Original Article

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Pulmonary Hamartoma

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Key Words
benign lung tumor;
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Background. Pulmonary hamartoma is the most common type of benign lung tumors. We retrospectively reviewed the clinicopathological features of 61 patients with pulmonary hamartomas undergoing surgical resection in our institution.

Methods. From 1971 to 2002, 61 patients with 62 pulmonary hamartomas underwent surgical resection in the Division of Thoracic Surgery, Taipei Veterans General Hospital. 45 were men and 16 were women (approximately in 3:1 ratio). Their mean age was 56.9 years (range 20 to 77 years).The medical records of these patients were reviewed. The information collected using a standardized data-collection form consisted of the age at presentation, gender, initial manifestations or symptoms, history of tobacco consumption, location of hamartoma, size of the lesions, state of calcification in the hamartoma, the results of preoperative bronchoscopic examination, operative procedures and pathological report of intra-operative frozen section. All available histological slides were reviewed by the same pathologist to reconfirm the diagnosis of pulmonary hamartoma.

Results. Of the 61 patients with pulmonary hamartoma, 41 patients were clinically asymptomatic, 16 patients had new onset of respiratory symptoms and 4 patients had chronic cough. One patient had synchronous 2 separate lesions. The hamartomas were equally distributed in the pulmonary lobes with the mean transverse diameter of 1.8 cm measured in operation (range 0.2 to 5.0). No tumor recurrence developed after resection in our series. The mean follow-up was 8.9 years.

Conclusions. The vast majority of pulmonary hamartomas represent as solitary pulmonary nodule. Definite diagnosis and the treatment can be achieved by surgical resection with minimal morbidity. No tumor recurrence was encountered in the follow-up period.

The term *hamartoma* was first introduced by Albrecht in 1904 to describe lesions composed of elements of tissue that are native to an organ but are present in a disorganized array.[1] They are considered as true neoplasms rather than development of anomalies in several cytogenetic studies that have identified recombination of chromosomal bands 6p21 and 14q24.[2,3] McDonald and associates reported in 1945 that the incidence of pulmonary hamartoma in the general population was 0.25%.[4] In a large autopsy series from the Mayo Clinic, pulmonary hamartomas were found in 2 of 7,972 cases (0.025%).[5] Another study from South Africa disclosed that pulmonary hamartomas were found in 152 of 47,635 coal miners (0.32%).[6] Pulmonary harmatomas can be seen in the lung parenchyma and within the tracheobronchial trees. Endobronchial hamartomas constitute only 1% - 19.5% of cases.[7-11] Parenchymal hamartoma has a more complex structure and consists of fibrous connective tissue, cartilage, fat and bone. Clefts and spaces lined by various types of respiratory epithelium are also seen.[7,8] Clinical interest in this unusual tumor centers around two problems: (1) differentiating them from malignant lesions and (2) recognizing them as the cause of secondary symptoms. In this series, we reviewed the clinical and pathological features of 61 patients with pulmonary harmatomas who underwent surgical resection in our institute during a period of 31 years.

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METHODS

From 1971 to 2002, 61 patients with 62 pulmonary hamartomas underwent surgical resection in the Division of Thoracic Surgery, Taipei Veterans General Hospital, including 45 male and 16 female with the age ranging from 20 to 77 years (mean 56.9 years). The peak age at presentation was in the sixth and seventh decades of life (Fig. 1). One patient had 2 separate harmatomas at the initial presentation. The medical records of these patients were reviewed. The information collected using a standardized data-collection form consisted of the age at presentation, gender, initial manifestations or symptoms, history of tobacco consumption, location of hamartoma, size of the lesions, calcification in the hamartoma, the results of preoperative bronchoscopic examination and the histological report if biopsy and/or brushing was performed, operative procedures, surgical complication, pathological report of intra-operative frozen section, hospital stay after resection and outcome. All available histological slides were reviewed by the same pathologist to reconfirm the diagnosis of pulmonary hamartoma.

RESULTS

The clinical features of the patients with pulmonary harmatoma are summarized in Table 1. Twenty patients had symptoms and signs at the presentation. Sixteen of them had their symptoms and signs developing within 3 months before the presentation. Their

