectomy or lobectomy is needed.^[5] We herewith present our experience with 32 cases with benign lung neoplasms and report their clinical symptoms, diagnostic methods employed and various treatment approaches.

MATERIALS AND METHODS

In this retrospective cross-sectional case series study, 32 patients with a diagnosis of benign lung tumor were studied. They were referred to the Mashhad University of Medical Sciences between 1981 and 2009. The studied variables included age, gender, symptoms, pulmonary location, surgery and sampling techniques, pathology findings, recurrence, surgery complications, and duration between the beginning of symptoms and surgery. The demographic and medical data of patients with benign lung tumor who underwent thorax surgery collected by means of questionnaires. Data collection was performed with respect to the legal and cultural rights of the patients. Data were analyzed by SPSS package version 16. The frequency and percentage of the descriptive statistics were used for analysis. This study was approved by the Regional Ethics Committee of the Mashhad University of Medical Sciences (project number: 900112).

RESULTS

The 32 patients were in the range of 10-89 years with the average age being 51.69 ± 20.5 years. Most of our patients (14 cases) were between 51 and 70 years old (43.8%). Both genders had equal patients (each 16). The most common reason of referral was cough (10 patients) [Table 1].

Lung auscultation of most patients (17 cases, 53.1%) with benign lung tumor was normal. In 10 patients there were decreased lung sounds (31.2%). crackles and wheezing were observed in four and one patient, respectively (12.4 and 3.1%). We used a chest x ray and a computed tomography (CT) scan for diagnosis. In 23 cases (71.9%), the right lung was involved, whereas, 27 patients (84.6%) showed a mass on radiography and CT scan. The second common finding was cystic lesions (15.6%). Calcification occurred in three patients [Figure 1]. Occasionally the lesion on the CT scan was observed as a solitary pulmonary nodule [Figure 2].

All patients underwent bronchoscopy before surgical treatment and in three patients with hamartoma, an endobronchial lesion was detected [Figure 3].

Even as 20 patients (62.5%) were diagnosed by TBLB, other patients (12 cases) were diagnosed by transthoracic needle biopsy (TTNB).

Most operations were performed in a month after the beginning of symptoms (68.8%). The most common operation technique was thoracotomy and wedge resection which was performed in 17 cases (53.1%); the other technique was thoracotomy and lobectomy in 15 patients (46.9%). The most common results of pathology report were

Table 1: Symptoms in patients with benign lung tumor

Symptoms	Number	Percent
Cough	10	31.2
Chest pain	7	21.9
Dyspnea	5	15.6
Hemoptysis	5	15.6
Fever and anorexia	4	12.5
No specific symptom	1	3.1
Total	32	100

Table 2: Results of pathology report in patients with benign lung tumor

Pathology result	Number
Hamartoma	8
Fibroma	8
Plasma cell granuloma	5
Inflammatory pseudotumor	3
Fibroleiomyoma	3
Leiomyoma	2
Inflammatory cyst	1
Pseudolymphoma	1
Lipoma	1
Total	32

hamartoma and fibroma, each of these was seen in eight cases (25%) [Table 2].

Follow-up was carried out by a plain chest x-ray in all patients. No recurrence occurred in the patients after their surgery. Twenty-five patients (78.1%) did not have any complication related to their surgery. However, in three cases (9.4%), prolonged air leakage occurred after surgery.



Figure 1: View of popcorn calcification in a patient with hamartoma



Figure 2: CT scan view of a patient with fibroma

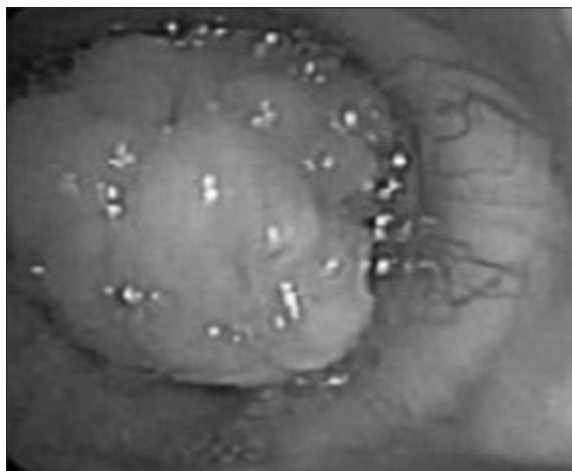


Figure 3: Endobronchial hamartoma in the left upper lobe

Atelectasis, surgical site infection, bronchopleural fistula, and postsurgical arrhythmia, occurred in one patient each (3.1% for each complication). All complications were managed conservatively.

DISCUSSION

Benign lung tumors are classified as rare neoplasms, hence, they are discussed mostly as case reports. The presence of lesions with a benign appearance, but malignant behavior was the reason for us to discuss about the diagnostic and therapeutic approach to patients with a benign lung tumor. Martini *et al.* reported that less than 1% of the lung tumors are benign.^[6] Philip *et al.* reported that benign tumors can originate from all the cells that are present in the lungs and their location may be parenchymal or endobronchial.^[7]

Muraoka and colleagues (2003), performed a study on 64 patients (50 male and 14 female) with endobronchial lipoma. In their study, the average age of the patients was 40 years. The right and left lungs were involved in 40 and 24 patients, respectively. Clinical symptoms such as cough, expectoration, hemoptysis, fever, and dyspnea were present in 75% of the patients. In our patients, cough was the most presenting sign and the other symptoms were chest pain, dyspnea, hemoptysis, fever, and anorexia.

