Mycotic aneurysm of descending thoracic aorta

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ABSTRACT

Mycotic aneurysm has become rare since the introduction of penicillin. However, clinicians should be aware and consider the possibility as delayed treatment can lead to poor outcomes. We report the case of a 23-year-old Malay lady with congenital scoliosis presenting with back pain and fever. Computer tomography scan showed a large pseudo-aneurysm of descending thoracic aorta and a smaller pseudo-aneurysm affecting the intercostal artery secondary to vertebral osteomyelitis. Blood culture isolated *Staphylococcus aureus.* She was treated with embolisation using custom-made coils and N-butyl-cyanoacrylate glue as temporary measure before eventually proceeding to surgery. Unfortunately, the surgery was complicated by bleeding secondary to the severely inflamed aorta resulting in her demise.

Keywords: Aneurysm, bacterial, osteomyelitis, complications, endo-vascular therapy

INTRODUCTION

Mycotic aneurysm is a complication of infection and is now exceeding rare since the introduction of penicillin. However, it still occur in the under-developed and developing countries. Treatment needs to initiated early and is mainly pharmacological, unless complicated. We report the case of a young Malay lady with background of severe congenital scoliosis, presenting with back pain and fever secondary to mycotic aneurysm secondary to Staphylococcal vertebral osteomyelitis.

CASE REPORT

A 23-year-old Malay lady presented with severe back pain and fever. She also had increasing dyspnoea on exertions. She had given birth seven months and a fall six months previously. Apart from severe congenital scoliosis, there was not other relevant past medical history.

Laboratory investigations on admission revealed a haemoglobin of 8.1gm/dL (normal 12 to 16), leukocytosis of 25.9 x 10^9/L (4 to 11) and elevated inflammatory markers; serum erythrocyte sedmentation rate (ESR) of 129mm/hr (normal <10) and C-reactive protein (CRP) of 29.8 mg/L (<0.4). Serum glucose, renal and liver profiles were all within normal limit.

The patient was pyrexia, tachycardiac

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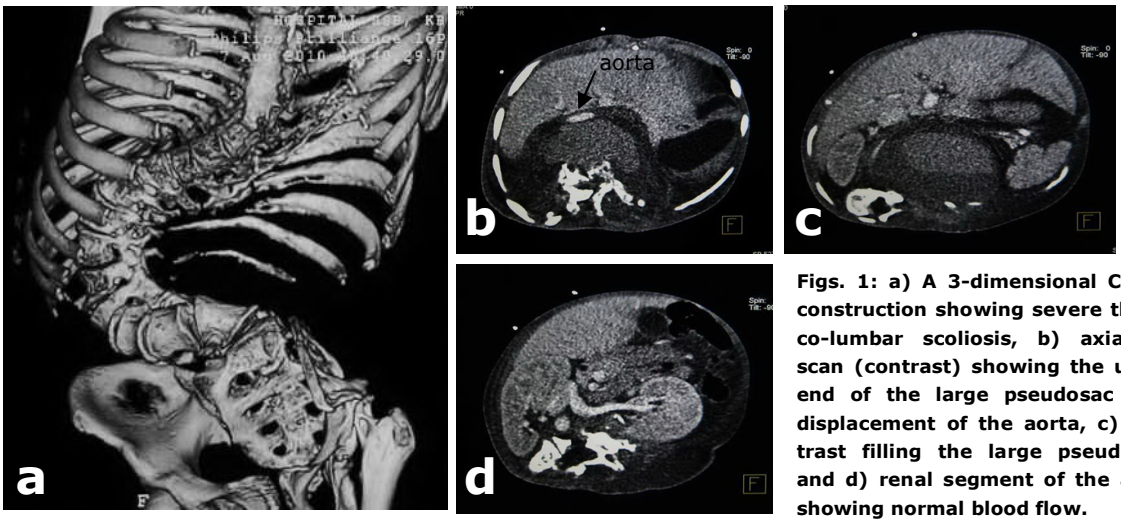


