Thoracic textilomas after myocardial revascularisation: typical CT findings

^{1,2}L F NOBRE, MD, PhD, ³E MARCHIORI, MD, PhD, ⁴F MAY, MD, PhD, ²Á D CARRÃO JR, MD, ³G ZANETTI, MD and ³D M MACHADO, MD

¹University Hospital, Santa Catarina Federal University, Campus Universitário - Trindade - CEP 88040-970, PBox 6199, Florianópolis, SC, ²Clínica DMI – Diagnóstico Médico por Imagem, Rua Constância Krumel, 1083, CEP 88103-600, São José/SC, ³Fluminense Federal University, Rua Marquês do Paraná, 303 Centro, CEP 24110.000, Niterói, Rio de Janeiro, Brazil and Universidade do Sul de Santa Catarina (UNISUL). Avenida José Acácio Moreira - no 787, Bairro Dehon. CEP 88704-900. Tubarão, Santa Catarina, Brazil

ABSTRACT. The objective of this work was to report the tomographic findings in five cases of intrathoracic textilomas. The CT scans of five patients presenting with textilomas after being submitted to thoracotomy for myocardial revascularisation were reviewed retrospectively. Two chest radiologists studied the scans independently, and decisions concerning the CT findings were made by consensus. In each of the five cases, the imaging findings were similar and showed lesions resembling an extrapulmonary mass and well-defined contours situated at the marginal posterior pleural surface. In four of the five cases, a low-density centre and peripheral rim-like enhancement were observed after administration of contrast media. The suspicion of textiloma should be raised when a patient with a history of previous myocardial revascularisation surgery presents with an extrapulmonary mass in close contact with the posterior pleural surface.

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Textiloma (also called gossypiboma) is a term used to describe a mass within the body composed of a cotton matrix, which usually refers to a retained surgical sponge or gauze, surrounded by a foreign body reaction [1, 2]. Most cases of textiloma reported in the literature have been connected to abdominal or orthopaedic surgery; very few have been linked with thoracic surgery [3]. It is also a rare complication of cardiac surgery [3, 4]. The aim of this work was to report the similar tomographic findings in five cases of intrathoracic textilomas, revealed by the presence of thoracic pain in the late post-operative period after successful myocardial revascularisation surgery. The pre-operative diagnosis was suspected by a combination of imaging findings and the historical context of previous cardiac surgery, and subsequently confirmed by surgical removal.

revascularisation surgery in a period varying from 90 days to 270 days (mean, 55 days) before being submitted to imaging diagnostic methods. As this was a retrospective study using existing clinical data with no change in the patients' management, our institution did not require review board approval, and informed consent was waived.

All of the examinations were performed on a single-row helical CT scanner (GE HiSpeed CTI Pro; GE Medical Systems, Milwaukee, WI) with pre- and post-contrast series acquired in helical mode, with 5 mm collimation, a pitch of 1.5 and 4 mm reconstruction increments. In three cases, high-resolution images were also obtained of the lesions, with 1 mm collimation, to better study their particular detail. Two chest radiologists studied the scans independently, and decisions concerning the CT findings were made by consensus.

Methods and materials

The authors reviewed retrospectively the clinical files and CT examinations of five patients presenting with intrathoracic foreign bodies after being submitted to thoracotomy for myocardial revascularisation. The patients were three men and two women, with ages ranging from 49 years to 63 years of age (mean, 57 years). All patients presented with thoracic posterior pain; two complained of cough; and one had low-grade fever (37°C). All five patients were submitted to myocardial

Results

The five cases reviewed showed similar CT findings, with a typical history of previous myocardial revascularisation surgery. Round or oval masses with well-defined and regular contours measuring 4–5 cm were observed in close relation to the posterior pleural surface in all patients (Figures 1 and 2). Adjacent pleural thickening was also observed in three patients. In four patients, the lesions were localised on the left side, whereas the lesion was right-sided in one patient. In three patients, lesions were found in the inferior third of the thorax, and in two were localised in the middle third. The masses presented heterogeneous attenuation values in four cases, with a

Address correspondence to: Edson Marchiori, Rua Thomaz Cameron, 438 Valparaíso, CEP 25685.120, Petrópolis, Rio de Janeiro, Brazil. E-mail: edmarchiori@gmail.com

