

## Original Article

# Diagnostic and Therapeutic Treatment Methods for Intrathoracic Extrapulmonary Lipomas

E Akar, MA Haberal, OS Dikis<sup>1</sup>

Departments of Thoracic Surgery and Pulmonary Diseases, Health Sciences University Bursa Yuksek Ihtisas Training and Research Hospital, Bursa, Turkey

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## INTRODUCTION

Lipomas are benign soft tissue neoplasms originating from mature adipocytes. Although lipomas constitute the half of soft tissue tumors and about 80% of fat containing benign tumors, the remainder 20% are angioliipomas, intramuscular lipomas, spindle cell lipomas, myoliipomas, and pleomorphic lipomas.<sup>[1]</sup>

Whereas it is possible to encounter lipomas at every part of the human body, it is of extremely rare occurrence to see them in anatomic relation to the pleural lining inside the thorax.<sup>[2]</sup> The origin of intrathoracic lipomas can be

**ABSTRACT** **Background:** Lipomas are rarely seen tumors of adipose tissue that are benign in character. Although mostly located to the subcutaneous region, specifically in the upper back, neck, and shoulder, they may also occur in thoracic cavity. **Aim:** They aim of the study was to analyse clinical features and outcome of treatment of intrathoracic pleural lipomas. **Materials and Method:** We retrospectively evaluated the clinicopathological records of seven patients with intrathoracic lipomas who had undergone surgery between 2005 and 2017. We made analyses in terms of age, gender, admission complaints, lesion locations and dimensions, diagnostic techniques, operative procedures, histopathological features, and prognosis. **Results:** Four women and three men with a mean age 62.7 (range, 48–75 years) were included. They had chest pain ( $n = 2$ ), effort dyspnea ( $n = 1$ ) as the admission symptom, whereas four patients were asymptomatic, whose lesions were detected on chest radiography on an incidental basis. The radiological features of the tumors were well-demarcated, homogenous lesions with fat density. Tumors of all cases were excised, which were located on the right side in two patients and left in five. We used video-assisted thoracoscopy in two patients, single-port video-assisted thoracoscopy in three patients, thoracotomy in two patients. All lesions were of parietal pleural origin and were located intrathoracically. They had a range of size between 4 and 10 cm, with an average of 6.7 cm. All cases were operated with complete resection. At a mean follow-up duration of 4.7 years no recurrence was noted. **Conclusion:** Intrathoracic lipomas are rare, benignly behaving tumors. As it may prove difficult to differentiate them from malignant lesions and they may grow in an invasive growth pattern, surgery should be pursued in all patients for both diagnosis and treatment.

**KEYWORDS:** *Intrathoracic, lipoma, surgery, video-assisted thoracoscopic surgery*

mediastinum, diaphragm, bronchus, lung, or thoracic wall. Unlike subcutaneous lipomas, these tumors are designated as deep-seated lipomas.<sup>[3]</sup> They are most common benign adult tumor. The majority of patients with pleural lipoma are asymptomatic, and their lesions are incidentally detected on radiograms. In this study, we aimed to discuss our rarely observed intrathoracic

**Address for correspondence:** Dr. OS Dikis,

Department of Pulmonary Diseases, Health Sciences University  
Bursa Yuksek Ihtisas Training and Research Hospital, Bursa,  
Turkey.

E-mail: ozlemsengoren@hotmail.com

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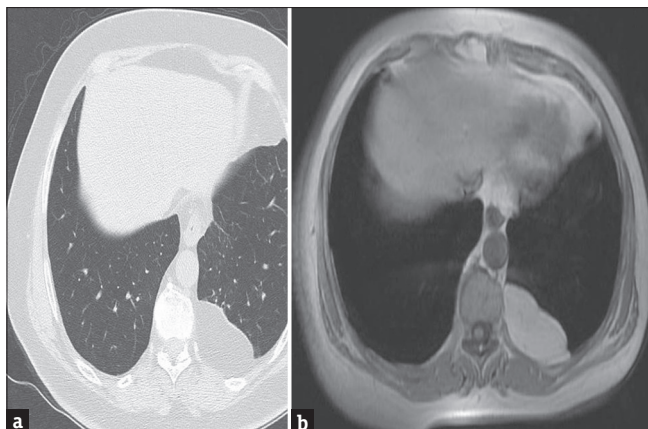
extrapulmonary lipoma cases in the light of the existing literature.

