

# Solitary fibrous tumor of the pleura

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## Original Article

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### ABSTRACT

**Background:** Solitary fibrous tumor of the pleura (SFTP), or pleural fibromas, are rare tumors that generally, but not universally, follow a benign course, though malignant changes may be encountered. Their surgical resection is the standard treatment.

**Aim:** To present six cases of SFTP, their age, sex, clinical presentation, imaging findings, operative appearances, the outcome of resection, histopathological results, and any encountered morbidity or mortality.

**Patients and Methods:** Six patients with the SFTP were studied retrospectively. They were admitted, investigated, and operated upon during a 3-year period from January 1 to 31, 2020–December 2022 in the thoracic department of the surgical specialties hospital of the Medical City Teaching Complex in Baghdad, Iraq. Surgical resection was the standard treatment for those patients.

**Results:** Four of our patients were females. The remaining two were males. Their ages range between 35 and 80 years, with a mean age of 54.6. Computed tomography scan of the chest was done for all of them in addition to a tru-cut biopsy. Thoracotomy was offered for all of them, and complete surgical removal was done for five of them. Postoperative course was smooth, with wound infection encountered in two of them treated successfully and the early appearance of a new cutaneous mass in the sixth patient, for which resection was done under local anesthesia.

**Conclusion:** Their early surgical resection offers the best chance of cure and may prevent their progression into malignant changes.

**Key Words:** Fibrous tumors, pleural-based mass, thoracotomy malignant changes, tru-cut biopsy.

**Received:** 4 February 2024, **Accepted:** 3 March 2024, **Publish:** 7 July 2024

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**ISSN:** 1110-1121, July 2024, Vol. 43, No. 3: 778-786, © The Egyptian Journal of Surgery

### INTRODUCTION

Solitary fibrous tumor of the pleura (SFTP) is a rare tumor that originates from the mesenchyme cells, and can be found both inside and outside the chest. It was described for the first time in 1931.<sup>[1]</sup> It can be localized or diffused.

Savu *et al.*<sup>[2]</sup> reported that it was described from a histological view by Wagner<sup>[3]</sup>. SFTP can be asymptomatic, though it can be presented with nonspecific symptoms, such as chest pain, which is dull in nature, dry cough, and even dyspnea. Mostly benign, however malignant changes can occur in 20%<sup>[4]</sup>.

SFT can be anywhere in the pleura, head, neck, pancreas, prostate, and thymic gland<sup>[2]</sup>.

Computed tomography (CT) scan of the chest may be a very useful diagnostic tool for the pleural-based

tumor<sup>[5]</sup>, however tru-cut biopsy may add diagnostic value preoperatively. The histopathology and the immunohistochemistry of the resected mass will finalize the diagnosis. The most common treatment modality for both benign and malignant SFTP is the surgical resection.

### PATIENTS AND METHODS:

A retrospective study of six patients with a preoperative diagnosis of SFTP. All were admitted, investigated, and managed during a 3-year period from January 1, 2020 to December 31, 2022 in the Thoracic Department of the Surgical Specialties Hospital of the Medical City Teaching Complex in Baghdad, Iraq.

Informed written consent was obtained after explaining the nature of the operation and its risks. The approval of ethics committee was obtained from Health Ethics Committee in college of medicine, university of Baghdad

with a registration number: 208, in 12/9/2023. Ethical considerations were obtained according to Helsinki Declaration.

History taking, physical examination, and laboratory findings were recorded for all of them with the radiological assessment by chest radiograph (CXR) and CT scan of the chest. A true cut biopsy was done for all of them preoperatively to confirm the provisional diagnosis, and then patients were scheduled for surgery.

Surgery in the form of the classical lateral decubitus position. Right or left postero-lateral thoracotomy was done under general anesthesia with double lumen intubation. Entering the chest through the fifth or sixth intercostal space. Total resection of the pleural-based mass was done in four of them, and the removal of multiple pleural-based masses was done in the sixth patient, in which other masses were seen in other sites such as the liver and pancreas. After resection of the mass or masses, hemostasis was done and a single tube thoracostomy was inserted. Closure is done, in the classical way in layers. Postoperative course was uneventful apart from simple wound infection in two of the patients and the appearance of a new cutaneous mass 3-week postoperatively, in the sixth patient, for whom resection of the mass was done under local anesthesia. The elderly patient refused surgery.

The obtained histopathological reports confirm the diagnosis of SFTP.

The information of our patients was retrospectively collected from information recorded from patients' medical files or surgeon's notes.

A data form used to collect and organize the data of patients, which include introductory information about the patient (age, sex), presenting symptoms, preoperative investigations, imaging findings, operative appearance, surgical resection technique and postoperative, morbidity and mortality in addition to the histopathological reports.