Figure 1. (a) Mass of probable extrapulmonary origin located posteriorly in the middle third of the left hemithorax, presenting with regular contours and heterogeneous attenuation, with a hypodense centre and peripheral enhancement after contrast media administration. Note also the post-surgical closure of the sternum and metallic clips in the mediastinum. (b,c) Surgical excision showed a textile foreign body in the pleural cavity (gauze).

hypodense centre and a dense peripheral margin. In only one case did the mass show homogeneous attenuation. In the four patients who were submitted to contrast media venous injection, clear peripheral capsule-like enhancement was observed. Linear atelectasis in the surrounding lung parenchyma and contralateral pleural effusion were also noted in one case.

In two cases, transthoracic fine-needle biopsies were taken, guided by CT scans, which showed no neoplastic cells on the smears. In one case, the pathologist referred to the presence of small filaments on the lamina, described as foreign bodies. In all cases, the surgical removal of the lesions demonstrated cotton material (surgical gauze) located in the pleural cavity.

Discussion

The term "gossypiboma" is derived from the Latin word "gossypium", which means cotton, and the Swahili word "boma", which means place of concealment, and refers to retained sponge in the surgical bed [5,6]. Although this term describes foreign bodies of a cotton matrix, it usually refers to any kind of retained surgical materials [6]. Presently, synthetic material has replaced cotton and the term "textiloma" has also been used in the literature [1].

Intrathoracic textiloma is a rare iatrogenic complication that can have severe medical consequences [7–10]. Although precautions are taken to avoid leaving such materials behind, mistakes do happen and the resultant foreign bodies can cause various clinical and radiological manifestations [11]. Measures to prevent textilomas include the careful count of surgical material and the

use of surgical sponges containing a radio-opaque thread [3]. The complications caused by these foreign bodies are well known, but cases are rarely published because of legal implications [11]. The medicolegal consequences of textiloma are significant because the patient may experience chronic pain or chronic infection or may undergo surgery or other treatments for malignancy on the basis of a misdiagnosis [5].

The most frequent clinical presentation is cough, expectoration or recurrent haemoptysis. Other reported clinical symptoms include chest pain, low-grade fever, weight loss and bilious expectoration [7]. Asymptomatic forms can be found fortuitously [6]. Clinical symptoms, as well as the diagnosis, have been reported to be delayed for months or even decades [3]. In the cases reported here, all of the patients had undergone thoracic surgeries for myocardial revascularisation, which were followed by non-specific clinical symptoms including cough, chest pain and low-grade fever, occurring 90–270 days after the surgical procedures.

Histopathological examination revealed a thick fibrous wall of the mass and the presence of foreign body giant cell reaction, necrosis, calcification and fragments of gauze. Textilomas vary in radiological manifestation according to their location and the chronicity of the retained gauze, type of foreign body reaction and the presence of a radio-opaque marker [6]. Being inert, cotton sponges do not undergo decomposition or biochemical reaction. They may stimulate an inflammatory reaction with subsequent fibrosis. Secondary infection with subsequent abscess formation also may occur [5, 7, 10]. Compression, migration or fistula formation may occur in the later stages of the disease [3]. In one of our cases, tiny filamentous foreign bodies were observed

Figure 2. (a) CT scan showing a mass with well-defined and regular limits, hypodense internal attenuation values and a clear rim-like peripheral enhancement after contrast media venous infusion. (b) Surgical finding of a foreign body in the pleural cavity (gauze).

at the smear after a fine-needle aspiration procedure, reinforcing the suspicion for textilomas.