### MATERIAL AND METHODS

Thoracic surgery was carried out on 6730 patients at our clinic in a period spanning from 2005 to 2017. A retrospective analysis of postoperative pathology reports revealed seven cases of pleural lipoma with intrathoracic, extrapulmonary localization. We excluded endobronchial, intraparenchymal, and chest wall lesions from the analysis. All patients' information regarding their age, gender, admission complaint, lesion localization and dimensions, diagnostic studies, operative procedures, histopathological features, and prognosis were recorded.

### RESULTS

Table 1 demonstrates the patients' clinical features.

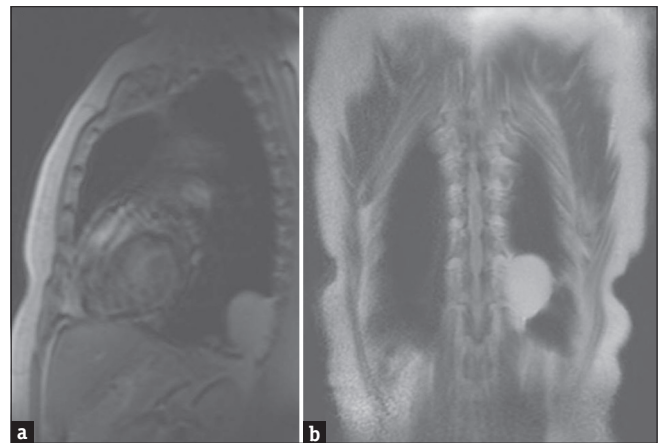


**Figure 1:** (a) A computerized tomography of the chest demonstrated a hypodense mass-like lesion with round borders in the posterior aspect of the lower zone of the left lung, (b) In the same patient's T1-weighted magnetic resonance images on the axial plane, the lesion appeared isointense with the subcutaneous fat tissue in fat non-suppressed images

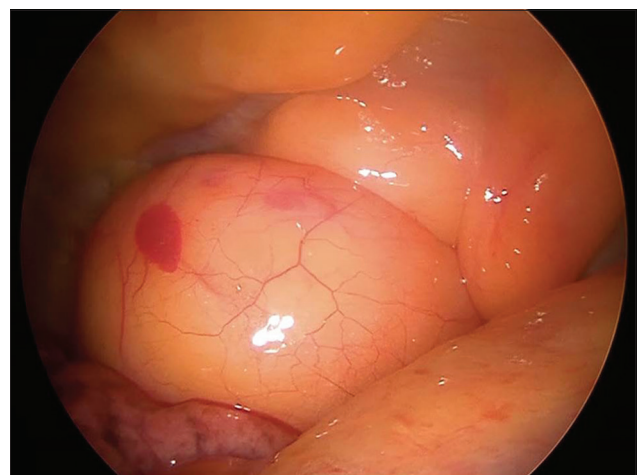


**Figure 3:** The computerized tomography of the 48-year-old female patient demonstrates a homogenous formation with a size of 44 × 21 mm and a fat density in the paravertebral and posterior regions, close to the left diaphragmatic level

Their mean age at presentation was 62.7 years. The tumors of four asymptomatic patients were incidentally detected by chest radiography. According to body mass index analysis, no patient was obese but there were four overweight patients. No abnormality of laboratory studies was noted in any patient. All lesions were assessed using plain chest films and computed tomography (CT) of the chest [Figure 1]. In two cases, where no contrast uptake was evident in the lesions in the postcontrast images after chest CT, magnetic resonance imaging (MRI) was performed to assess both lesion homogeneity and internal fat tissue [Figure 2]. Seven patients had a well-demarcated shadow of a homogenous lesion on chest X-ray. CT of the chest revealed a tumor with a well-distinguished borders and a homogenous fat density [between -50 and -150 Hounsfield unit (HU)], which was compatible with subcutaneous fat. In radiological examination, the lesion was located



**Figure 2:** All MRI sequences extending posteriorly from the paravertebral region on transverse coronary and sagittal planes (a, b) demonstrate the lesion appearing isointense with fat tissue and being suppressed in fat suppressed sequences