### **Case 1**

A 52-year-old women, presented on the March 10, 2020, with right-sided chest pain, cough, with sputum production, her CT scan of the chest showed a big lesion (160x85 mm) in the right lower zone (pleural-based mass) as shown in (Fig. 1).

CT-guided tru-cut biopsy was done by our colleague interventional radiologist, and the result was of benign SFTP.

Classical left lateral decubitus position, right postero-lateral thoracotomy incision done, entering the chest through sixth intercostal space and a huge pleural-based

mass, pressing on the heart and attached to the diaphragm and right middle lobe, was encountered. Adhesion was released and the mass resected completely. Its weight is 3200 g. Hemostasis, single chest tube thoracostomy inserted. Closure done in layers. The postoperative course was uneventful. The patient was discharged well on the fifth postoperative day after removal of the chest tube thoracostomy. Histopathology was consistent with benign SFTP.

### **Case 2**

A 63-year-old female, who lived in Baghdad, referred by a colleague consultant chest physician, presented to me on the August 6, 2020, with left chest pain since 7 years. She was febrile, her heart rate 144/m, O<sub>2</sub> saturation 92%, normotensive 130/80, with diminished breath sound on the left side. She had a history of COVID-19 infection with improvement in medical treatment. Her CXR showed a massive left pleural effusion. CT scan of the chest showed multicystic lesion of the left lower zone with massive left pleural effusion and mediastinal lymph node (LN) as seen in (Fig. 2).

Ultrasound showed left pleural effusion amounting up to 1200 ml with multiple cystic lesion. Aspiration of 300 ml showed a nonspecific chronic pleuritis, with the mature lymphocyte constitute more than 90%

PET scan showed a hypermetabolic left pleural thickening (TB or mesothelioma), loculated effusion with mediastinal and subcarinal LN, possibly metastatic with questionable mesenteric LN.

On August 26, 2021, surgery was done, under general anesthesia, with double lumen intubation, right lateral decubitus position, and left postero-lateral thoracotomy incision, entering the chest through the fifth intercostal space. Effusion drained, with the complete removal of a large pleural-based mass. Hemostasis and single chest tube thoracostomy was inserted. A smooth postoperative course apart from wound infection, treated by daily change of dressing and antibiotic according to culture and sensitivity test. The patient was discharged well on the seventh postoperative day after removal of the chest drain.

Histopathological report was consistent with low-grade malignant SFTP with some areas of pleura showing chronic nonspecific inflammation.

### **Case 3**

An 80-year-old man, presented with fever, shivering, and sweating. His vitals were BP 120/80, SpO<sub>2</sub> 98% PR: 100/m. IgM positive while his IgG was negative, CRP positive, and his D Dimer was high. His WBC 14740 and lymphocyte % was low (15.8). Given parenteral antibiotics

together with the symptomatic and supportive treatment for COVID-19. He showed gradual improvement, so CT scan of the chest was arranged, which showed mild left-sided pleural effusion and left mid-zone opacity (pleural-based enhanced mass), which was merging into the left hilum, measured 50×40×30 mm as seen in (Fig. 3). CT-guided tru-cut biopsy was arranged under local anesthesia and the histopathological report was consistent with benign SFTP with no evidence of any malignancy. Surgery was offered for him but the patient and his family were happy about the result and decided not to proceed further.

#### Case 4

A 35-year-old female, referred to me by a colleague, consultant pulmonologist, with the diagnosis of SFTP, proved by tru-cut biopsy. She presented with right-sided chest pain, which was dull in nature. She looks well with BP 120/80, oxygen saturation of 97%, and diminished breath sound on the right side. Her CXR and CT scan of the chest which was done in September 2022 showed a pleural-based mass measures (12x8 cm). She was hypertensive on Micardis 40 mg. She had a history of lacunar brain infarct, which subsided, but maintain on Clopidogril 75 mg tab daily. A new CT arranged in November 2022 which showed large pleural-based mass 13×9×8.5 cm in the right side of the chest. Preoperative carotid Doppler was done, due to her past medical history. It showed bilateral patent both carotid arteries both internal and external. Her preoperative echo was normal with EF of 76%. Patient prepared for right thoracotomy after cessation of Clopidogril for 7 days before surgery, so under general anesthesia left lateral decubitus position, with double lumen intubation, right postero-lateral thoracotomy approach was done, entering the chest through fifth intercostal space. The adhesions to the upper and middle lobes were released. The mass completely resected. Hemostasis was secured and single chest tube thoracostomy inserted. Patient discharged well on the fifth postoperative day after removal of the chest drain.