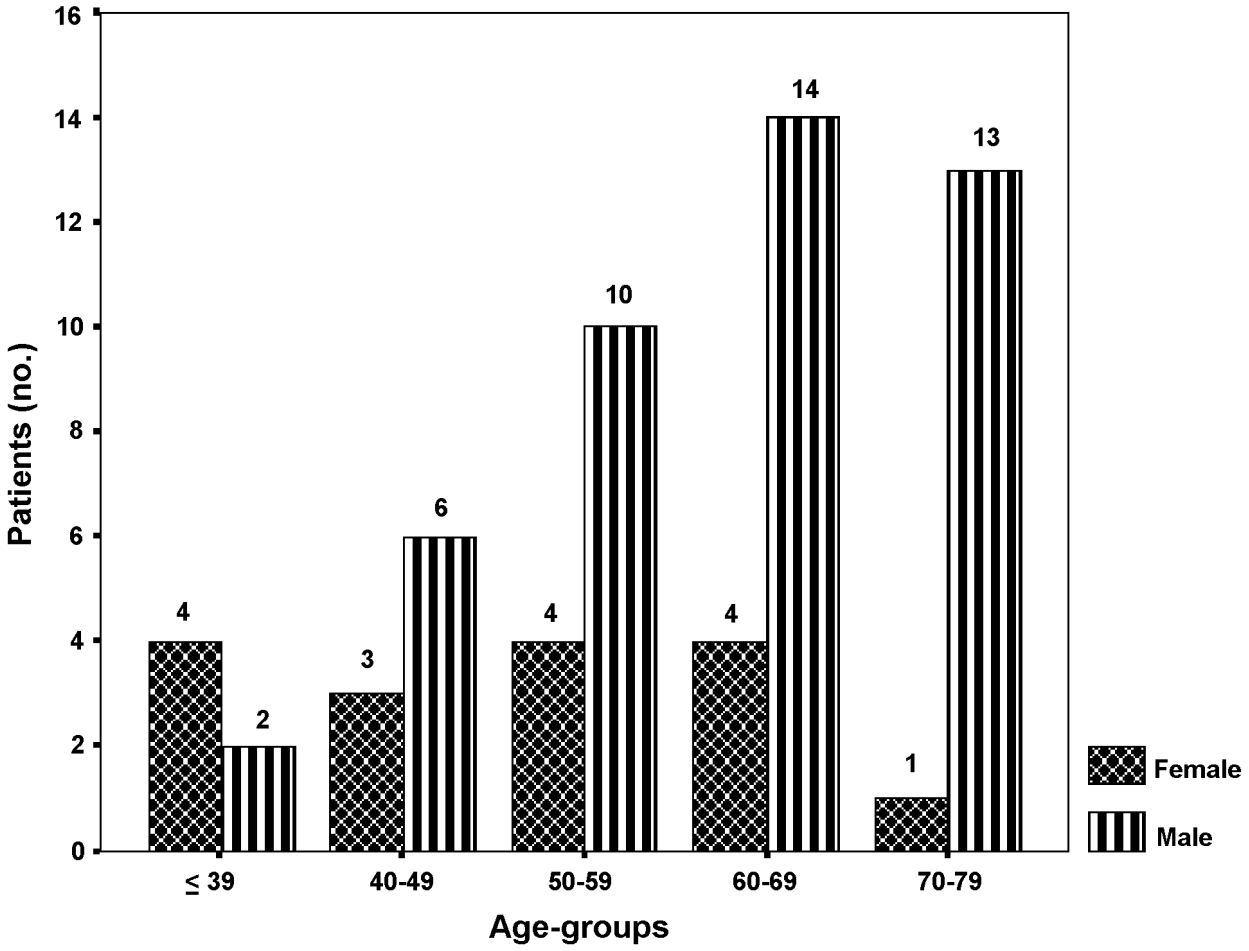

Fig. 1. Age and sex distribution of 61 patients with pulmonary hamartoma.

Table 1. The clinical features of the patients with pulmonary harmatomas

61 Patients	No. (%)
Age	20-77 (mean 56.9)
Sex	
Man	45 (73.7)
Woman	16 (26.3)
Smoking history	
Yes	32 (52.4)
No	29 (47.6)
Symptoms/signs	
None	41 (67.2)
Persistent cough	13 (21.3)
Chest tightness	4 (6.5)
Repeated respiratory tract infection	3 (4.9)
Calcification on Chest X-ray (n = 57)*	
Yes	14 (24.5)
No	43 (75.5)
Location of the tumor (n = 62)	
Endobronchial	4 (6.4)
Parenchyma	58 (93.6)
RUL	8 (12.9)
RML	6 (9.6)
RLL	16 (25.8)
LUL	18 (29.0)
LLL	10 (16.1)
Tumor size (cm)	0.2 - 5.0 (mean 1.8)
Pathological subtype (n=48)#	
Chondromatous type	44 (91.6)
Lipochondromatous type	2 (4.2)
Fibrous type	1 (2.1)
Fibroleiomyomatous type	1 (2.1)

*Cases of parenchymal harmatomas; RUL= right upper lobe, RML = right middle lobe, RLL = right lower lobe, LUL = left upper lobe, LLL = left lower lobe. #Cases of reviewed histological slides.

