Hematemesis, A Rare Sign of Aortic Infection

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Non-typhoid salmonella infection of a mycotic aortic aneurysm is rare, but it is fatal when diagnosis is delayed. The clinical presentation is often nonspecific and varies widely, with fever being the most common initial presentation. Early diagnosis requires a high level of alertness and a detailed history. We report a 77 year-old man who visited our emergency room with complaints of vomiting with bloody content for two days, with increasing severity. The chest radiographs showed infiltration of the para-aortic arch left lung fields. A ruptured aneurysm was diagnosed only after contrast-enhanced computed tomography (CT) was performed. The patient received immediate surgical treatment and adequate preoperative and postoperative antimicrobial therapy.

Key words: hematemesis, mycotic aortic aneurysm, non-typhoid salmonella infection

Introduction

Aortic infection is relatively rare but highly fatal, especially when there is formation or infection of an aneurysm(1,5). The mortality rate ranges from 20% to 53%, depending on the severity of infection, the location of the infected aneurysm, and the development of rupture, as well as whether the infection is caused by salmonella species or staphylococcus aureus(1,3,5-8). The most common pathogen is Salmonella supp. (57%), followed by Staphylococcus aureus (14%)(3). Therefore, prompt and accurate diagnosis followed by surgical treatment and prolonged antibiotic therapy are necessary.

Case Report

A 77 year-old man with a history of gouty arthritis and peptic ulcer disease visited our emergency department (ED) because of persistent fever for 2 days. He had been treated by a local medical doctor under the impression of urinary tract infection, but his symptoms continued. He presented with an elevated body temperature of 38.3℃ and a stable hemodynamic status with pulse rate 92/min., respiratory rate 16/min., and blood pressure 113/53 mmHg. Routine laboratory studies showed a decreased hemoglobin level (9.6 g/dl), but a normal white blood cell count (6,630/μL). The urinanalysis was negative for infection. Hydration and antibiotic treatment with one dose of intramuscular gentamycin 80 mg were given in the ED and the fever subsided. The patient was discharged to follow-up in the outpatient department with sulfamethoxazole/trimethoprim 800 mg twice per day and acetaminophen 500 mg 4 times per day prescribed for 2 days. However, the
patient returned three days later with complaints of vomiting blood for two days. The patient was ambulatory, and in stable hemodynamic condition, with blood pressure 128/79 mmHg, temperature 37.5°C, pulse rate 100/min, and respiratory rate 17/min. However, the fever recurred, with the body temperature elevated to 37.8°C two hours later when acetaminophen was discontinued in the ED. Laboratory data showed a decreased hemoglobin level (9.4 g/dl), elevated blood urea nitrogen (23 mg/dl), creatinine (1.9 mg/dl), and aspartate aminotranferase (50 U/L) levels, and a normal white cell count (6,610/μL) and urinanalysis. The patient was admitted under a tentative diagnosis of upper gastrointestinal bleeding. Endoscopic examination performed on the second day showed the esophagus was not the bleeding source and had no other significant abnormality. However, a large amount of blood was noted in the stomach and a small amount in the duodenum without evidence of an active bleeding source. Therefore, a review of the disease course and previous examinations was done. A review of the chest radiographs (Fig. 1) showed blurring of the para-aortic knob lung fields, and contrast-enhanced computed tomography (Fig. 2) disclosed a wide-based 2.1 × 1.8 cm saccular aneurysm of the aortic arch just adjacent and distal to the left subclavian artery, with increased infiltrates at the left upper lobe near the aortic aneurysm, which might have been caused by previous hemorrhage into the lung parenchyma. The patient may have vomited blood after swallowing blood coughed up from the lungs. The patient had immediate surgery under a diagnosis of ruptured mycotic aneurysm of the aortic arch. The patient received a thorough debridement and resection of the infected segment of the aortic arch followed by a 24 mm Hemashield graft repair. Microscopically, the tissue specimens disclosed a picture of a ruptured atherosclerotic aneurysm of the aorta with fresh hemorrhage and acute and chronic inflammatory cell infiltration in the adventitia of the aorta. Atheromatous plaques composed of necrotic debris and cholesterol clefts were noted in the intima.