Postoperative course was uneventful. The obtained histopathological report was consistent with that of benign right pleural-based SFTP, as seen in (Fig. 4).

#### Case 5

A 53-year old women, presented to me on the April 15, 2021, with a progressive SOB, and easy fatigability, weight loss, with left-sided chest pain, which was dull in nature. She had a history of COVID in November 2020. On examination, she has a BP of 130/80, SpO<sub>2</sub> of 98% and a PR of 110/m with diminished breath sound on the left side of the chest. Her investigations showed a WBC 7900, Hb 9.6, ESR 65 and +ve CRP. Her CXR, showed mass with left pleural effusion.

Chest ultrasound showed a well-defined, with irregular outline, hypervascular left-sided intrathoracic mass lesion, measuring 10×7×5 cm, associated with clear pleural effusion, measuring about 150 ml in volume. CT scan of the chest showed a well-defined large pleural-based mass in the left hemithorax with heterogeneous enhancement and of smooth outline measuring 15x7.5 cm, in addition to a mild left pleural effusion.

Pleural fluid aspiration was done, cytology of which showed mature lymphocyte, AFB was negative and there was no evidence for malignant cells.

Tru-cut biopsy was done under local anesthesia and the obtained histopathological result was that of benign SFTP. Preoperative echo showed that the mass was completely isolated from the pericardium with EF 66%. On the May 24, 2021 and under GA, with double lumen intubation. Right lateral decubitus, left postero-lateral thoracotomy incision, entering the chest through the fifth intercostal space. The pleural-based mass completely resected. Hemostasis and single chest tube thoracostomy inserted postoperative course was uneventful (Fig. 5).

The histopathological result of the resected mass was consistent with benign SFTP with no evidence for malignancy.

#### Case 6

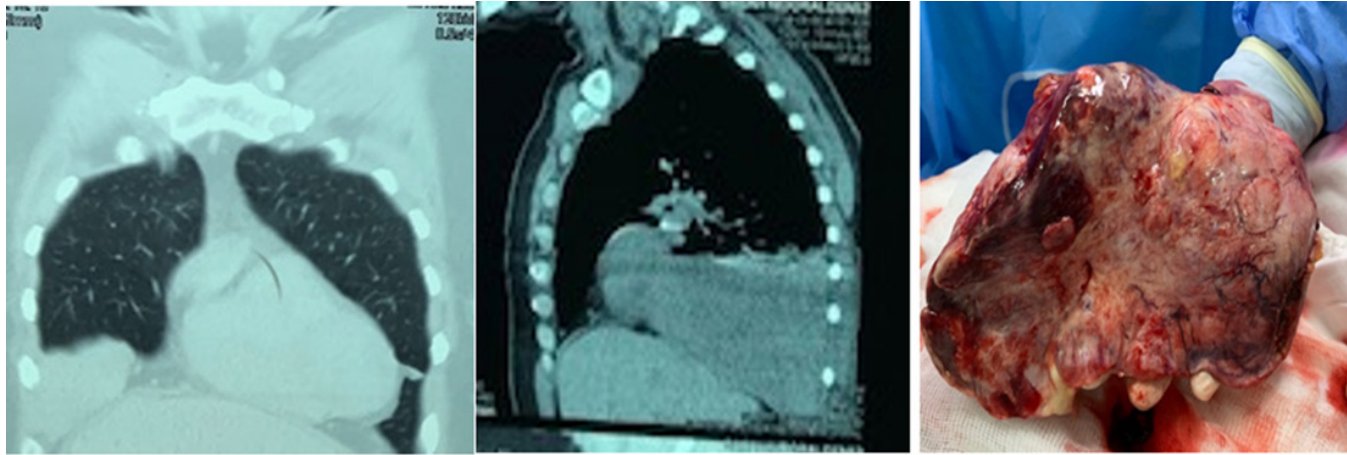
A 45-year-old man, diabetic, heavy smoker, referred to me by a colleague consultant general surgeon, with a chest wall mass, in addition to the pulmonary mass. His BP was normal 120/80, SpO<sub>2</sub> 96%. Clinical examination of his chest revealed scattered wheeze. His CT scan of the chest showed enhanced chest wall mass (43x27 mm). Right lower lobe lung nodule in addition to a pleural-based mass as seen in (Fig. 6).

