Superior mesenteric artery aneurysm in a patient with infective endocarditis

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ABSTRACT

Infective endocarditis (IE) is a rare but serious condition. We present a case of endocarditis in a healthy 40-year-old male with no predisposing conditions. His physical examination was suggestive of peripheral microembolization and prompted us to consider the diagnosis of IE and order the appropriate investigations. After treatment, he later presented to the emergency department with abdominal pain, and a superior mesenteric artery aneurysm was discovered. We discuss recent advances in the changing epidemiology and microbiology of IE, review the presentation and diagnosis of IE, and highlight the potential complications of this disease.

RÉSUMÉ

L'endocardite infectieuse (EI) est une maladie rare mais grave. Il sera ici question d'un cas d'endocardite chez un homme de 40 ans, auparavant en bonne santé et exempt de facteur de prédisposition. L'examen physique était évocateur d'une micro-embolie périphérique, ce qui a incité à envisager le diagnostic d'EI et à procéder à une exploration appropriée. Après le traitement, le patient est revenu au service des urgences pour des douleurs abdominales, et les examens ont révélé la présence d'un anévrisme de l'artère mésentérique supérieure. Nous ferons donc état, dans le présent article, des changements observés dans l'épidémiologie et la microbiologie de cette affection; passerons en revue le tableau clinique de l'EI et le diagnostic; et ferons ressortir les complications possibles de cette maladie.

Keywords: endocarditis, fever, Janeway lesions, *Staphylococcus aureus*

Infective endocarditis (IE) is the inflammation of the endocardium and heart valves caused by bacteria or fungi. It is an uncommon condition with an incidence of between 2 and 10 per 100,000 person-years. Despite advances in diagnosis and treatment, it still has a high mortality rate, with in-hospital mortality of 15 to 20% and 1-year mortality of 20 to 30%. Recent prospective studies show that the epidemiology and microbiology of IE are changing over time. There is a higher rate of diagnosis of health care–associated IE and *Staphylococcus aureus* IE.[1] In the emergency department (ED), key points include maintaining an appropriate index of suspicion in patients with risk factors or specific presentations, performing a thorough history and physical examination, and obtaining blood cultures prior to antibiotic administration if possible. Despite being treated for IE, patients can still present to EDs with relapse and delayed complications of IE.

CASE REPORT

A 40-year-old previously healthy male presented to our ED with a 1-week history of fever and chills and a 2-day history of pain and redness on his right foot. His only medication was ciprofloxacin, which he had been taking for 6 days. This was prescribed for a presumed urinary tract infection based on complaints of dysuria, urinary frequency, and left flank pain on the second day of illness, which had resolved by the time of representation. He had no other infectious symptoms to account for his fever and no recent travel history. He was not immunocompromised and denied any history of valvular heart disease, intravenous drug use, or recent invasive dental or medical procedures.

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Significant physical examination findings included a temperature of 37.9°C (100 °F), a soft systolic murmur, and several small, nontender, hemorrhagic lesions on the sole of the right foot, several toes, the right thumb, and sole of the left foot (Figure 1). He also had a splinter hemorrhage on the nail of the fourth digit of his right hand. The rest of his examination was unremarkable.

The patient was admitted with a presumptive diagnosis of IE. Blood cultures grew *S. aureus*, and a transesophageal echocardiogram confirmed the presence of a vegetation. His in-hospital course was unremarkable, and he was discharged after 2 weeks to complete his course of intravenous cloxacillin at home.

Approximately 1 month after his diagnosis, the patient presented to the ED with periumbilical abdominal pain. By the time of his examination, his pain had completely resolved and his abdominal examination was unremarkable. He was afebrile and hemodynamically stable. A computed tomographic (CT) scan of the abdomen revealed an aneurysm off a branch of the superior mesenteric artery (SMA). It was measured at 5.0 × 3.1 × 2.9 cm (Figure 2). There was also a second small aneurysm off a branch of the hepatic artery measuring up to 4 mm in diameter. Of note, the Janeway lesions on his hands and feet had all resolved by this visit. The patient was transferred to a tertiary care centre, where he underwent angiography and open repair of his aneurysm. He completed 8 weeks of antibiotic treatment followed by surgical repair of his mitral valve.

Figure 1. Right foot of a 40-year-old man with several nontender hemorrhagic lesions on the plantar surface of the toes and forefoot consistent with Janeway lesions.

Figure 2. Computed tomographic scan of the abdomen showing the superior mesenteric artery aneurym.

DISCUSSION

Endocarditis can be divided broadly into two categories by location of acquisition: community acquired or health care acquired.[1] It can also be divided by valve type: infected native valve, prosthetic valve, or pacemaker or implantable cardiac defibrillator. Patients can also be subdivided into those who are intravenous drug users and those who are not. Although rheumatic valve disease was once a very important cause of endocarditis in developed countries, it is now a rare cause, affecting less than 5% of endocarditis patients in a contemporary international cohort from the International Collaboration on Endocarditis.[2]

Recent prospective data show that the epidemiology of IE is changing.[2] As a result of increasing medical procedures and an aging population, the incidence of health care–associated IE is increasing. Predisposing factors such as cancer, diabetes, and degenerative valve disease (aortic stenosis, mitral regurgitation) are playing a larger role. Concomitant to this is an increase in the incidence of *S. aureus* IE, such that it is now the most common cause of IE worldwide.[2] Many types of medical procedures have been associated with causing IE, from any type of vascular access (including peripheral intravenous catheters) to gastrointestinal, cardiac, and genitourinary procedures.[1,3,4]

