Turkish Journal of Medical Sciences

Volume 46 | Number 4 Article 8

1-1-2016

An unusual pathology with an undefined etiology:solitary fibrous tumors of the pleura

KUTSAL TURHAN

ALİ ÖZDİL

AYŞE GÜL ERGÖNÜL

DENİZ NART

ALPASLAN ÇAKAN

See next page for additional authors

An unusual pathology with an undefined etiology:solitary fibrous tumors of the pleura

Authors
KUTSAL TURHAN, ALİ ÖZDİL, AYŞE GÜL ERGÖNÜL, DENİZ NART, ALPASLAN ÇAKAN, and UFUK ÇAĞIRICI

TÜBİTAK

Turkish Journal of Medical Sciences

http://journals.tubitak.gov.tr/medical/

Research Article

Turk J Med Sci
(2016) 46: 992-996
© TÜBİTAK
doi:10.3906/sag-1502-95

An unusual pathology with an undefined etiology: solitary fibrous tumors of the pleura

Kutsal TURHAN[1], Ali ÖZDİL[1,*], Ayşe Gül ERGÖNÜL[1], Deniz NART[2], Alpaslan ÇAKAN[1], Ufuk ÇAĞIRICI[1]

[1]Department of Thoracic Surgery, Faculty of Medicine, Ege University, İzmir, Turkey
[2]Department of Pathology, Faculty of Medicine, Ege University, İzmir, Turkey

Received: 17.02.2015 • **Accepted/Published Online:** 13.09.2015 • **Final Version:** 23.06.2016

Background/aim: The aim of the present study was to evaluate the etiology and clinical and pathological behavior of solitary fibrous tumors of the pleura (SFTPs), as well as the most appropriate surgical approach and the results of long-term follow-up of this condition.

Materials and methods: Clinical and long-term follow-up records of 14 patients who had surgery for SFTP between 2001 and 2014 were reviewed retrospectively. Etiological factors, diagnostic procedures, and clinical courses and outcomes for these patients were studied.

Results: Of the 14 patients, 8 were male (57%) and 6 were female (43%) patients. The mean age was 54.14 ± 10.35 (41–75) years. There was no remarkable common etiological factor. Preoperative diagnosis was achieved only in 2 patients. Predominant symptoms were cough and chest pain. Complete resection was achieved in all patients. Video-assisted thoracic surgery (VATS) was performed in 8 patients. All but one patient were classified as having benign SFTP. The mean follow-up was 58.5 ± 41.4 (10–132) months and no recurrence was noted in the follow-up.

Conclusion: These rarely seen tumors of the pleura are usually benign and asymptomatic and their preoperative diagnosis is difficult. Clinical and pathological behavior is still unpredictable and the treatment consists of complete resection. Minimally invasive techniques such as VATS are recommended for surgery if the tumor size is appropriate.

Key words: Solitary fibrous tumor, pleura, etiology, diagnosis, treatment

1. Introduction

Primary tumors of the pleura are classified as diffuse and solitary. The solitary form was thought to be a form of mesothelioma and received different names such as localized mesothelioma, subpleural fibroma, benign mesothelioma, and subserous fibroma (1,2). It is recognized that the solitary fibrous tumor of the pleura (SFTP), which is rare and grows slowly, originates from mesenchymal cells of the submesothelial tissue of the pleura (3,4). No reports have demonstrated a correlation between SFTP and exposure to asbestos or any other carcinogens (5,6). Over 80% of these tumors are benign (1,4,7). They mostly appear between the 4th and 7th decades of life, half of them are asymptomatic, and they manifest as rounded, homogeneous masses with smooth margins on routine radiograms (8,9). Preoperative diagnosis is difficult because of nonspecific radiographic findings, and complete resection is the best prognostic factor (10–13).

The aim of the present study was to identify any common or remarkable etiological factor or any biochemical abnormality or clinical presentation of SFTP, as well as to examine the best appropriate surgical approach and the results of long-term follow-up, and to compare these parameters with those reported in the literature.