Tru-cut biopsy from the chest wall mass and the pleural-based mass was done and sent for biopsy, which turned out to be a benign solitary fibrous tumor. PET scan disclosed a hypermetabolic chest wall mass, large right pleural-based mass (solid and fluid), which is adherent to the RML and RLL, a RLL nodules with small left lung nodule, and mild left pleural effusion. There was a pancreatic head small lesion and pelvic soft tissue mass. He had a history of surgery for an extracranial frontal mass told to be a benign tumor. Surgery was done on the December 5, 2022 with resection of the chest wall mass as illustrated in (Fig. 7). Left lateral decubitus position, right postero-lateral thoracotomy, resection of a big right pleural-based mass, and a mass within the right lower lobe as seen in (Fig. 8). Hemostasis and single chest tube inserted. Closure done in layers. Postoperative course was uneventful, apart from local skin infection at the site of the chest wall mass. Patient discharged well on the seventh postoperative day after

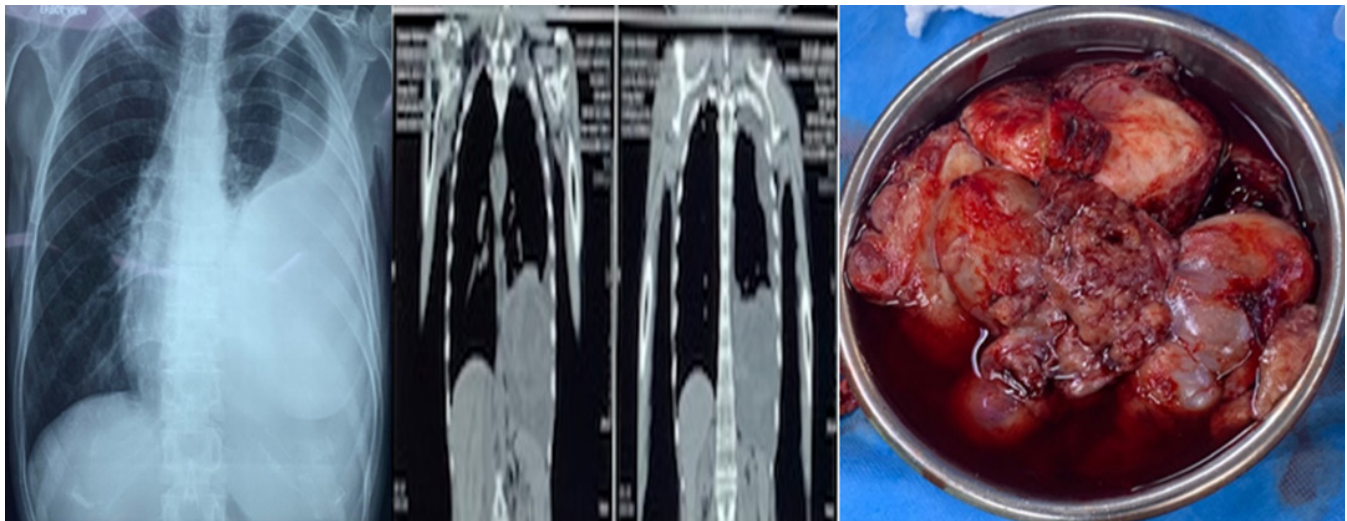


removal of the chest drain. The obtained histopathological result turned to be a malignant SFTP. Patient sent to the oncologist for further treatment. Unfortunately patients

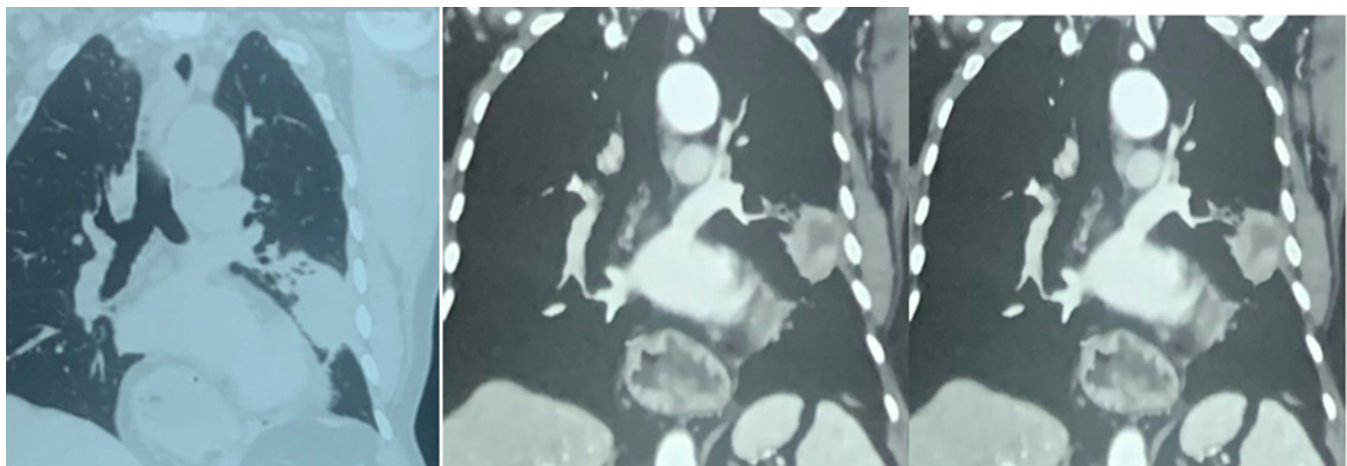
presented with local cutaneous mass 3 weeks after being discharged and the mass locally excised and turned to have the same histopathological result.



