Para-aortic arch abscess secondary to *Staphylococcus aureus* pneumonia

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Staphylococcus aureus is a relatively common pathogen causing pneumonia in the community, hospital ward and intensive care unit. Although pneumonia is responsible for significant morbidity and mortality, especially in elderly and immunocompromised patients, it is usually uncomplicated and resolves without complications. The case of a woman who developed a para-aortic abscess after a community-acquired *S aureus* pneumonia infection is presented. A number of diagnostic imaging modalities were used to reach the diagnosis. This complication has not been reported previously and it is likely secondary to suppurative lymphadenitis of a station 5 or 6 node. The patient was successfully managed nonsurgically with computed tomography-guided drainage and intravenous antibiotics.

Key Words: Abscess; Aorta; Computed tomography; Echocardiography; Infection; Magnetic resonance imaging; Pneumonia

The present report describes the case of a patient who developed a rare complication of a relatively common disease. The diagnosis and management of the patient required the collaboration of multiple specialists and the use of multiple imaging modalities.

CASE PRESENTATION

A 67-year-old woman with hypertension who was in a motor vehicle accident several years previously presented with a one-week history of vague chest and left scapular pain. She described a sensation of 'water trickling' within her left chest and shoulder region. She denied any history of intravenous drug use or indwelling foreign prostheses or catheters. In the emergency room, her temperature was 36.8°C and her systolic blood pressure was higher than 200 mmHg. She had elevated leukocytes at $17.7 \times 10^9/L$ with a left shift containing bands, toxic granulations and vacuoles. The blood and urine cultures that were drawn were negative and a chest x-ray showed a widened mediastinum with tracheal shift (Figure 1).

A contrast-enhanced computed tomography (CT) scan of the chest was performed to rule out aortic dissection. No dissection flap was seen; instead, a large fluid collection was discovered around the aortic arch (Figure 2) and in the left pleural space. There was also a calcified area seen at the distal aortic arch, which potentially represented a small pseudoaneurysm that formed after her previous motor vehicle accident (Figure 3). She was transferred to the intensive care unit where her blood pressure was controlled with intravenous nitroprusside and diltiazem. Transesophageal echocardiography (TEE) revealed no evidence of dissection and documented a static fluid collection outside the distal aortic arch with a maximal diameter of 3.4 cm (Figures 4 and 5).

Un abcès de la crosse para-aortique secondaire à une pneumonie à *Staphylococcus aureus*

Le *Staphylococcus aureus* est un pathogène relativement courant responsable de pneumonies dans la collectivité, en milieu hospitalier et en soins intensifs. Même si la pneumonie s'associe à une importante morbidité et mortalité, notamment chez les personnes âgées ou immunocompromises, elle est habituellement non complexe et guérit sans complications. Le cas d'une femme qui a développé un abcès para-aortique après une pneumonie à *S aureus* non nosocomiale est présenté. Plusieurs modalités d'imagerie diagnostique ont permis de poser le diagnostic. Cette complication n'a jamais été déclarée auparavant et découle probablement d'une lymphadénite suppurée du nœud de la station 5 ou 6. La patiente a été traitée avec succès sans intervention chirurgicale, au moyen d'un drainage orienté par tomographie guidée et l'administration d'antibiotiques par voie intraveineuse.

Before any attempts were made to drain the para-aortic fluid collection, magnetic resonance imaging (MRI) was performed to ensure that the collection was not secondary to a pseudoaneurysm with contained rupture. The MRI images were suggestive of an abscess collection associated with left upper lobe pneumonia (Figure 6). It also confirmed that the consistency of the pleural effusion was different from that surrounding the aortic arch (Figure 7).

A pigtail catheter was inserted under CT guidance to drain 50 mL of para-aortic pus that grew Gram-positive cocci in groups. The cultures later revealed *Staphylococcus aureus* that was sensitive to both cloxacillin and cefazolin. The left pleural effusion was drained via a second ultrasound-guided pigtail catheter (Figure 8). The pleural effusion was exudative with a high lactate dehydrogenase level of 2402 mmol/L, and did not contain any malignant cells. The patient had an uneventful recovery and was discharged home after four weeks of intravenous cloxacillin therapy and a chest x-ray confirming clinical resolution of the pneumonia.

DISCUSSION

The differential diagnosis of a widened mediastinum seen on chest x-ray includes life-threatening etiologies such as aortic dissection and esophageal perforation (1). In the present case, the history was not consistent with esophageal perforation. Those patients often present with vomiting, chest pain and subcutaneous emphysema, and may have fever and hypotension. CT findings often include esophageal wall thickening, fluid collections in the adjacent mediastinal or lower cervical areas, extraluminal air and extravasation of ingested contrast material into the mediastinum or pleural space (2). Esophageal perforation is a contraindication for TEE and, if it is

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Figure 1) Chest x-ray showing widened mediastinum with left mediastinal convexity at the aortic arch and tracheal deviation. There is also a left pleural effusion

Figure 2) Enhanced axial computed tomography at the level of the aortic arch (Ao) demonstrating normal vasculature with a low attenuation fluid collection (arrow) adjacent to the arch

suspected, a water-soluble contrast esophagram or barium swallow should be performed (3).