2. Materials and methods

Between January 2001 and October 2014 the clinical and long-term follow-up records of 14 patients who had had surgery for SFTP were reviewed retrospectively. Common etiological factors, diagnostic procedures, and the clinical courses and outcomes for these patients were evaluated. The diagnosis of SFTP was confirmed by histomorphologic and immunohistochemical staining with hematoxylin/eosin, CD34, vimentin, and cytokeratin. Malignancy criteria were described by England et al. (14) as more than 4 mitoses per 10 high-power fields, the presence of necrosis, and nuclear crowding and overlapping, which was defined as high cellularity and nuclear atypia. When one or more of these criteria was found histologically, the fibrous tumor was categorized as malignant (2,4). The classification of staging was based on de Perrot et al.

* Correspondence: dr_aliozdil@yahoo.com

Table 1. Classification of solitary fibrous tumors of the pleura according to the staging proposed in de Perrot et al. (2).

Stage 0	Pedunculated tumor without signs of malignancy
Stage I	Sessile or "inverted" tumor without signs of malignancy
Stage II	Pedunculated tumor with histologic signs of malignancy
Stage III	Sessile or "inverted" tumor with histologic signs of malignancy
Stage IV	Multiple synchronous metastatic tumors

(2) (Table 1). All patients were included in a follow-up program with clinical and radiographic examinations.

3. Results

There were 8 male (57%) and 6 female (43%) patients with a mean age of 54.1 ± 10.4 (41–75) years. Seven patients (50%) were asymptomatic. The predominant symptoms for symptomatic patients were cough and chest pain. One patient had a history of thyroid carcinoma and 1 patient was diagnosed with endometrium carcinoma. The demographical and clinical characteristics of the patients are given in Table 2.

With the exception of 1 hyperglycemic patient who had diabetes mellitus, there were no abnormalities in laboratory findings. The tumor was on the left side in 6 patients. On preoperative computed tomography (CT), SFTP was predefined in only 5 patients, lung cancer was described in 8, and hematoma was suspected in 1 patient because of a history of blunt thoracic trauma.

Five patients underwent preoperative diagnostic invasive procedures: 2 of them were reported as having SFTP, another 2 were diagnosed with nonspecific histology, and 1 patient was mistakenly prediagnosed with nonsmall-cell lung carcinoma.

Table 2. Demographic and clinical characteristics of the patients.

Case	Age	Sex	Additional disease	Laboratory abnormality	Symptom	Side	Pleural origin	Tumor size (mm)	Incision	Follow-up (months)
1	53	M	-	-	-	Right	Parietal	95 × 60	LT	132
2	54	M	COLD	-	Cough Chest pain	Left	Visceral	40 × 25	VATS	110
3	51	F	Thyroid carcinoma	-	-	Right	Visceral	40 × 30	VATS	106
4	59	F	-	-	-	Left	Visceral	40 × 40	LT	102
5	66	M	DM+HT	Hyperglycemia	Cough Dizziness	Left	Visceral	40 × 35	VATS	91
6	41	M	Blunt thorax trauma	-	-	Left	Visceral	120 × 75	PLT	55
7	45	F	Endometrium carcinoma	-	Chest pain	Right	Visceral	60 × 40	VATS	50
8	49	F	Bile stone	-	-	Right	Visceral	30 × 35	LT	45
9	45	F	-	Hypercholesterolemia	Chest pain	Right	Parietal	20 × 16	VATS	38
10	75	M	HT	-	Cough	Left	Visceral	70 × 70	VATS	29
11	52	M	Hyperlipidemia	Hyperglycemia + hypercholesterolemia	Chest pain	Right	Visceral	55 × 40	VATS	20
12	40	M	-	-	-	Right	Visceral	15 × 10	VATS	17
13	61	F	HT	High blood sedimentation	Back and right arm pain	Right	Visceral	60 × 50	LT	14
14	67	M	DM+HT+BPH	Hypercholesterolemia	-	Left	Visceral	65 × 50	LT	10

M: male, F: female, COLD: chronic obstructive lung disease, DM: diabetes mellitus, HT: hypertension, BPH: benign prostatic hypertrophy, VATS: video-assisted thoracic surgery, VAST: video-assisted small thoracotomy, LT: lateral thoracotomy, PLT: posterolateral thoracotomy.