**Fig. 1:** Right pleural-based mass.



**Fig. 2:** (a, b) Left pleural mass with effusion, (c) The resected mass.



**Fig. 3:** CT scan of the chest showed a left-sided pleural-based tumor. CT, computed tomography.



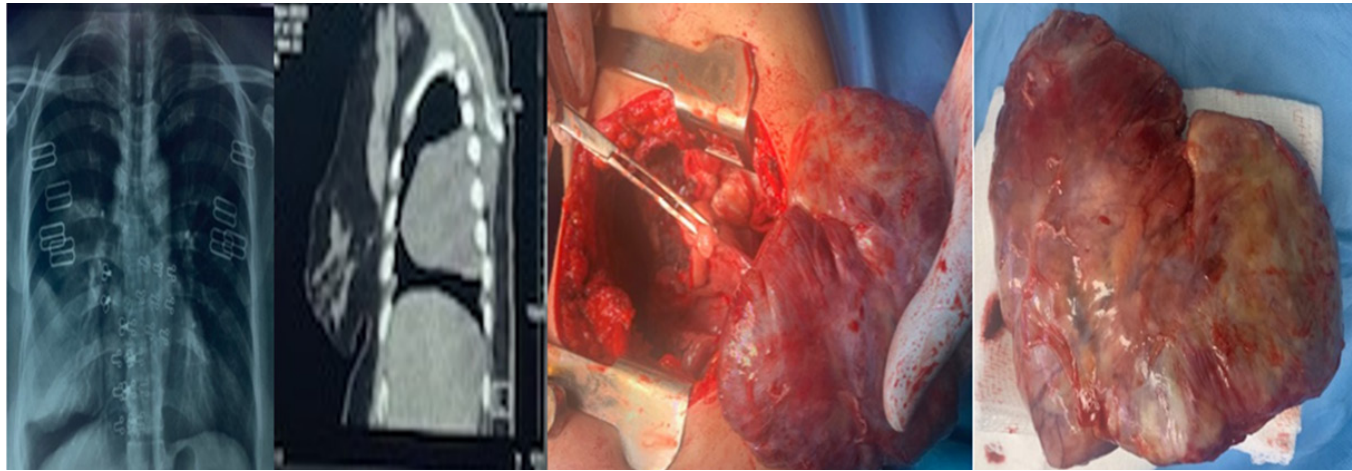


Fig. 4: (a) Preoperative CT, (b) operative view, (c) the resected mass.



Fig. 5: (a) preoperative CXR, (b) CT scan of the chest, (c) the resected mass. CT, computed tomography; CXR, chest radiograph.

