

Imaging of thoracic textiloma

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Abstract

Objective: Intrathoracic textiloma or gossypiboma, a retained surgical sponge in the thoracic cavity, is an exceptional but serious complication following thoracic or abdominal surgery. The purpose of this work is to highlight the topographic features of thoracic textiloma and to describe imaging aspects, and, particularly, computed tomography (CT) features. **Methods:** Eight patients have been operated in our thoracic surgery department for thoracic gossypiboma. In the past, three patients had undergone hepatic surgery and the five others had a history of thoracic surgery. All the patients had a chest radiograph, five of them had a thoracic ultrasonography, all had a chest CT, and one patient had a chest magnetic resonance imaging (MRI). **Results:** In patients with a history of abdominal surgery, the foreign body was located in the parenchyma of the right lower lobe. In the other patients, the foreign body was either intrapleural or mediastinal. Ultrasonography suggested the diagnosis of textiloma in three of the five patients by demonstrating a non-calcified hyperechoic mass with acoustic shadow. At CT, the gossypiboma was a low-attenuating mass containing trapped gas lucencies in six patients and it was a high-attenuating mass in two patients. MRI showed a diaphragmatic defect in one patient with an intrapulmonary gossypiboma that migrated from the abdomen. **Conclusions:** The CT aspect of thoracic gossypiboma may be different according to pleural or parenchymal location. The spongiform appearance, characteristic in abdominal gossypiboma, is not the only CT presentation of thoracic gossypiboma. The confrontation of the surgical history with the CT signs helps to have a preoperative diagnosis. © 2010 European Association for Cardio-Thoracic Surgery. Published by Elsevier B.V. All rights reserved.

Keywords: Chest imaging; Gossypiboma; Ultrasonography; Computed tomography; Surgical complications

1. Introduction

Textiloma or compress oversight in the operative site is rare in thoracic surgery, and transdiaphragmatic migration of foreign body after abdominal surgery is even rarer [1,2]. Because of its rare occurrence and nonspecific clinical and radiographic presentations, the diagnosis is often missed. The diagnosis is suspected primarily on the surgical history and imaging data. The purpose of this work is to highlight the topographic features of thoracic textiloma and to describe imaging aspects, and, particularly, computed tomography (CT) features.

2. Materials and methods

We report eight cases of patients with thoracic textiloma collected in 8 years between 2002 and 2009. Only one patient has been previously operated in our hospital, the seven

others were referred to our surgical department from other national hospitals. The textilomas were confirmed at surgery in all patients. There were four men and four women whose ages ranged between 16 and 68 years, with an average age of 43.75 years. Seven patients had previous surgery for echinococcal cyst, three patients with hepatic echinococcal cyst (HEC) via subcostal approach, three patients with pulmonary echinococcal cyst (PEC), and one patient with costo-vertebral echinococcal cyst. The last patient had a history of coronary artery bypass. At the time when the patients were operated in the past, the surgeons did not use sponges with radiopaque wire markers. The lapse of time between surgery and the onset of symptoms ranged between 45 days and 25 years, with an average of 13.37 years. The main complaint was hemoptysis in three cases, chest pain in two cases, and parietal swelling in one. Two patients were asymptomatic but chest radiograph, performed in the postoperative follow-up, revealed abnormalities. All patients underwent a chest CT, preceded by a thoracic ultrasonography in five of them. CT was performed in sequential mode by contiguous axial slices of 10 mm in four patients (GE Sytec) and in helical mode in the other four patients by a 16-detector row CT system (GE Light Speed).

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The administration of contrast agent was performed in all cases. In addition to CT, a magnetic resonance imaging (MRI) with gadolinium of the chest and upper abdomen was performed in one patient in order to better study the diaphragm. For this retrospective observational analysis of medical record, our national law does not require any specific approval of an internal review board or the consent of patients.

3. Results

For the four patients with a history of operated PEC and costo-vertebral echinococcal cyst, the textiloma was located in the pleural cavity – the mass was removed. For the other three patients who were operated for HEC, the foreign body was embedded inside a cavity in the lower lobe of the right lung, requiring lobectomy only in one case, and only resection of cavity wall in the other two cases. In the last patient with a history of coronary artery bypass, the foreign body was in the mediastinum, the cavity was evacuated (Table 1). The postoperative course was satisfactory for all patients.