Tissue culture was positive for salmonella species. A blood culture performed in the ED during his first visit grew no bacteria. However, one of the two blood cultures obtained immediately after admission to the hospital was positive for Staphylococcus epidermidis (MRSE), but this might have been caused by contamination because the rest of the blood cultures during his stay in hospital were all negative for bacterial growth. The patient received intravenous ceftriaxone 1 g q12h and vancomycin 500 mg q8h for 25 days, before and after operative treatment until skin rashes and impaired hepatic function were noted. The antibiotic treatment continued with oral ampicillin 1000 mg for 8 months. Laboratory markers for inflammation including the erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) were used for monitoring. The postoperative condition was stable and the patient had an uneventful follow-up in the departments of cardiovascular surgery and infectious disease.

Discussion

Mycotic infection occurs in 12% of all aneurysms, and 0.8%-3.3% of patients who have reconstructive surgery for aortic aneurysm. Infection occurs in all portions of the aorta, most frequently in the abdominal aorta, followed by the thoraco-abdominal aorta and the thoracic aorta. Nearly all of these infections result in formation of an aneurysm, or infection of a previously existing aneurysm. In most patients, mycotic aneurysms are solitary lesions, but multiple aneurysms have been described. Salmonella-infected aneurysm in the thoracic aorta is rare and the prognosis is poor because the anatomical position results in a difficult surgical approach.
Fig. 1  Chest radiographs (a) during the 1st and (b) 2nd ED visits. Both show a prominent aortic knob with blurring of the para-aortic lung fields (arrows)

Fig. 2  CT angiography (a) with sagittal reconstruction (b) shows a ruptured aneurysm at the aortic arch just adjacent to the left subclavian artery with mural thrombus and hemorrhage (arrows)
The majority of salmonella infections occur in the abdominal aorta\textsuperscript{(1)}. The reported incidence of these infections ranges from 9 to 10% in western countries to 16.2% in a recent Taiwanese series\textsuperscript{(2)}. Reported risk factors for aortic infection include diagnostic or therapeutic arterial catheterization, intravenous drug use, and immunocompromised status due to chronic or neoplastic diseases such as diabetes mellitus (DM), liver cirrhosis, cancer, or acquired immunodeficiency syndrome\textsuperscript{(1,6)}. DM is reported to be the most common underlying disease in salmonella aortitis. Oskoui et al.\textsuperscript{(5)} reported that 28% of 98 patients with salmonella aortitis had DM. Bacterial seeding of the aortic wall can occur by hematogenous spread to the intima or vasa vasarum such as in pneumonia or systemic sepsis, by lymphatic spread such as in tuberculous aortitis\textsuperscript{(4,12)}, or by direct extension from an adjacent focus such as in purulent pericarditis or osteomyelitis\textsuperscript{(4,12,13)}. The thin endothelial intimal lining of the aorta is generally highly resistant to infection\textsuperscript{(4,14)}, but disruption of this barrier by atherosclerosis reduces this resistance. The normal aortic intima can also be subject to bacterial invasion causing degenerative changes in the arterial wall which result in aneurysm formation and rupture\textsuperscript{(4,12,14)}. The latter may occur as early as 1 week after the onset of aortitis, and may be heralded by pericardial or pleural effusion\textsuperscript{(4,12)}. Infection of a pre-existing aortic aneurysm is reported to occur in 3% of patients with aneurysm\textsuperscript{(1,6)}. Salmonella species have a predilection for diseased arteries and are associated with a high incidence of early aneurysm rupture\textsuperscript{(4,12)}. Hence, salmonella sepsis should alert the physician to the possibility of salmonella aortitis, particularly in the elderly, in whom the prevalence of atherosclerosis is increased.

Manifestations of endovascular infections can be protean and non-specific. Common presentations include fever, unremitting sepsis, and relapsing bacteraemia. Localized symptoms may be related to pressure effects from aneurysms, contagious extension of infection, or impending aneurysmal rupture\textsuperscript{(2,15)}. Rare presentations include psoas and pelvic abscesses, vertebral osteomyelitis, endobronchial masses\textsuperscript{(2)}, hemoptysis\textsuperscript{(2)}, and gastrointestinal bleeding due to aortobronchial or aortoduodenal fistula formation\textsuperscript{(2,15)}. The presence of blood in our patient’s stomach and duodenum were not due to bleeding from the fistula tract but from swallowing blood after hemoptysis. Failure to consider these unusual complications of non-typhoid salmonella bacteraemia can lead to catastrophic consequences.