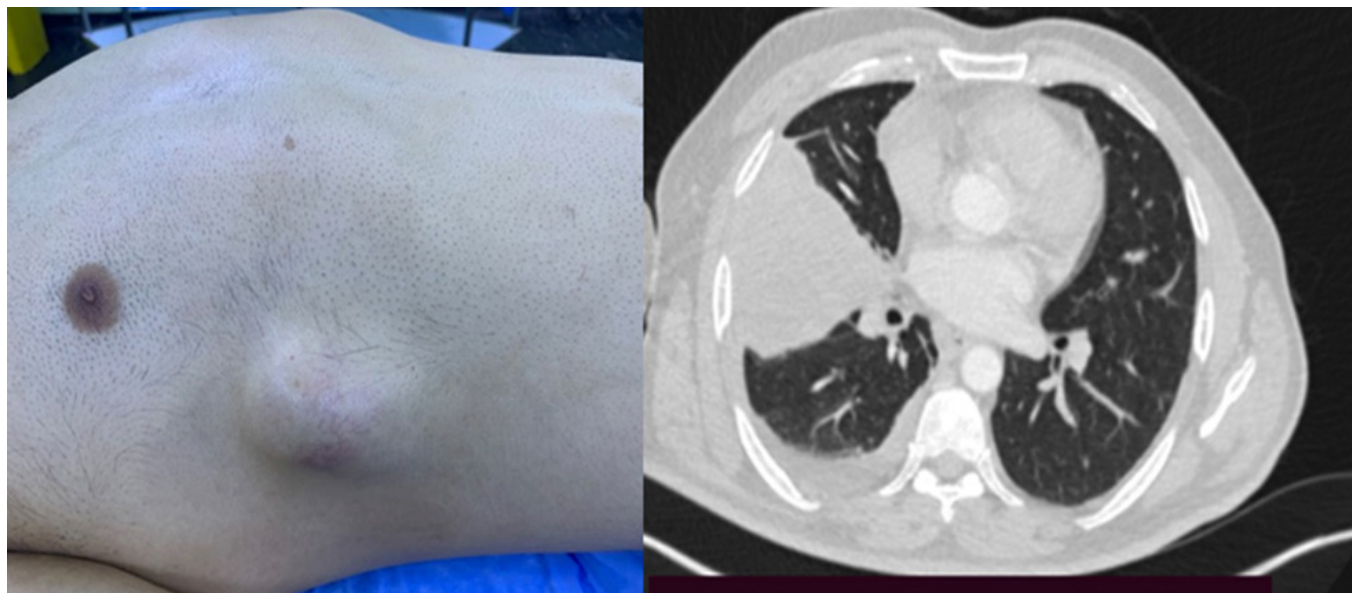
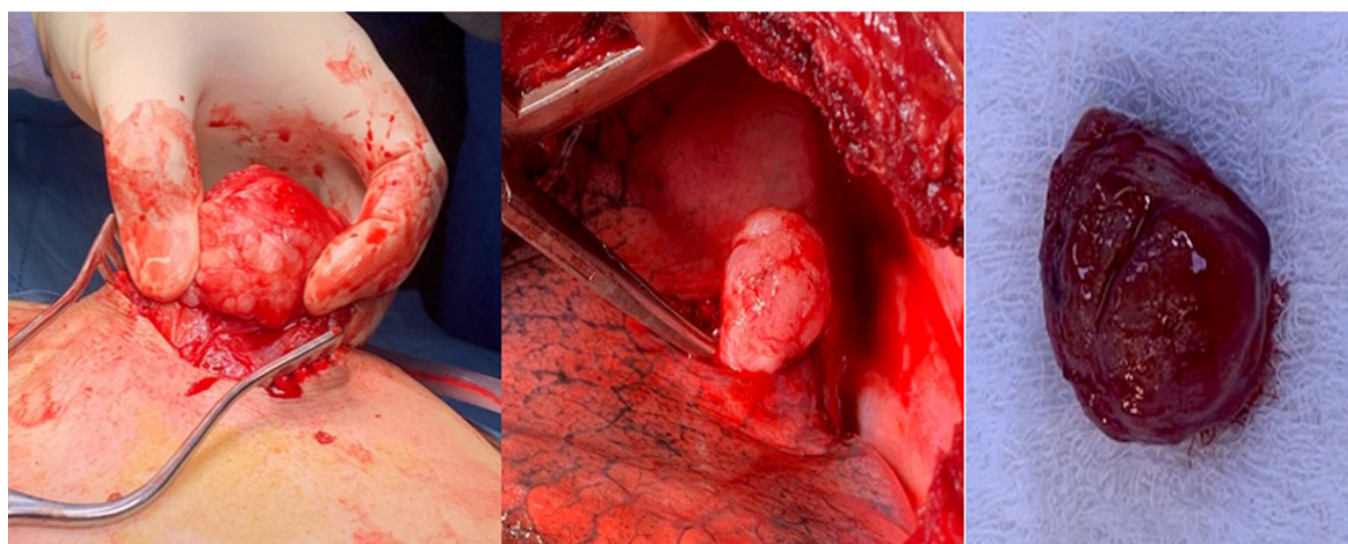
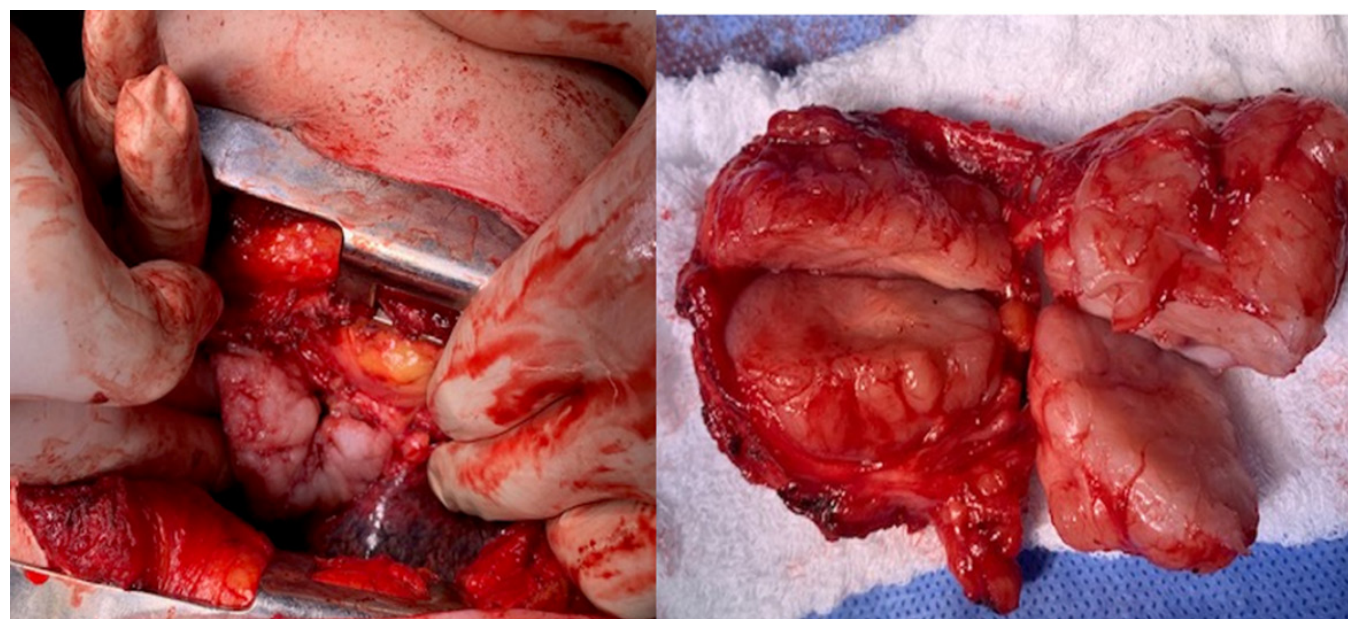