symptoms in these 16 patients included persistent cough (9 patients), chest tightness (4 patients), and repeated respiratory tract infection (3 patients). The other 4 patients had chronic cough for several years. Among the patients with pulmonary harmatomas, 4 (6.4%) had endobronchial hamartomas and had symptoms including 3 repeated respiratory tract infections and 1 chronic cough. Most of the patients with parenchymal hamartoma were asymptomatic (72%) and had the lesions discovered on the routine chest roentgenogram check-up. The tumors were evenly distributed throughout the lung. Forty-seven parenchymal hamartomas (81%) were located peripherally in chest roentgenograms and 14 (24%) had calcification formation. One patient had 2 separate hamartomas in the same lobe. The bronchoscopic examination was performed in all patients before operation. Except for 4 endobronchial lesions, only 1 patient had external compression of bronchus in the bronchoscopic examination. Preoperative bronchoscopic biopsy and/or brushing were performed in 15 patients including the 4 with endobronchial lesions. Only 2 endobronchial hamartomas had preoperative histological diagnosis (13.3%). The operative procedure for removal of the pulmonary harmatomas is shown in Table 2. Two of 7 patients who received lobectomy had endobronchial hamartomas. The other 5 patients had centrally located parenchymal hamartomas that necessitated extensive resection. A 40-year-old male patient with endobronchial hamartoma underwent pneumonectomy in that sleeve lobectomy was tried and failed during the operation. The surgical complications were few including one minor wound infection and one pleural effusion respectively in our series. The hospital stay after resection ranged from 3 to 16 days (mean 7.9 days). The tumor size of parenchymal hamartomas ranged from 0.2 to 5.0 cm (mean 1.8) in greatest dimension measured at operation, while the mean size thru chest roentgenograms was 1.75 cm (range 1.0 to 4.0). Intra-operative frozen section was obtained in 46 patients. All of them were diagnosed as benign lesions and 40 cases (87%) were confirmed by the pathologists as hamartoma. Grossly, hamartomas were described as well-circumscribed, firm nodules that frequently shelled out of surrounding lung parenchyma. At low magnification, the hamartoma had a vaguely lobulated appearance; the central portion of the

Table 2. The operative procedures in 61 patients with pulmonary hamartoma (62 lesions)

	No. (%)
Enucleation	17 (27.4)
Wedge Resection*	35 (56.4)
Segmental Resection	2 (3.2)
Lobectomy	7 (11.2)
Pneumonectomy	1 (1.6)

* 3 cases had video-assisted thoracoscopic surgery (VATS).

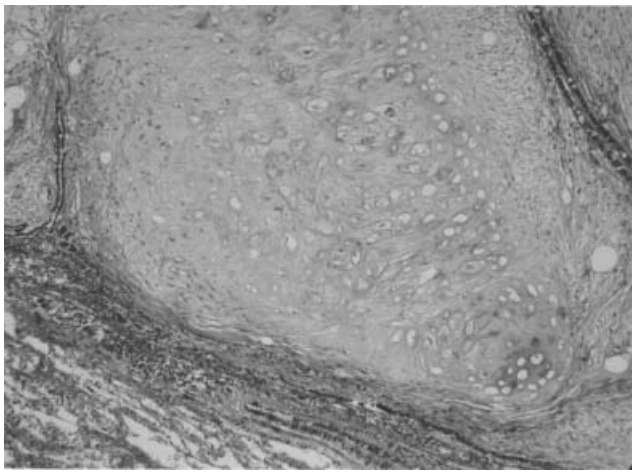

Fig. 2. Low-magnification photomicrograph, showing typical appearance of pulmonary hamartoma. Lobules of mature hyaline cartilage are intimately admixed with fibromyxoid stroma. Space between the lobules of cartilage are deep clefts lined by bronchiolar-type epithelium. Periphery of hamartoma (upper) is the lung tissue. (Hematoxylin-eosin; ×40.)

ill-defined lobules was composed of hyaline cartilage surrounded by various proportions of fibormyxoid stroma and adipose tissue (Fig. 2). Chondromatous type represented the major component (more than 50%) and was the mature hyaline cartilage in most of the 48 hamartomas (44 or 92%). Lipochondromatous type that had adipose tissue predominately was present in 2 cases. Only 2 patients were composed exclusively of cartilaginous tissue – one consisted only of fibromyxoid stroma that was negative for immunohistochemical staining of S-100 protein and neurofilament as fibrous type and the other fibroleiomyomatous type consisted of fibrous stroma and smooth muscle bundles. No tumor recurrence developed after resection in our series.