Five patients underwent muscle sparing lateral thoracotomy and 1 patient underwent posterolateral thoracotomy. The videothoracoscopic approach was used in 7 patients. In 1 patient the excision was started with video-assisted thoracoscopy, but for removing the large tumor completely a utility thoracotomy was added.

Upon surgical exploration it was determined that the tumor originated from the visceral pleura in 10 patients (71.42%); among them a pedicle was present in 7 patients. All 14 tumors showed high vascularity. There was no local invasion and complete resection was performed in all patients. The mean tumor diameter was 53.6 ± 28.5 (20–120) mm. In histopathological examination, all patients were positive for CD34 and vimentin and negative for cytokeratin. All except 1 patient were diagnosed with benign solitary fibrous tumors. Seven patients were stage 0, 6 patients were stage 1, and 1 patient was stage 3 according to the classification reported in de Perrot et al. (2) (Table 3).

There were no preoperative or postoperative mortalities and no major complications. Minimum and maximum follow-up times were 10 and 132 months, respectively. The mean follow-up was 58.5 ± 41.5 months and no recurrence was determined in radiographic controls.

Table 3. Staging of the cases.

Patient	Base	Behavior[a]	Stage[b]
1	Cecile	Benign	I
2	Cecile	Benign	I
3	Pedunculated	Benign	0
4	Cecile	Benign	I
5	Pedunculated	Benign	0
6	Pedunculated	Benign	0
7	Pedunculated	Benign	0
8	Pedunculated	Benign	0
9	Cecile	Benign	1
10	Cecile	Malign	3
11	Cecile	Benign	1
12	Pedunculated	Benign	0
13	Pedunculated	Benign	0
14	Cecile	Benign	1

a: According to the criteria described in England et al. (14).
b: According to the staging proposed in de Perrot et al. (2).

4. Discussion

Primary tumors of the pleura were described by Lieutaud in 1767 and classified as diffuse and localized by Klemperer and Rabin in 1931 (1). Only 5% of neoplasms that arise from the pleura are SFTP and have been reported between the ages of 5 and 87; the incidence is only 2.8 cases per 100,000 (7,8).

Solitary fibrous tumors are rarely seen tumors, and therefore the weakness of this study is the small number of patients, although this is one of the major series published about SFTP. Still more studies are needed to clarify the etiology and nonsurgical diagnostic alternatives of this rare pathology.

Environmental agents or genetically transmitted germline mutations may play a role in its etiology according to the literature, but no consistent chromosomal abnormality has been reported (9). Similar to 1 case in the current study, it has been reported that history of trauma can overshadow the exact pathogenesis (12).

The clinical behavior of solitary fibrous tumors is unpredictable. Half of the patients are asymptomatic and are recognized with routine radiograms (1,8,15). On the other hand, the most common symptoms are cough and chest pain (11,12). Other rare symptoms are fever, more than 10% body weight loss, pleural effusion, hypertrophic osteoarthropathy, clubbing, galactorrhea, and hypoglycemia that disappears in 3 to 4 days after surgery (3,16–18). None of these rare symptoms and laboratory findings was seen in our patients.

Radiographic examinations reveal these tumors as solitary, well-circumscribed, sometimes lobulated, generally noninvasive tumors with a size range from 1 to 40 cm (1,2,7,10). Serous pleural effusion has been reported in a malignant group (7,10). Radiographic signs are nonspecific. Unusually, lesions can be multicentric (4,19,20).

Pathologically, a SFTP diagnosis is confirmed by typical histomorphologic findings of a solid spindle cell component and a diffuse sclerosing component combined with immunohistochemical staining positive for vimentin and/or CD34, and negative for keratin and/or S-100 protein (10).

Eighty percent of SFTPs originate from the visceral pleura, but the parietal pleura, mediastinal pleura, diaphragm, and chest wall may be the origin in some cases (3,6). In our series, heterogeneous findings on CT support the idea that the variety of origins affects preoperative diagnosis negatively. The CT diagnosis of SFTP depends on a high index of suspicion and on the experience of the radiologist.

Preoperative fine needle aspiration and tru-cut biopsy is not recommended because of insufficient diagnostic value (6,8,10). In our series, only 2 cases from 5 patients

who had undergone preoperative diagnostic invasive procedures were reported as SFTP.