Fig. 6: (a) Chest wall mass, (b) CT chest with right pleural-based mass.





**Fig. 7:** (a) Chest wall mass, (b) right middle lobe mass, (c) the resected mass.



**Fig. 8:** (a) Operative view, (b) the resected mass.

## **RESULTS:**

Six patients were studied retrospectively. All with SFTP, admitted, investigated, and managed in a single center, at the Thoracic Department of the surgical specialties hospital of the Medical City Teaching Hospital, Baghdad, Iraq during 3-year period.

Four (66.6%) of our patients were females; the remaining two (33.3%) patients were males in a ratio of 2 : 1. The youngest patient was a 35-year-old women, while the oldest was an 80-year-old man.

All of them presented with chest pain , which was dull in nature, localized to the side of the pleural-based mass. Three of them have progressive SOB due to pleural efusion, severity of which depends on the amount of effusion.

CXR and CT scan of the chest was done for all the patients, which disclosed a pleural-based mass, variable in size, one female with moderate to severe effusion and three of them (two male and one female) with mild effusion. In five of them a preoperative tru-cut biopsy was done and the histopatholigical results consistent with SFT, while the one with massive pleural effusion. The aspirated fluid was suggestive of inflammatory pleuritis without any evidence for TB or malignancy.

Five of our patients underwent thoracotomy, three of them a left-sided postero-lateral thoracotomy and the remaining two, right postero-lateral thoracotomy, the oldest patient, with 80 years of age, after performing the tru-cut biopsy and ascertain that it is a benign lesion, he and his family refused to do surgery and they were happy about the result.

The pleural bases masses resected completely in five patient, in addition to the chest wall mass in one of them, and all of the ran uneventful postoperative course and discharged on the fifth or the seventh postoperative day after removal of a single chest tube thoracostomy, with the exception of one male and one female patient whom developed mild wound infection, which was treated conservatively on an out-patient basis and one with early recurrence of a chest wall mass which excised and turned to be malignant SFTP.

The obtained histopathological reports confirm the benign SFT of the pleural in in four of them (included

the tru-cut in the elderly patient), while it was low-grade malignant SFTP in the female patient, with massive left pleural effusion, and it was malignant solitary fibrous tumor in the 45-year-old male patient with chest wall, pleural and pulmonary masses. The last two patients were referred after discharge to the oncology center in our hospital for further management, still during their follow-up visits. The female patient looks well and healthy, while the male one presented, with local recurrence. The distribution of age, sex, imaging findings, tru-cut results, operative procedure, and the histopathological diagnosis are all illustrated in (Table 1).