The use of TEE in the current case was particularly informative. We were able to rule out aortic dissection, assess the density of the fluid collection and determine that there was no flow or communication using Doppler ultrasound. TEE is also useful for the diagnosis of other posterior mediastinal lesions such as lung cancers, lymph node disease, granulomas (Wegener's granulomatosis, sarcoid, histoplasmosis, tuberculosis), cysts and, as demonstrated in the present case, abscesses (4). Transthoracic echocardiography has limited utility in the evaluation of the thoracic

Figure 3) Enhanced axial computed tomography at the level of the superior distal aortic arch showing an area possibly representing an old pseudoaneurysm (arrow)

Figure 4) Transesophageal horizontal scan plane of the aortic arch (Ao) showing a neighbouring mass (arrow)

aorta for dissection because visualization of the distal ascending, transverse and descending aorta is inadequate in most patients. Although the sensitivity and specificity of transthoracic echocardiography for the diagnosis of aortic dissection based on monoplane studies (97% to 99% and 77% to 85%, respectively) are inferior to those of CT, MRI and TEE (5-7), it can be useful in the evaluation of cardiac complications of dissection. These include aortic insufficiency, pericardial effusion or tamponade, and left ventricular dysfunction.

A contrast-enhanced CT scan can be used to identify intraluminal thrombus and pericardial effusions. Although reports of the sensitivity and specificity of standard CT for the diagnosis of aortic dissection are excellent (83% to 98% and 87% to 100%, respectively) (5,8,9), the intimal flap is seen in less than 75% of cases and the site of entry is rarely identified (6). MRI is an alternative imaging modality that avoids the risks of contrast and radiation exposure. In a prospective trial, the sensitivity and specificity of MRI were 98% and 85%, respectively (8).

Aortography involves the injection of contrast media into the aorta and permits localization of the precise dissection site. It has been replaced by noninvasive testing due to delays in accessing catheterization laboratories as well as false-negative results with simultaneous opacification of true and false lumens, thrombosis of the false lumen and intramural hematoma with noncommunicating dissection (5). Coronary angiography is safe in stable patients, although the delay to surgical intervention for ascending dissections should be minimized.

Figure 5) Transesophageal short axis view of a static mass (arrow) just outside of the aortic arch (Ao)

Figure 6) Gradient axial magnetic resonance image at the level of the arch vessels showing a para-aortic collection that is more consistent with an abscess than blood (arrow)

Retrospective data suggest no in-hospital benefit associated with coronary angiography (10).

S aureus is a virulent microbe with a known ability to form abscesses. It is the most common cause of hospital-acquired pneumonia but is occasionally seen in cases of severe community-acquired pneumonia (11). *S aureus* is responsible for 5% of all community-acquired pneumonias and up to 22% of the most severe cases (11). While community-acquired methicillin-resistant *S aureus* is more common in the United States, its incidence is growing in Canada with an increase of 0.46 per 1000 hospital admissions in 2003 (12). The true incidence of both methicillin-sensitive and -resistant strains is likely underestimated because reporting is not mandatory and more than 50% of pneumonia cases have negative cultures (13). Risk factors for *S aureus* pneumonia include intravenous drug use, diabetes, renal failure and recent infection with viral pathogens (14-16). It has been postulated that viral infections preceding *S aureus* pneumonia can lead to severe necrotizing pneumonias requiring admission to the intensive care unit and mechanical ventilation, and is associated with significant mortality (17,18).

Described complications of pneumonia include parapneumonic effusion, empyema, lung abscess, sepsis, endocarditis and meningitis.

Figure 7) Gradient axial magnetic resonance image at the mid-descending thoracic aorta (Ao) revealing left pleural fluid (arrow) of a different signal and intensity from that of the para-aortic collection. A consolidated lung (L) can be seen anterior to the pleural fluid

Figure 8) Computed tomography of the chest showing two pigtail catheters in situ. The superior catheter is draining the para-aortic abscess and the inferior catheter is draining the left pleural effusion

Our search of the literature found no cases of pneumonia with associated para-aortic abscess. It is likely that the present patient developed suppurative lymphadenitis in a station 5 or 6 node with a pathogen known to cause abscesses.

In the past, physicians were limited to surgical drainage of mediastinal abscesses. Ultrasonography and CT allow direct visual access to deep infections with less invasiveness than traditional open techniques. These modalities assisted in the successful diagnosis and management of our patient.

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