These tumors are attached to the pleura by a highly vascular pedicle in 50% of cases and sometimes preoperative angiographic embolization can be applied because of hypervascularity (3,6,21). Excision should be done carefully due to the possibility of bleeding during surgery (5,6,18,21). The intrathoracic cavity had to be thoroughly observed due to the multicentricity and contact metastasis of the tumors (19). In our series, especially in cases with large tumors, lots of vascular vessels up to 0.8 cm in diameter were explored and divided intraoperatively.

The surgical approach can change due to the size and origin of the tumor, but videothoracoscopy is recommended as the choice of resection for all pedunculated tumors and lesions smaller than 5 cm (3,4,10).

Large tumors can also be treated by videothoracoscopy, whereas a utility thoracotomy can be added for the removal of the tumors, similar to 1 case in our study (13,22).

A safety margin of at least 1 to 2 cm from normal tissue is recommended for excision (2,6,8). Occasionally resection of the tumor is sufficient for treatment, but mandatory extended approaches such as lobectomy, pneumonectomy, or partial resection of the chest wall or diaphragm were applied because of the size of the tumor or local invasion in some studies (4,11,22). In contradiction with the literature, complete resection was obtained with excision of the tumor in all of our cases.

Malignant SFTPs do not reflect their clinical behavior (6,8,12). Some studies remarked on the possibility of malignancy in gross lesions (9,11). De Perrot et al. (2) suggested that tumor size could not be a malignancy criterion. A benign tumor with a diameter of 12 cm in our study supports this recommendation.

Complete resection is the mainstay of therapy for both benign and malignant tumors and cure rates are 100% for benign and 50% for malignant lesions (2,3,21). The most important good prognostic factors are histological benign variant, pedunculated tumors, and small size (4). Based on the staging system proposed by de Perrot et al. (2), a predominance of stage 0 was revealed (13). Similar to the literature, disease-free survival for all of our patients was 100%, because of the characteristics such as benign type and pedunculated (3,15).

Local recurrence can be found in 2%–10% of cases, but this rate is decreased in pedunculated lesions (1,2,11). A long follow-up should be carried out because of the high risk of recurrence (8). However, the factors that are predictive of recurrence have yet to be specified and require additional immunohistochemical and genetic investigations (23). In cases of recurrence, surgical resection is the best choice of treatment (6,7,10). Adjuvant therapies are not recommended if complete resection has been done, but some authors suggest the use of radiotherapy when resection is incomplete (2,3,11). There is no standard protocol about postoperative chemotherapy or radiotherapy (6).

In conclusion, SFTPs are unusual and their etiology is yet undefined. Preoperative diagnosis is difficult because of the absence of marked signs, symptoms, or laboratory findings. Complete surgical resection is still the best method for both diagnosis and treatment. We recommend the videothoracoscopic approach even in the case of a large tumor. However, the dissection should be performed carefully, especially if the tumor is large, if there is a thick pedicle, or in nonpedunculated tumors because of the high vascularity of these tumors.