**Table 1:** Of results

No.	Age	Sex	CXR	CT scan of the chest	Effusion	Tru-cut	Surgery	Postoperative	Histopathology
1	52	Female	Right pleural-based mass	Big lesion (160×85) mm right lower zone (pleural-based mass)	No effusion	Done	Right postero-lateral thoracotomy. huge pleural-based mass pressing on the heart and attached to the diaphragm and right middle lobe, resected completely. Its weight 3200 g	Smooth	benign solitary fibrous tumor of pleura
2	63	Female	Massive left pleural effusion	Multicyst lesion of the left lower zone with massive left pleural effusion and mediastinal LN	Massive left pleural effusion	Aspiration cytology	Left thoracotomy removal of a large pleural base mass, with effusion, intimately related to parietal pleura, completely resected	Smooth with simple Wound infection	Low-grade malignant solitary fibrous tumor of the pleura with some areas of pleural showing chronic nonspecific inflammation
3	80	Male	Mild left pleural effusion and left mid-zone opacity	left pleural effusion and left mid-zone pleural-based enhanced mass merging into the left hilum, measured 50×40×30 mm	Mild left pleural effusion	Done	Tru-cut CT-guided biopsy consistent with benign solitary fibrous tumor of the pleura with no evidence for any malignancy	Patient and his family were happy about the result and decided not to proceed further	benign solitary fibrous tumor of the pleura
4	35	Female	Right pleural-based mass	Large pleural-based mass 13×9×8.5 cm in the right side of the chest	No effusion	Done	Right thoracotomy and the mass completely resected	Uneventful	benign huge right pleural-based solitary fibrous tumor of the pleura
5	53	Female	Mass with left pleural effusion	A well-defined large pleural-based mass. in the left hemithorax with heterogeneous enhancement of smooth outline measuring 15×7.5 cm	Mild left pleural effusion	Done	Left postero-lateral thoracotomy The pleural-based mass completely resected	Uneventful	benign solitary fibrous tumor of the pleura. No evidence for malignancy

6	45	Male	Chest wall and right pleural-based mass	Enhanced chest wall mass (43×27 mm and right pleural-based mass	Mild right pleural effusion	Done	Chest wall mass big pleural mass and mass RLL excised completely	Cutaneous wound infection and early local recurrence	Malignant solitary fib Tumor
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CT, computed tomography; CXR, chest radiograph.

## DISCUSSION

The SFTP although not very commonly encountered but it is not a very rare entity. It is occasionally encountered in the thoracic surgery practice.

In our study, the age range is between 35 and 80 years, with a mean age of 54.6 years which is slightly less than the study of Savu *et al.*<sup>[2]</sup>, which is 61.84.

Female more in our study 2 : 1, which is comparable to the study of Savu *et al.*<sup>[2]</sup>, in his study of 45 patient series, 35 (77.7%) were women and were 10 (22.2%) men with a ratio of female to male of 3.5 : 1.

The youngest patient was a 35-year-old female, while it is 32-year-old female in Savu *et al.*<sup>[2]</sup>. The oldest patient was a 80-year-old man, which is slightly higher than the study done by Jadczyk *et al.*<sup>[6]</sup>, which is 74 years.

Nearly all patients presented with chest pain, which is dull in nature, with one of them had progressive SOB, due to the accumulated massive pleural effusion.

Imaging study specifically CT scan of the chest was the diagnostic modality of choice in establishing a provisional diagnosis, as it showed mostly a homogenous lesion, with smooth outline attached to the pleura and this is comparable to other studies<sup>[2,4,5]</sup>.

As regards the tru-cut biopsy, which was done in five of our patient as a preoperative procedure to have a hint to the diagnosis and in all of them, the diagnosis of SFT was raised<sup>[2,4,7]</sup>. While the young female with massive effusion aspiration done of the fluid, which failed to give any clue to the diagnosis and this agree with other study<sup>[8]</sup>.

Surgery was our standard mean for resection in five of our patients in the form of the classical posterolateral thoracotomy and this approach is comparable to other studies<sup>[2,7,8]</sup>. The use of the video-assisted thoracoscopic surgery, which is the main surgical approach in Cardillo *et al.*<sup>[9]</sup> study, is not used in our case series due to our limited experience and the lack of the proper instruments, still it is our future plan.

All of our patients ran uneventful postoperative course, apart from simple wound infection in two of them and early tumor recurrence in one of them and this is comparable to others studies<sup>[2,7,8]</sup>.

No mortality was encountered in our patients while Cardillo *et al.*<sup>[9]</sup> reported an operative mortality of 0.9% (1 of 110) and the overall morbidity was 10.9% (12 of 110).

## CONCLUSION

The early surgical resection of the recently diagnosed SFTP offers the best chance of cure and may prevent their progression into malignant changes.

## CONFLICT OF INTEREST

There are no conflicts of interest.

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