Plain chest radiography is often the initial examination. Although certain characteristic plain-film and CT features of textilomas have been described, the appearance of retained sponges may be variable with any imaging technique, and the diagnosis can be especially difficult if a radio-opaque marker is not present [1]. It usually reveals a heterogeneous mass in the chest, which can be calcified or contain both dense material and air pockets. The mass generally does not change over time [6, 7]. Early in the post-operative period, such radiological findings may be confused with abscess formations and complicated haematoma or seroma. However, later on, atypical calcification and the thick irregular inflammatory wall of the mass may mimic a chronic infectious or granulomatous process or neoplasm. Gas may be present in the sponge mesh and give a whorl-like pattern that is detectable on radiological examination [1]. The incorporation of radio-opaque markers in swabs is a significant aid in the radiologic detection of a retained swab. Surgical practice in most institutions prohibits the use of unmarked swabs. Even with the presence of a marker, the diagnosis of a retained swab may be overlooked if the radio-opaque material is misinterpreted as an area of calcification within a lesion or surgical suture [4, 10]. Furthermore, the marker may be distorted by folding, twisting or disintegration over a period of time [1].

CT is the most effective method for detecting a retained surgical sponge in the chest [4, 7]. The CT appearance of a retained surgical foreign body has been reported several times. The typical feature is an encapsulated mass having a spongiform pattern with gas bubbles [4–7]. It most frequently presents as a sharply defined, round mass with inhomogeneous mixed high- and low-attenuation contents that represent the sponge itself and a capsule that may show marked enhancement after administration of contrast material [1, 2, 4]. The absence of central enhancement is probably due to a trapped clot within the sponge, and the peripheral enhancement is caused by an inflammatory reaction. Cystic masses with an infolded pattern, strongly suggesting the look of a towel, have also been described [1, 2]. Other CT features of pleural textilomas are less specific. They may appear as a complex pleural-based mass having concentric layers of different densities, a mass having a high-density component, or a calcified pleural mass [7]. Although the presence of locules of gas is described as a characteristic feature of a gauze swab and is believed to be caused by trapped gas (which may persist for long periods) rather than infection, it may also be caused by secondary communication with the bronchial tree [10]. Conversely, a sponge left within the pleural space usually doesn't show gas lucencies due to resorption of the air by the pleura [5]. Air bubbles may not be as prominent a feature of retained intrathoracic sponges as they are in retained intra-abdominal sponges. It is likely that the resorption of air by the pleura is a possible explanation for this difference [4].

In all of the five cases reported here, the imaging findings were very similar, showing lesions resembling an extrapulmonary mass and well-defined contours situated at the marginal posterior pleural surface. In four of the five cases, a low-density centre and peripheral rim-like

enhancement were observed after administration of contrast media. None of the lesions contained gas bubbles. The coincidence of radiological findings and the typical cardiac surgery history has led us to review with the surgeons, step by step, all of the adopted procedures undertaken in this kind of intervention. It is quite acceptable to imagine that textilomas show the topographic behaviour described here owing to a gravity effect over the sponge or gauze, which inadvertently "falls" into the posterior pleural space during surgery and moves between parietal and visceral pleura at a moment when the lungs are kept collapsed and the attention of the surgeon is focused on the anterior mediastinum.

Most reports in the literature relate to intra-abdominal swabs, and relatively few cases of intrathoracic swabs have been described [10]. Gossypibomas related to cardiac surgery are very infrequent [3]. Of the potential sites in the thorax where a sponge may be left, the pleural space seems to be the most likely [2, 4, 5, 10].

Because of its rare occurrence, its non-specific clinical and radiographic presentations and a low index of suspicion, the diagnosis can be easily missed [7]. The differential diagnosis for the CT appearances will depend on the clinical context. In the early post-operative period, the mass may be confused with a complicated haematoma, an abscess or a loculated empyema [1, 2, 5, 7, 10]. In a chronic long-standing case, the pattern may mimic other causes of pulmonary or pleural masses, mainly of neoplastic origin [10, 12]. Considering the possibility that a mass might be the result of a retained sponge is probably the most important step in making the diagnosis [1].

In conclusion, the diagnosis of intrathoracic textiloma may be easily overlooked. Early recognition and prompt treatment will reduce the sequelae of this undesirable condition. Even in a patient with a history of surgery, a physician may find it difficult to make a pre-operative diagnosis. The suspicion of textiloma should be raised when a patient with a history of previous myocardial revascularisation surgery presents with a lesion resembling an extrapulmonary mass on plain radiograph and chest CT that is in close contact with the posterior marginal pleural surface, particularly when hypodense and heterogeneous densities within the lesion and peripheral rim-like enhancement after contrast media administration can be observed during the scan.

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