DISCUSSION

Pulmonary hamartoma is a benign lung neoplasm that occurs most frequently in middle-aged or elderly adults, and the peak incidence is in the sixth or seventh decade of life.[5,8-13] The youngest patient in our series was 20 years old. Younger patients and even neonate have been reported in other series.[11,13-16] A greater prevalence of male patients was found in most studies, with a variation in preponderance from 2:1 to 3:1, which is consistent with our study. Pulmonary hamartomas can be seen in all parts of the lung, but most often in the periphery and rarely near the hilar parts.[9,11] Endobronchial location is reported in 1% to 19.5% cases. Consistently, only 4 endobronchial hamartomas (6.4%) were found in our series. Most of the parenchymal hamartomas in our study were located peripherally and evenly distributed throughout both lungs.

Most of the patients with pulmonary hamartoma are free of symptoms, and tumor is found incidentally on chest X-ray examination.[5,8-9,12] One third of our patients had pulmonary symptoms. It is difficult to determine if the symptoms were related to the tumors. However, pulmonary hamartomas with bronchial compression or intraluminar growth can lead to atelectasis, infections, pyrexia and perhaps bleeding.[9,13] Gjevre and colleagues, reporting on Mayo Clinic experience with 215

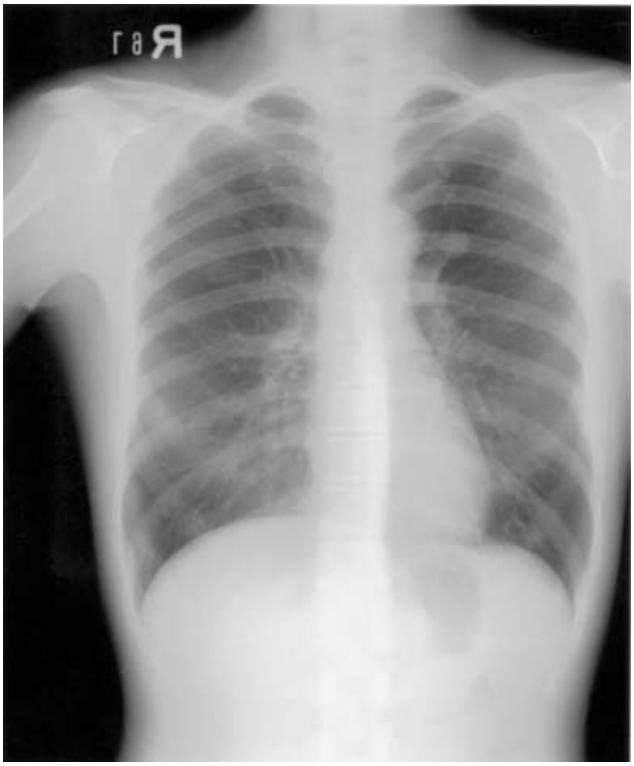

Fig. 3. Chest X-ray showing a solitary, coin-like nodule over left upper lobe.

patients, described only 4 new-onset respiratory symptoms.[5] In our experience, 3 of 4 endobronchial hamartomas had recurrent pneumonia and the other one had chronic cough and atelectasis of right meddle lobe. In symptom-free patients, the main problem is the difficulty in distinguishing pulmonary harmartoma from lung cancer. On X-ray examination, a pulmonary hamartoma usually shows up as a sharply demarcated coin lesion (Fig. 3), sometimes with calcification,[14,17] but this is not diagnostic since calcifications may appear in carcinomas and in tuberculosis as well. Hasen and associates observed that preoperative diagnosis from transthoracic needle aspiration biopsy could be obtained in 85% of the patients with pulmonary harmatoma.[10] Hamper and colleagues reported the similar diagnostic rate but also a 50% incidence of postaspiration pneumonthorax.[18] However, in our series, the efficacy of bronchoscopic examination in the preoperative diagnosis for pulmonary harmatomas is unsatisfactory. Only 2 of 15 patients (13.3%) undergoing transbronchial biopsy had histological diagnosis before operation. Bronchoscopic examination is helpful only in patients with endobronchial localization.

In the majority of our patients (83%), the tumor was removed by wedge resection or enucleation of the tumor. Only the tumors located deep in the parenchyma or endobronchial lesions necessitate more extensive procedures. Some authors have advocated segmental resection or lobectomy to avoid spillage if the lesion proves to be a cancer or an abscess.[13] In our series, 46 patients had the intraoperative histological examination of frozen sections, which all showed benign lesions. Of them, hamartomas were confirmed in 40 cases. Recurrence of pulmonary hamartomas after resection is not common.[5] Van den Bosch reported 2 cases of recurrence in a series of 154 patients.[8] We did not observe recurrence in our study.

In conclusion, pulmonary hamartoma is a benign lesion and represents as solitary pulmonary nodule in roentgenogram. The efficacy of bronchoscopic transbronchial biopsy in the preoperative diagnosis of pulmonary harmatomas is limited. Definite diagnosis and the treatment can be achieved by surgical resection with minimal morbidity. Tumor recurrence is not observed in our study.

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