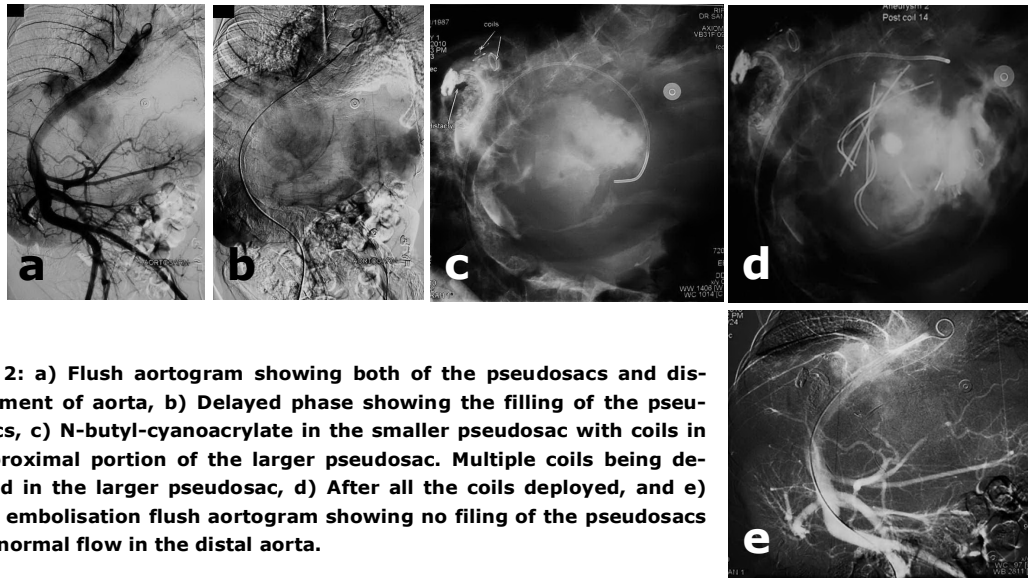
Figs. 1: a) A 3-dimensional CT reconstruction showing severe thoraco-lumbar scoliosis, b) axial CT scan (contrast) showing the upper end of the large pseudosac with displacement of the aorta, c) contrast filling the large pseudosac; and d) renal segment of the aorta showing normal blood flow.

(128 beats per minute and hypotension (85/62 mmHg) and was given intravenous fluid and started on intravenous broad spectrum penicillin.

A computerised tomography (CT) with revealed marked scoliosis of the thoraco-lumbar spine (Figures 1a-d) with destruction of the 8th to 10th thoracic vertebral bodies and a saccular pseudoaneurysm (2.0 x 2.0cm).

Repeated blood tests the following day revealed persistent leukocytosis and elevated inflammatory markers. In addition, her renal function deteriorated. Blood cultures isolated *Staphylococcus aureus (S. aureus)*.

She was transferred to the main tertiary hospital. A repeat CT angiography revealed a 3.0 x 2.0cm saccular aneurysm arising from the intercostal artery projecting on the right and another saccular aneurysm measuring 17.5 x 11.4cm arising from the descending thoracic aorta, projecting on the left with stretching and displacement of the descending thoracic aorta to the right (Figure



Figs. 2: a) Flush aortogram showing both of the pseudosacs and displacement of aorta, b) Delayed phase showing the filling of the pseudosacs, c) N-butyl-cyanoacrylate in the smaller pseudosac with coils in the proximal portion of the larger pseudosac. Multiple coils being deployed in the larger pseudosac, d) After all the coils deployed, and e) Post- embolisation flush aortogram showing no filing of the pseudosacs with normal flow in the distal aorta.

2). The origin of the major vessels were splayed around the larger pseudosac. Osteolytic lesions of the thoracic vertebrae, ribs and femoral head from the infection were seen.

Abdominal aortogram under local anaesthesia was performed through the right femoral artery and this confirmed the CT findings. Selective intercostals angiogram showed a small pseudosac on the right with direct filling of the larger pseudosac left of the aorta (Figures 3). The small pseudosac was embolised with 0.5 ml 50% N-butyl-cyanoacrylate (Histoacryl®) mixed with lipiodol. Two 8.0mm x 5.0cm coils were positioned at the neck of the pseudosac to reduce blood flow. The larger pseudosac was later cannulated with a 4.1F JB1 catheter, and two 5.0mm x 8.0cm cotton-impregnated coils and custom-made five to six cm coils were positioned inside the pseudosac. This was followed with injection of 1.0ml of 30% N-butyl-cyanoacrylate, which induced thrombus formation in the pseudosac. Post-embolisation angiogram revealed minimal filling of the pseudosacs with normal blood flow to the distal aorta.

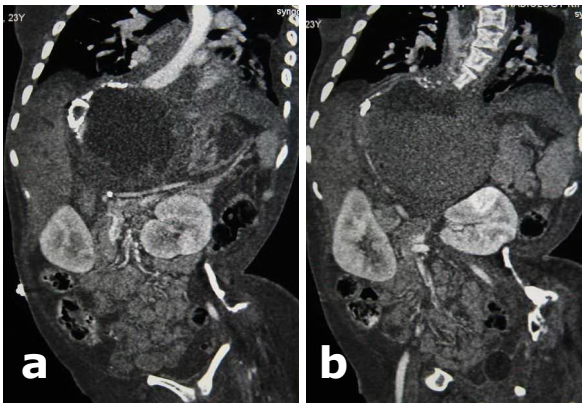
A contrast CT scan performed 48 hours later showed the thrombi and layering of blood products (Figures 3), coils and the Injected N-butyl-cyanoacrylate within the pseudosacs. There was filling of the pseudosacs. The descending thoracic aorta was compressed by the large pseudosac.