Fifty-one patients (80%) had abnormal findings on radiography. Atelectasis, lung opacity, and decreased lung sounds were present in 18, 14, and six patients, respectively. Mass resection, pneumonectomy, lobectomy, bilobectomy, and mass resection with bronchotomy, were performed for forty, four, twenty-four, eight, and four patients, respectively.^[8] Borja and colleagues (2002) performed a study on 43 patients (37 male and 6 female) between the years 1974 and 1997, under the title 'Endobronchial Hamartoma'. The average age was 62 years. Thirty-one patients had clinical symptoms. The most common clinical symptoms were recurrent respiratory infections in 16 patients (44%) and hemoptysis in 12 (33.4%); 38 patients had abnormal findings on radiography. The clinical and endoscopic follow-up was done in 23 patients with a duration of 1 to 73 months, with an average of 17 months.^[9] Haghi *et al.* reported a diagnosis of benign tumors of the lung in 24 cases during the years of study (1979-2003). The results showed that the most prevalent benign tumor was hamartoma, more common in men, especially in those over 50 years of age.^[10] Suheil *et al.* discussed the case of a 55-year-old man, with persistent cough and dyspnea, in a case report. An endobronchial mass was found on the CT scan. The pathology report showed squamous papilloma. The mass was resected by laser, endoscopically. The author reported that less than 50 cases of this disease had been reported to date. The standard treatment was surgical resection. However, endoscopic resection with laser was proposed in uncomplicated cases, because of its benignity.^[11] Dakeshita *et al.* reported a lipoma with rapid growth in a 53-year-old man. A homogeneous, fat density mass, which

was thought to be a 'benign tumor,' was seen on a CT scan. However, surgical resection was performed because of its fast growth. The reason for the rapid growth was suggested to be inflammation-based findings during surgery, where in, lung 'adhesion' and many vessels were seen around the mass.^[12] Wang *et al.* reported a man with recurrent cough and blood-streaked sputum. A CT scan of the chest revealed a round, homogeneous pulmonary mass in the left lower lobe. A pathology report, after fine needle aspiration biopsy, showed a benign clear-cell tumor of the lung. The patients underwent thoracotomy and wedge resection and no recurrence took place in a year of follow-up. The authors found 55 cases of this tumor in the literature and summarized them.^[13]

In our study, the patients underwent bronchoscopy before surgical treatment and three patients with endobronchial hamartoma were detected. Twenty patients (62.5%) were diagnosed by TBNB and other patients (12 cases) were diagnosed by TTNB.

Isaka *et al.* reported a lesion with mixed ground-glass opacity in a 55-year-old woman. A video-assisted thoracic surgery wedge resection was done due to a slight increase in interior density. Frozen section results showed a benign tumor without proliferation of atypical epithelial cells. The final diagnosis after performing immunohistochemical procedures was capillary hemangioma.^[14] Smith *et al.* studied 140 patients with focal pulmonary lesions. The patients underwent resection for their lesions. The pathological diagnoses were as follows: Granulomatous inflammation in 91 patients (65%), hamartoma in 17 patients (12%), pneumonia or pneumonitis in 14 patients (10%), fibrosis in five patients (4%), and other diagnoses in 13 patients (9%).^[15] Mitsudomi *et al.* studied 36 patients with benign lesions, who underwent resection for treatment of 'lung tumors.' The results were as follows: Hamartoma was present in 58% of the cases, inflammatory pseudotumors in 25%, and sclerosing hemangioma in 16%.^[16] In our study, the most common operation technique was thoracotomy and wedge resection, which was performed in 17 cases (53.1%); the other technique was thoracotomy and lobectomy in 15 patients (46.9%). Salari and colleagues performed a study on 400 lung samples of patients with lung diseases during 2001-2006. The results showed that the disease was more prevalent among men and also more common after 60 years of age. The most common symptoms were cough and dyspnea. Among 200 non-neoplastic lesions, tuberculosis was 39.9%, pneumoconiosis 27%, pulmonary fibrosis 23%, vasculitis 6%, and inflammatory lung diseases 5%.^[17] Kim and colleagues performed a study of 28 cases on patients with pulmonary inflammatory pseudotumors. It was present mainly in men (81.5%) and they were mostly below the age of 50. The chief complaints were cough (44.4%), chest pain (29.6%), fever (22.2%), hemoptysis (15%), sputum (15%), and dyspnea (11.1%); 11.1% of the cases were asymptomatic.^[18] Borczuk had mentioned that in spite of the advances in imaging techniques, wedge biopsy

and resection specimens were performed for benign lung nodules. Histopathology, immunohistochemistry, and molecular techniques assured a precise pathological diagnosis.^[19] Joseph *et al.* mentioned that the diagnosis of a benign nodule must be confirmed by a transbronchial or percutaneous needle biopsy. If diagnosis is not definitive, the lesion must be resected so that its benignity can be proved. Development of video thoracoscopic techniques helped reach a definitive diagnosis with far less problems for patients, to rule out the malignancy.^[20]

CONCLUSION

Given that lung tumors are among the most common tumors, accuracy of their diagnostic methods is of high importance. Correct diagnosis is directly related to disease prognosis, survival rate, and life quality of the patients. This study aims to show that TTNB and TBLB needle biopsy sampling methods can lead to a correct diagnosis. It has been shown in this study that in patients with a probable diagnosis of a benign lung tumor, wedge resection can be used to reach a definitive diagnosis. However, based on the size of the lesion, lobectomy can be performed in some cases.

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