The clinical features of IE are quite variable. Most patients will present with systemic symptoms such as fever (found in 90%), night sweats, weight loss, and anorexia; however, fever is less common in the elderly. Murmurs are common but may change in nature. Diagnosis of IE still is based on the modified Duke criteria. A recent study suggested that the addition of

microscopic hematuria to the modified Duke criteria may increase their sensitivity, whereas the addition of erythrocyte sedimentation rate increases sensitivity but decreases specificity.[5] The Duke criteria are based on clinical, laboratory, and echocardiographic findings. To make this diagnosis, three sets of blood cultures should be drawn and transthoracic echocardiography (TTE) should be performed as soon as endocarditis is suspected. If TTE is negative or indeterminate and the symptoms persist, transesophageal echocardiography (TEE) should be performed. TEE has a sensitivity of 90 to 100%.[1]

S. aureus is now the most common cause of IE in the developed world and is followed by various strains of streptococci and then by *Enterococcus* species.[2] About 10 to 15% of cases of IE will be culture negative.[6] Approximately half of the time, this may be due to antibiotic administration prior to culture, which is why it is essential to draw blood cultures prior to antibiotic administration in any patient in whom this diagnosis is being considered.[7]

The most common complication of endocarditis is congestive heart failure, which is found in approximately 32% of patients.[1] Other common complications are mainly from arterial embolization. Central nervous system embolization can present with meningoencephalitis, brain abscess, ischemic stroke, intracerebral bleeding, and subarachnoid hemorrhage from rupture of mycotic aneurysms. Patients may have symptoms from peripheral embolization, such as kidney, spleen, or liver abscess, or limb ischemia. If endocarditis affects the right-sided heart valves, the vegetation can embolize to the lungs, presenting with signs and symptoms of pneumonia, lung abscess, or pulmonary embolism.

Sir William Osler coined the term "mycotic aneurysm" in 1885,[8] which refers to any infected aneurysm (not necessarily fungal in origin, as the name implies). Mycotic aneurysms, a rare complication of endocarditis, are formed from direct invasion by bacteria, embolic occlusion, or injury from deposition of immune complexes. These have been described in almost all arteries, ranging from peripheral arteries, such as the peroneal and ulnar arteries, to major arteries, such as the cerebral vessels and the aorta.[9] SMA aneurysms are rare, comprising only 8% of all visceral artery aneurysms.[10] More than 60% of SMA aneurysms are infectious in origin.[11] Case reports of SMA aneurysms are very variable in their presentation. Occasionally, an SMA aneurysm will be the initial presenting feature of IE, but reports have also described the diagnosis of SMA aneurysms weeks to months after successful IE treatment.[12–14] One case describes an SMA aneurysm that was diagnosed after 3 months of chronic abdominal pain.[15] Although diagnosis is difficult, SMA aneurysms have both a rupture risk and a mortality rate of 40 to 50%.[16–18] After diagnosis, treatment involves consultation with Vascular Surgery for consideration of endovascular or open repair.

The treatment for endocarditis should start with resuscitation, supportive care, and management of complications as appropriate. However, the mainstay of treatment for endocarditis is intravenous antibiotics that can be tailored to the appropriate organism once it is cultured. The rate of embolization is highest immediately after diagnosis and decreases after antibiotics are initiated. There are several indications for cardiac surgery in endocarditis, and several recent studies seem to suggest a role for early valve replacement.[19,20] All suspected prosthetic valve infections should be managed with early cardiac surgery consultation.

The prognosis depends on patient characteristics, the presence of certain complications, and microbiologic and echocardiographic findings. Poor prognostic factors at presentation include being elderly, *S. aureus* IE, heart failure as a complication, and periannular extension of the vegetation on echocardiography.[1] These patients should be closely monitored, and consideration should be made for early referral to a tertiary care centre for further management.

Endocarditis prophylaxis is being used for fewer patients and less procedures than in the past. The European Society of Cardiology and the American Heart Association have both produced guidelines on this topic in the last several years.[1,21] This topic is beyond the scope of this case report. All providers performing procedures in the ED should familiarize themselves with these or other local guidelines because there are some indications for prophylaxis in patients who are at higher risk for developing endocarditis. Some examples include certain dental procedures or procedures involving infected skin or soft tissue (such as abscess drainage) in high-risk patients, such as those with a history of previous endocarditis, prosthetic valves, and congenital heart disease.

CONCLUSION

IE is a rare disease with a high mortality rate that is often difficult to diagnose. There are a variety of different types of presentation of this condition. Important in the ED is having a high index of suspicion for all patients presenting with fever and an unclear source, especially if there is a new or different murmur. Although this condition must be considered in intravenous drug abusers, it is also becoming increasingly common in elderly patients, immunocompromised patients, and those with extensive health care contact. Endocarditis must be considered even in patients with no risk factors, such as the patient we have presented here. A thorough physical examination must be conducted, with attention to any signs of peripheral embolization. If there is any suspicion for endocarditis, blood cultures and echocardiography should be ordered in a timely manner and broad-spectrum antimicrobials should be initiated. Lastly, this case highlights the need to be vigilant for delayed complications of endocarditis, even after treatment has been initiated.

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