The chest radiograph showed a heterogeneous alveolar opacity ($n = 3$), pleural opacity with trapped air bubbles ($n = 2$) (Fig. 1a and b), and mediastinal opacity ($n = 2$). The chest radiograph was normal in one patient. Ultrasonography suggested the diagnosis of textiloma in three of the five patients by demonstrating a non-calcified hyperechoic mass with acoustic shadow (Fig. 2). In one case, ultrasonography revealed a collection containing membranous folds, suggesting a complicated PEC. In the latter case, it was inconclusive showing only heterogeneous pulmonary consolidation. CT performed in all patients has diagnosed textiloma in five cases. In the three other patients, the diagnosis proposed by CT was a complicated PEC, a mediastinal echinococcal cyst and a postoperative collection. It was a high-attenuating mass in two cases (Fig. 3a). In four cases, it contained calcifications which were either peripheral (Fig. 3b) or intralesional. When located centrally, calcifications were very thin in one case and cloudy in the other case. In six cases, it was a low-attenuating mass containing trapped gas lucencies, producing a spongiform appearance in four cases (Fig. 4a and b). In all cases, it was a well-defined mass, with a thin enhancing capsule (Fig. 5), whose size varied from 4 to 14 cm with an average of 7.5 cm. MRI performed after the chest CT in a patient with a history of operated HEC demonstrated a basithoracic cystic mass of low intensity on T1- and T2-weighted images showing peripheral enhancement with a localized diaphragmatic defect (Fig. 6).

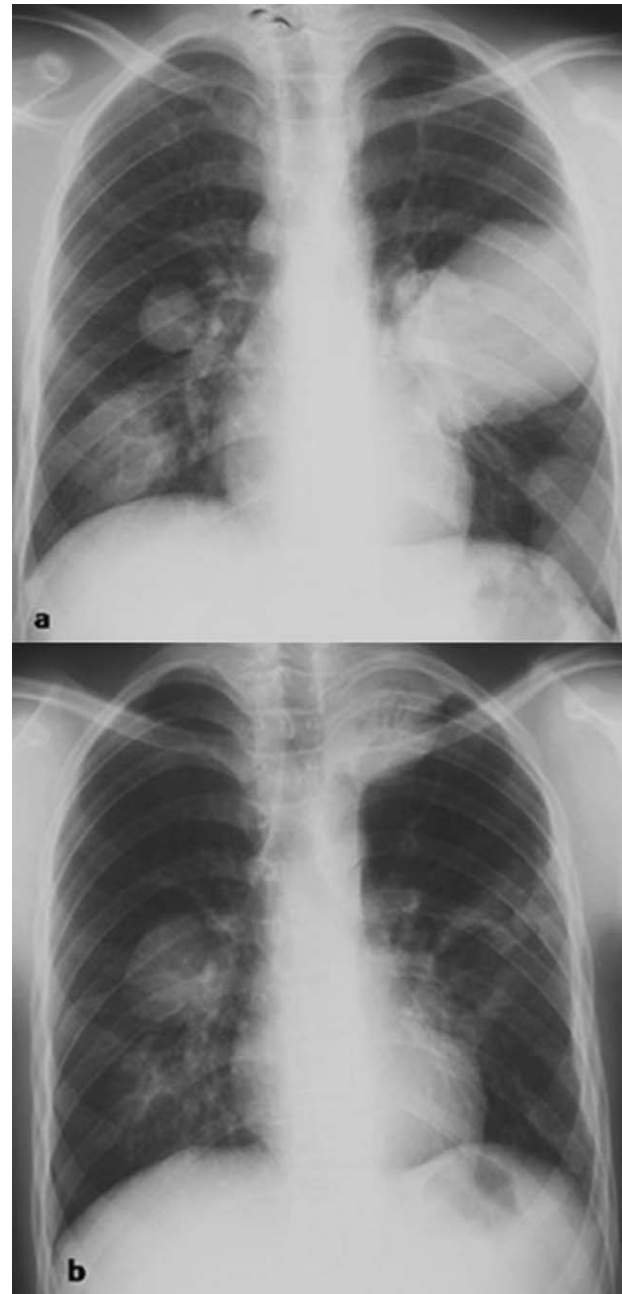


Fig. 1. (a) Chest radiograph before chest surgery shows bilateral echinococcal cyst. (b) Chest radiograph realized 45 days after chest surgery (resection of a left echinococcal cyst) shows a left residual cavity with an ipsilateral superior pleural mass with gas bubbles. One of the remaining right pulmonary echinococcal cysts is complicated by rupture into the bronchi.

Table 1. Clinical data and gossypiboma location.

Patients	Age (years)	Surgical history	Textiloma localization	Symptoms onset delay (years)	Symptoms
Case N°1	63	HEC	Pulmonary	19	Hemoptysis
Case N°2	46	HEC	Pulmonary	14	Hemoptysis
Case N°3	61	HEC	Pulmonary	25	Cough, hemoptysis
Case N°4	16	PEC	Pleural	0.12	No symptoms
Case N°5	34	PEC	Pleural	11	Chest pain
Case N°6	29	PEC	Pleural	20	Chest pain
Case N°7	68	Coronary artery bypass	Mediastinal	7	No symptoms
Case N°8	33	Costo-vertebral echinococcal cyst	Extra-pleural	11	Parietal swelling

HEC: hepatic echinococcal cyst; PEC: pulmonary echinococcal cyst.