**Figure 4:** The intraoperative image of a lipoma in the posterior part of the left hemithorax, in the neighborhood of diaphragm, in a 52-year-old female patient

**Table 1: Clinical features of patients with intrathoracic lipoma**

No	Age/sex	Symptom	Side	Location	Tumor size	Surgery	Follow-up
1	64/M	Chest pain	L	Thoracic pl	7 cm	sVATS	8.4 y, well
2	52/F	None	L	Posterior	6 cm	VATS	6.5 y, well
3	48/F	Chest pain	L	P.vertebral + posterior	10 cm	Thoracotomy	3.7 y, well
4	62/F	None	L	Paravertebral	5 cm	sVATS	5 y, well
5	75/F	Effort dyspnea	R	Thoracic pl	4 cm	sVATS	4 y, well
6	68/M	None	R	Posterior	7 cm	VATS	2.5 y, well
7	70/M	None	L	Diaphragm	8 cm	Thoracotomy	3 y, well

M: male, F: female; R: right, L: left; pl: pleura, VATS: video assisted thoracoscopic surgery, s: single-port, y: years

posteriorly in two patients; in thoracic pleura in two patients; in diaphragm in one patient; in paravertebral region in one patient; and both in paravertebral region and posteriorly in one patient [Figure 3]. The mean lesion size was 6.7 cm. All patients had a suspected lipomatous lesion on radiological studies. Lipomatous lesions were considered as provisional diagnosis, and as a pathology examination would not alter treatment decision, surgical operation was contemplated in all cases. In order to totally excise the lipomas and not to leave any residual tumor tissue behind, the most appropriate operative technique was selected. Depending on lipomas' anatomic locations and size, thoracotomy was preferred in two cases; standard video-assisted thoracoscopic surgery (VATS) in two cases; and single-port video assisted thoracoscopic surgery (sVATS) in three cases. Surgical exploration revealed lesions with smooth surface and pedicles and broad bases, some of which were yellow and some white in color, and all but one were encapsulated [Figure 4]. The lesions were completely resected in all cases. The histopathological diagnosis was lipoma and no malignant transformation was observed in any patient. Postoperative follow-up was free of recurrence at an average follow-up duration of 4.7 years.

## DISCUSSION

Lipomas are soft tissue neoplasms with benign character and originate from mature adipocytes.<sup>[2]</sup> They may be located superficially (subcutaneous) or deep.<sup>[4]</sup> The latter are rarer, and since they are detected long after development, they tend to be larger than the superficial ones.<sup>[4]</sup> Intrathoracic lipomas reoccur extremely rarely, and constitute approximately 0.3% of all mediastinal neoplasms.<sup>[5]</sup> They affect all age groups and both genders equally, but most patients are 40–60 years old.<sup>[4,6]</sup> In our study, four patients were female and three were male, and they had an age range of 48–75 years.

These tumors tend to grow slowly and be asymptomatic. When they reach massive sizes, they may cause nonproductive cough, tightness sensation in the chest, and respiratory difficulty. Symptoms such as dyspnea

and dysphagia are show due to local compression on adjacent structures, such as the trachea or esophagus. When asymptomatic, a pleural lipoma may be incidentally shown by a chest roentgenogram.<sup>[2,7]</sup> Obese persons are considered to be specifically prone to develop lipomas.<sup>[4,7]</sup> However, none of our patients was obese.

Pleural lipomas also may cause complications such as intratumoral hemorrhage with pain and fever; moreover, they can invade intercostal spaces and induce rib lysis.

Liposarcoma and lipoblastoma should be remembered in the differential diagnosis. A lipoasarcoma should be suspected when a fat containing lesion infiltrates adjacent structures rather than displacing them, possesses a heterogeneous internal structure, and has a density above -50 HU. The distinction between lipomas and low-grade liposarcomas cannot be necessarily made by radiological methods, and a definitive diagnosis requires histopathological sampling with biopsy.<sup>[8]</sup> Lipoblastoma is a tumor most commonly seen in children under the age of three years, which consists of immature fat cells and is detected incidentally. Considering its age of appearance, its differential diagnosis includes lipomas. Mediastinal lesions containing fat are lipomas, liposarcomas, thymolipomas, and germ cell tumors. Lesions containing parenchymal and endobronchial fat are hematomas, lipomas, and lipoid pneumonia.<sup>[9]</sup> Lipomas are distinguished from tumors containing fat, such as fibrolipomas and teratomas, by containing no soft tissue component. Diaphragmatic hernias should also be considered in the case of lesions located in the vicinity of the diaphragm.