Under local anaesthesia, fine-needle aspirations of the left rib lesion and left hip joint were performed. Cytology examinations of the fluids revealed a large number of acute inflammatory cells, histiocytes and newly laden fibroblasts. There were no granuloma or caseation and Ziehl-Nelseen stain for acid fast bacilli was negative.

The patient's condition deteriorated and required ventilatory and ionotropics supports. She was continued on intravenous antibiotic targeting *S. aureus.* When her condition stabilized, she was transferred to the Cardiothoracic Centre for further management. After three weeks of antibiotic treatment, she proceeded to repair of the pseudoaneurysms. Intra-operatively, it was found that the aorta was very friable, inflammed and eroded by the edges of vertebrae as a result of the severe scoliosis and infective process. The surgery was completed by severe uncontrollable bleeding which led to her demise.

DISCUSSION

Aneurysm is a pathological dilatation of a segment of a blood vessel and is classified according to the involvement of the blood vessel walls. A true aneurysm occurs when all the three layers of the vessel wall are involved, whereas a false aneurysm, or pseudoaneurysm occurs when the intimal and medial



Figs. 3: a) Post-embolisation multi-slice computed tomography (CT) scan after 48 hours showing flow in the distorted aorta but non-filling of both the pseudosacs with coils in situ.

layers are disrupted, and the dilatation is lined only by the adventitia, and at times by a perivascular clot. [1] Most aneurysms are located in the major vessels with the aorta most commonly affected. The most common aetiology is atherosclerosis.

Approximately 0.8 to 3.4% of aortic aneurysms are mycotic in nature and the organisms implicated include *Mycobacterium tuberculosis*, *Salmonella* species, Gram-positive cocci and Gram-negative bacilli. [2, 3] The natural history of mycotic aneurysms has not been fully discovered. [4] However, microbial arteritis is the most common pathogenesis. [5] Mycotic aneurysms are typically pseudoanuerysms. Among the causes of mycotic aneurysms, Cinà *et al.* identified osteomyelitis as one of the sources. [7] In this study, *Salmonella* species was found to be the most common organism followed by *Staphylococcus* and *Streptococcus* species. Formation of pseudoaneurysms was believed to be due to direct extension from the affected vertebral bodies. [6] Clinical presentation of mycotic aortic aneurysms depends on their location. [1] A high level of suspicion should be considered if there is fever, abdominal or back pain, and a pulsatile abdominal mass. [8] Our patient had all these features.

CT scan plays an important role in diagnosis and assessment of aneurysm. [1] For mycotic aneurysm, suggestive CT scan features include lack of calcium in the wall of the aneurysm, multilobular in appearance, multifocal or saccular in configuration, presence of peri-aortic gas or air, soft tissue reaction, and adjacent vertebral osteomyelitis. [10] Gallium-67 scan can be used in doubtful cases as it can locate active infectious processes. In our patient, the CT scan findings were diagnostic especially with *S. aureus* isolated from the blood culture. If required, angiography can be used to define the structure of the affected blood vessel. [11]

A confirmed microbiological diagnosis of vertebral osteomyelitis require isolation of the organism from affected areas. However, a presumptive microbiological diagnosis can be made based on positive blood cultures. [9] Our patient's blood cultures and biopsies lytic lesion both isolated *S. aureus*.

The treatment of pseudoaneurysm of descending thoracic aorta can be divided into traditional open repair and endovascular aortic repair (EVAR). The standard of care is the traditional open repair. However, patient with mycotic aneurysm carries a 40% risk of mortality with open repair. [13] Therefore, other options such as EVAR, need to be considered. EVAR may involves placement of a stent graft into the aorta through the femoral artery and acts as an artificial lumen and prevent blood flow into the pseudosac. [12] EVAR can also involve embolisation of the pseudosac with obliteration of lumen, as in our case.

We treated our patient urgently as there was up to 60% risk of rupture with delay. [14] Traditional open repair was not possible as our patient was too unstable to undergo an operation. Endovascular stenting was not possible as it not available in our centre at that time. EVAR is ideal the best option as it allows rapid repair with fewer risk. It also acts as bridge before proceeding to a more definitive procedure. [14] Although coils and N-butyl-cyanoacrylate embolisations have used for peri-graft leak post stent-graft therapy, [15]

they can also be used as temporary measure to stabilise the patient, as shown in our case. The embolic therapies in our patients successfully sealed off the pseudosacs without compromising the aortic blood flow. The patient remained stable after the therapies and was later transferred for definitive open repair. Unfortunately, the repair was not successful and was complicated with bleeding from the badly damaged aorta. Perhaps delaying the operation further along with prolonged antibiotic treatment might have led to a better outcome.

In conclusion, our case highlights the successful use of coils and tissue glue embolisations of mycotic pseudo-aneurysms as a bridge to definitive therapy when EVAR stent placement is not available. However, the risk remains high and outcomes remain guarded.

Note: Seit Mei CHIEN is a fifth year medical student from the Medical School, University of Glasgow, Scotland. This work was done during her attachment in the Department of Radiology, RIPAS Hospital.

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