Routine chest radiographs can be significant if they show prominent periaortic lung tissue infiltration. Computed tomography is usually the initial radiographic study of choice for detection of mycotic aneurysms. Transeosophageal echocardiography is the diagnostic method of choice for ruling out endocarditis\textsuperscript{(4,14)} and a negative result should prompt the operator to examine the thoracic aorta for evidence of a mycotic aneurysm. Aortography may be useful for excluding multiple mycotic aneurysms, and outlining the relation of the mycotic aneurysm to the major branches of the aorta\textsuperscript{(4,8-11,13)}. Endoscopic study of the upper gastrointestinal system may be necessary if there is any doubt in differentiating hemoptysis from hematemesis. Therefore, a mycotic aneurysm may not be suspected initially, as in out patient, but the diagnosis is made eventually while searching for the source of persistent fever and hematemesis. A high degree of awareness remains an indispensable prerequisite for early diagnosis. Laboratory investigation may reveal nonspecific findings such as leukocytosis, or an increased ESR. Negative blood cultures have been reported in up to 25% of cases and may be caused by antibiotic pretreatment and anaerobic organisms. This may also could
account for negative culture results in surgically removed pathological tissue sections\(^{(4,8,9)}\).

Current management of mycotic aneurysm consists of surgery as early as the day of admission\(^{(4,10)}\), and appropriate antibiotic therapy. Complete excision of the affected aorta is the key to curative treatment. It is the definitive treatment even when the infection appears to be controlled with antibiotics, because adequate infection control does not prevent aneurysm rupture\(^{(4,18)}\).

There is no consensus on the duration of antibiotic therapy\(^{(4,10)}\). The length of preoperative antibiotic usage can range from 24 hours to 30 days\(^{(4,10,13)}\), whereas postoperative treatment can range from 6 weeks to 12 months. When the source of infection is not known, life-long prophylactic antibiotic therapy is recommended, particularly if disease is caused by salmonella species, and if there is active infection (regardless of cause) at the time of surgery\(^{(4,8,9)}\). In postoperative follow-up serial non-invasive imaging studies should be done to exclude recurrent infection and laboratory markers of inflammation should be monitored\(^{(4,8)}\). Recurrent or persistent infection is the leading cause of death after successful surgery.

**Conclusion**

We reported a rare case of non-typhoid salmonella mycotic aneurysm of the aortic arch in a patient presenting with recurrent fever despite antipyretic treatment, and an initial presentation of hematemesis. Non-typhoid salmonella bacteremia is frequently associated with fever or sepsis, unexplained symptoms of chest, abdominal or back pain, hemoptysis, and rarely, hematemesis. Whether or not blood is coughed up or vomited, an alert physician should perform a prompt and thorough evaluation for possible aortic infection in the ED, especially in patients over 50 years old, and in those with risk factors for atherosclerosis or reduced immunity, a detail medical history is, therefore, necessary. The appearance of periaortic infiltrates on routine chest radiography should arouse the suspicion of the ED physician and a targeted CT scan should be done urgently. Immediate surgical treatment must be available with adequate preoperative and postoperative antimicrobial therapy.

**References**

吐血、罕見之主動脈細菌感染徵象的個案報告

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主動脈非典型沙門氏桿菌感染是一種罕見但卻可致命的疾病，尤其因未能早期診斷因而延誤手術治療。此疾病的臨床病徵經常是非特性且多變的，一般常見症狀為發燒，直到較特性病徵如胸痛的出現，這通常表示動脈瘤擴大或破裂，而急診醫療人員需具備高度警覺性，才能在此病初期診斷此疾病。本文報告一位77歲男性患者，因發燒，吐血兩天且日趨嚴重，到本院急診就診。胸部X光檢查顯示主動脈弓旁之左側肺部浸潤，雖然經由造影加強之電腦斷層檢查後確認診斷。

關鍵詞：吐血，主動脈瘤，非典型沙門氏桿菌感染