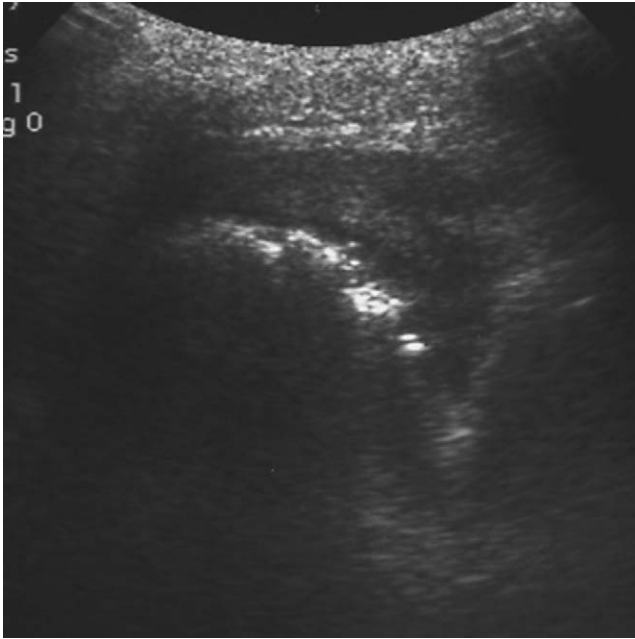


Fig. 2. Chest ultrasound image reveals a pleural hyperechoic mass with intense sharply defined posterior acoustic shadowing.

4. Discussion

Textiloma or gossypiboma is defined as a retained sponge in the surgical bed. Surgical sponges are usually made of inert cotton, but they can provoke an aseptic reaction with foreign-body granuloma, fibrosis, adhesions, calcification, and ulceration. This form is often asymptomatic, discovered incidentally. They can also become infected with abscess formation and fistulization to adjacent structures [3,4]. The clinical data are then dominated, in the case of thoracic textiloma, by fever, purulent sputum, chest pain, or hemoptysis due to bronchial fistula [2]. Textilomas are most frequently reported after laparotomy. It is uncommon to find an iatrogenic foreign body after thoracic surgery. Moreover, foreign-body migration through the diaphragm after abdominal surgery, especially after hepatic surgery, is exceptional. The contact of the foreign body with the diaphragm, helped by the pressure gradient between thorax and abdomen, leads to progressive ischemia of the diaphragm muscle fibers and their erosion, resulting in fistulization of the sponge in the thoracic cavity [2,5]. For our patients with a history of abdominal surgery, two findings are worth noting: (1) the long lapse of time between the first surgery and the declaration of the textiloma between 14 and 25 years and (2) that textilomas were all time intrapulmonary. This is well explained by the inflammation accompanying the transdiaphragmatic migration of sponges with important pleural adhesions. We have found only one similar case reported in literature [5]. For patients with a history of operated PEC, the foreign body was in the pleural cavity, where it has been forgotten.

The clinical manifestations of textiloma are variable and nonspecific, making diagnosis difficult. It is suspected on the surgical history and imaging data. The chest radiograph usually shows an alveolar or pleural opacity, which may contain gas lucencies or calcifications. As for abdominal textiloma,



Fig. 3. (a) CT scan showing spontaneous hyperdense mass of the inferior right lobe. (b) Contrast enhanced CT showing peripheral rim enhancement with calcifications.

ultrasonography shows a hyperechoic mass with an acoustic shadow even in the absence of air and calcification. This posterior acoustic shadow is sometimes difficult to identify because of the shadow generated by the surrounding air in the lung. Other aspects of ultrasonography are less common, such as a heterogeneous mass of mixed echostructure [4,5]. CT is the method of choice for diagnosing textiloma. The CT density depends on the type of sponge, the associated granuloma or abscess, and on the presence or absence of radiopaque wire markers. One of the characteristic CT features of thoracic gossypiboma, similar to the one in abdominal location, is a mass containing mixed high- and low-attenuation contents with gas bubbles in the center, having sometimes the so-called spongiform appearance [5,7,8]. This spongiform appearance was noticed in four patients: two with intrapulmonary textiloma and two with pleural textiloma. Another evocative feature is a sharply defined round mass with a high-attenuation central portion and an enhancing wall. The absence of central enhancement is probably due to a trapped clot within the sponge, and the peripheral enhancement is due to inflamma-