Thorax CT is crucial to describe pleural origin, characterize the lesions and measure their size. A homogenous fat attenuation of -50 to -150 HU is typically observed.<sup>[2,10]</sup> A malignant lesion should be suspected when there is an invasive growth pattern and a heterogeneous enhancement character.<sup>[10]</sup> Nevertheless, lipomas and well-differentiated liposarcomas cannot be reliably differentiated by the CT of the chest.<sup>[3,10]</sup> MRI can be considered when CT demonstrates equivocal

findings. Sometimes, MRI can provide a more precise description of the invasion pattern. MRI also eliminates the possibility of diaphragmatic hernias and localizes from pleural lipomas.<sup>[6]</sup> Diaphragmatic lipomas are located on the left side twice more common than the right side and tend to involve the posterolateral portion of the diaphragm. They may mimic diaphragmatic tumors by having lobule, localized eventration slip, or hypertrophic diaphragmatic crus.<sup>[11]</sup> Our patients' lesions had characteristics of lipomas on radiological studies.

When there is suspicion of malignancy or metastatic lesions, percutaneous needle biopsy can be used to confirm the diagnosis, although the pathological examination of the specimen is limited.<sup>[6]</sup> Our patients had no history of malignancy and metastasis was not the case. As the surgical plan could not possibly be altered by a preoperative biopsy, the latter was skipped.

There is controversy surrounding the management of asymptomatic lipomas. Although some advocate radiological follow-up for asymptomatic intrathoracic lipomas, some others are in favor of surgical excision.<sup>[3,6,11,12]</sup> We believe that surgical exploration is useful for both diagnosis and treatment, specifically for massive lesions producing compressive symptoms, long-follow-up time, stressful patient psychology, and suspicion of malignancy. Furthermore, preoperative distinction between lipomas and liposarcomas may be difficult especially when the latter is well-differentiated. The latter may sometime progress into undifferentiated liposarcomas.<sup>[13]</sup> Thus, surgery should be used for both diagnosis and treatment when there is radiological suspicion of a malignancy. Elderly and highly morbid patient need to be managed conservatively and just followed. In younger patients and if the lesion is small, the decision to proceed with surgery is up to the patient, but we recommend these patients surgery as comorbidities may become important when they age. Currently, these lesions are excised totally if possible, as the most definitive treatment.<sup>[14]</sup> Surgical resection can easily be performed via muscle sparing or an open typical thoracotomy. VATS has become a common technique for thoracic tumor which was pedunculated in form and small enough in size because there is no infiltrating growth in this type. It is an effective well-tolerated procedure that is associated with less morbidity and mortality. Recently, successful extirpation of a pleural lipoma with a sVATS has been reported.<sup>[4,15]</sup> If a lipoma without a pedicle does not invade adjacent structures, VATS and sVATS are feasible.<sup>[2,3]</sup> Depending on lipomas' anatomic locations and size, we have preferred thoracotomy in two cases; VATS in two cases; and sVATS in three cases.

Histopathological characteristics of lipomas is the mostly uniform, mature adipocytes without mitotic activity.<sup>[4,13]</sup> In well-differentiated liposarcoma, which is important for differential diagnosis, fat cells appear in different size, and have solitary or multiple hyperchromatic nuclei and eosinophilic vacuoles as well as a cytoplasm containing fat droplets.<sup>[1]</sup> All of our cases were benign lipomas without mitotic activity. Lipomas behave benignly and have a favorable postoperative outcome. All lipomas may recur after surgery but with less than 5% chance, although deeply located ones tend to recur more commonly secondary to incomplete resection.<sup>[4]</sup> We observed that complete resection was possible without recurrence during follow-up in all patients.

## CONCLUSION

Intrathoracic lipomas occur rare and are benign. As they cannot be distinguished from malignant lesions and may grow invasively, surgery is the diagnostic and treatment option in every asymptomatic patient whose radiological screening detected a lesion that is not suspected of malignancy.

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## Conflicts of interest

There are no conflicts of interest.

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