References

1. Briselli M, Mark EJ, Dickersin GR. Solitary fibrous tumors of the pleura: eight new cases and review of 360 cases in the literature. Cancer 1981; 47: 2678-2689.
2. De Perrot M, Fischer S, Bründler MA, Sekine Y, Keshavjee S. Solitary fibrous tumors of the pleura. Ann Thorac Surg 2002; 74: 285-293.
3. Magdeleinat P, Alifano M, Petino A, Le Rochais JP, Dulmet E, Galateau F, Icard P, Regnard JF. Solitary fibrous tumors of the pleura: clinical characteristics, surgical treatment and outcome. Eur J Cardio-thorac 2002; 21: 1087-1093.
4. Cardillo G, Facciolo F, Cavazzana A. O, Capece G, Gasparri R, Martelli M. Localized (solitary) fibrous tumors of the pleura: an analysis of 55 patients. Ann Thorac Surg 2000; 70: 1808-1812.
5. Mezzetti M, Panigalli T, Giudice F.L, Cappelli R, Giuliani L, Raveglia F, Meda S. Surgical experience of 15 solitary fibrous tumors of the pleura. Crit Rev Oncol Hemat 2003; 47: 29-33.
6. Suter M, Gebhard S, Boumghar M, Peloponisios N, Genton CY. Localized fibrous tumors of the pleura: 15 new cases and review of the literature. Eur J Cardio-thorac 1998; 14: 453-459.
7. Altıok T, Topçu S, Taştepe İ, Yazıcı Ü, Çetin G. Localized fibrous tumors of the pleura: clinical and surgical evaluation. Ann Thorac Surg 2003; 76: 892-895.
8. Torre W, Rogriguez-Spiteri N, Sola JJ, Delgado M. Localized fibrous tumors of the pleura: experience with 7 recent cases. Arch Bronconeumol 2004; 40: 329-332.
9. Jha V, Gil J, Teirstein AS. Familial solitary fibrous tumor of the pleura. Chest 2005; 127: 1852-1854.
10. Kohler M, Clarenbach C, Kestenholz P, Kurrer M, Steinert HC, Russi EW, Weder W. Diagnosis, treatment and long-term outcome of solitary fibrous tumors of the pleura. Eur J Cardio-thorac 2007; 32: 403-408.

11. Breda C, Zuin A, Giuseppe M, Galligioni A, Rea F. Giant localized fibrous tumors of the pleura: report of three subsequent cases. Lung Cancer 2006; 52: 249-252.

12. Chang YL, Lee YC, Wu CT. Thoracic solitary fibrous tumors: clinical and pathological diversity. Lung Cancer 1999; 23: 53-60.

13. Takahama M, Kushibe K, Kawaguchi T, Kimura M, Taniguchi S. Video-assisted thoracoscopic surgery is a promising treatment for solitary fibrous tumors of the pleura. Chest 2004; 125: 1144-1147.

14. England DM, Hochholzer L, McCarthy MJ. Localized benign and malignant fibrous tumors of the pleura. A clinicopathologic review of 223 cases. Am J Surg Pathol 1988; 13: 640-658.

15. Carretta A, Bandiera A, Melloni G, Ciriaco P, Arrigoni G, Rizzo N, Negri G, Zannini P. Solitary fibrous tumors of the pleura: immunohistochemical analysis and evaluation of prognostic factors after surgical treatment. J Surg Oncol 2006; 94: 40-44.

16. Santambrogio L, Nosotti M, Palleschi A, Rosso L, Tosi D, De Simone M, Ciulla MM, Maggioni M, Cioffi U. Solitary fibrous tumor of the pleura presenting with syncope episodes when coughing. World J Surg Oncol 2008; 6: 86.

17. D'Andrilli A, Andreetti C, İbrahim M, Rendina EA. The evolution of a pleural nodule into a giant fibrous tumor associated with hypoglycemic coma. Eur J Cardio-thorac 2007; 31: 955-957.

18. Cakan A, Cagirici U, Yuncu G, Yener AG. Giant benign fibrous tumor of the pleura in a pregnant woman: report of a case. Surg Today 2003; 33: 196-198.

19. Tastepe I, Alper A, Ozaydin H. E, Memis L, Cetin G. A case of multiple synchronous localized fibrous tumors of the pleura. Eur J Cardio-thorac 2000; 18: 491-494.

20. Nomori H, Horio H, Fuyuno G, Morinaga S. Contacting metastasis of a fibrous tumor of the pleura. Eur J Cardio-thorac 1997; 12: 928-930.

21. Weiss B, Horton DA. Preoperative embolization of a massive solitary fibrous tumor of the pleura. Ann Thorac Surg 2002; 73: 983-985.

22. Rena O, Filosso PL, Papalia E, Molinatti M, Di Marzio P, Maggi G, Oliaro A. Solitary fibrous tumors of the pleura: surgical treatment. Eur J Cardio-thorac 2001; 19: 185-189.

23. Boddaert G, Guiraudet P, Grand B, Venissac N, Le Pimpec-Barthes F, Mouroux J, Riquet M. Solitary fibrous tumors of the pleura: a poorly defined malignancy profile. Ann Thorac Surg 2015; 99: 1025-1031.