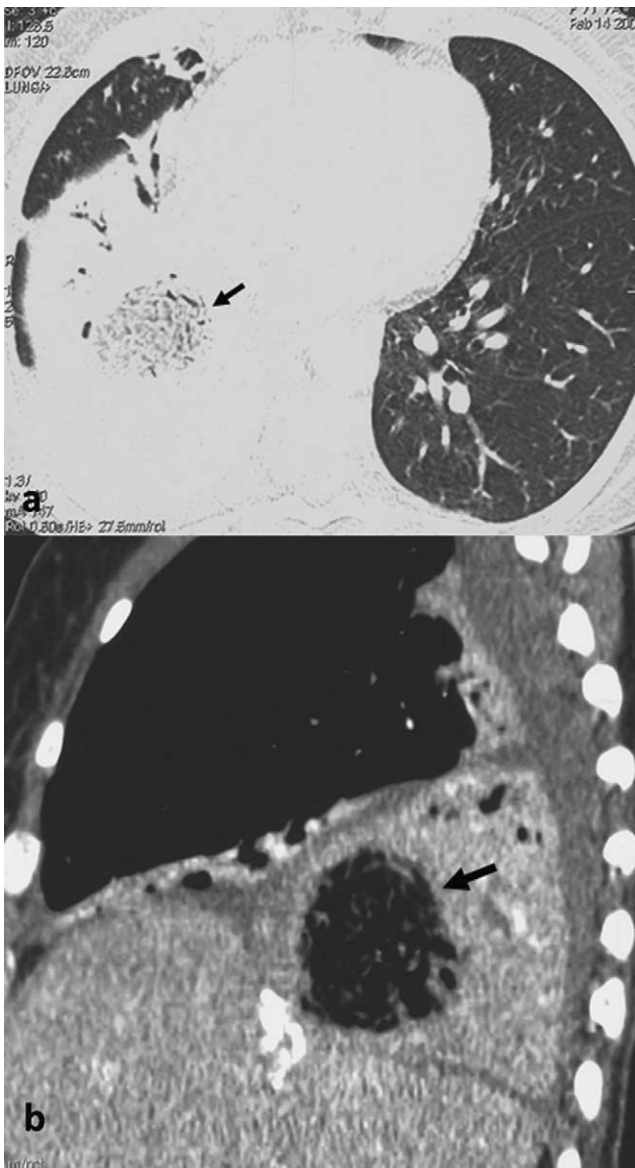


Fig. 4. (a) CT showing a mass containing gas bubbles and internal wavy structures of the right inferior lobe (arrow). (b) CT sagittal reconstruction showing pulmonary mass (arrow) in face of hepatic scar of echinococcal cyst resection.

tory reaction [9,10]. This presentation is more likely seen in gossypiboma within the pleural space, with no gas lucencies due to resorption of the air by the pleura [11]. This aspect was noticed in one patient with an intrapulmonary gossypiboma. The textiloma may also be in the form of a low-density mass with a thin enhancing capsule, observed in two of our patients. Calcifications can be seen within the mass and are of variable patterns. They can be thin and peripheral, or chunky [11]. Even in the absence of radiopaque wire markers, CT is very useful to specify the location of the foreign body, in the pleural space, within the pulmonary parenchyma or in the mediastinum, which is necessary in planning the surgical procedure [6]. It helped to make the preoperative diagnosis in five of our patients.

For some authors, MRI appears more effective than CT – it shows a very limited mass, hypointense T1 and hyperintense



Fig. 5. Contrast enhanced CT shows intrapleural mass containing air bubbles with peripheral thick enhancement.



Fig. 6. Coronal enhanced T1-weighted MRI shows low signal intensity mass of the right inferior lobe with peripheral rim enhancement and diaphragmatic breach (arrow).

T2 with a surrounding capsule corresponding to thick fibrous tissue [2,6]. The presence of a T2 hypointense serpiginous structure spotted in the center of the mass is related to the foreign body. MRI can also highlight the gap in the diaphragm when the textiloma migrates from the abdomen [12,13].

The main differential diagnoses of thoracic gossypiboma include lung abscess, hematoma, and pulmonary sequestration. When the mass contains gas bubbles, differential diagnosis will include aspergilloma or, mainly in Tunisia, complicated echinococcal cyst as it was the case in two of our patients [2,14,15].

5. Conclusion

Gossypiboma is a rare complication of surgery, and exceptional in thoracic surgery. However, nearly half of our cases represent a complication of hepatic surgery. This fact may be explained by the high prevalence of HEC in Tunisia. The clinical data of thoracic gossypiboma are not specific. The highly attenuating behavior in ultrasonography with acoustic shadow is suggestive. CT remains the method of choice for preoperative diagnosis. Different CT features are possible and must be known – these have been demonstrated in this large series of thoracic gossypiboma, the largest series published to our knowledge. The CT aspect may be different according to pleural or parenchymal location. The spongiform appearance, characteristic in abdominal gossypiboma, is not the only CT presentation of thoracic gossypiboma. The confrontation of the surgical history with the CT signs helps to have a preoperative diagnosis.

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