Primary pyomyositis (PP) is a purulent infection of skeletal muscle, which is not caused by a contiguous infection from the bone, soft tissues or skin or by deep injuries. Rather, it is considered a local complication of a transient bacteremia. This infection is quite rare given the inherent resistance of normal muscle to bacterial colonization. For that reason, underlying pathologic factors in the muscle or in the host, such as HIV infection, diabetes, malnutrition, cancer or steroid treatment, are necessary to allow infection of the muscle. PP is the most common in the first and second decades of life, although it has been seen in all age groups. Pyomyositis is exceedingly rare in patients >80 years of age (<5%) and the micro-organisms most commonly isolated in this age group are Gram-negative bacteria.

In temperate climates, cultures of pus obtained by puncture or surgical drainage are usually positive and the microorganism is identified in 91% of cases. Nonetheless, blood cultures have a low sensitivity, around 40%. The most common bacteria isolated is Staphylococcus aureus (75%), 25% of which are methicillin resistant, followed by Group A Streptococcus and Gram-negative bacilli.

Enterococcus is associated with urinary tract infections, meningitis, bacteremia and endocarditis. However, after an exhaustive review of the medical literature (searching in PubMed for a combination of the terms ‘pyomyositis’ or ‘muscle infection’ and ‘Enterococcus’ or ‘group D Streptococcus’), we have not found any published cases of enterococcal pyomyositis. The objective of this article is to present the first case of PP caused by E. faecalis.

An 80-year-old woman presented to the emergency department with a 3-day history of pain and swelling in her right calf without a history of a wound or trauma. She also reported chills without fever at home. The patient had a history of steroid-dependent asthma with chronic respiratory insufficiency and home oxygen therapy. She had been taking deflazacort 15 mg daily for the past 5 years. She had a long history of hypertension and permanent atrial fibrillation. Seven years earlier, she had suffered a cardioembolic stroke in the left parietal lobe after which anticoagulation with coumarin was initiated. Five years earlier, a permanent pacemaker had been implanted because of symptomatic bradycardia. Two years earlier, she was admitted to another hospital for chest pain suspicious for a non-ST-segment elevation myocardial infarction, although coronary angiography was unremarkable. Echocardiogram performed at that time revealed a left ventricle hypertrophy, left ventricular ejection fraction of 40%, posterior–inferior, septal and apical hypokinesia, mitral-valve prolapse with moderate regurgitation and severe tricuspid-valve regurgitation with an estimated pulmonary-artery systolic pressure of 50 mmHg. She had no history of smoking or heavy alcohol consumption.

On physical examination, the patient looked well. She had a temperature of 38.5°C, with a blood
pressure of 156/90 mmHg, a pulse of 69 bpd, a respiratory rate of 24 bpd, while saturating 95% on 2 l of supplemental oxygen. Auscultation of the lungs revealed scattered expiratory wheezes and coarse bronchial breath sounds. Auscultation of the heart revealed a Grade 2/6 systolic murmur loudest at the left sternal border and apex. Her abdomen was non-tender without hepatosplenomegaly. The posterior region of the left calf was erythematous, warm and swollen with tenderness on deep palpation of the gastrocnemius muscle. No skin injuries were observed.

Blood tests revealed a mild leukocytosis with a neutrophil predominance, erythrocyte sedimentation rate 31 mm/h and C-reactive protein 14.76 mg/l. A contrast enhanced computed tomography (CT) of the lower limbs demonstrated an abscess with gas in the posterior compartment of the right leg (Figure 1), compatible with pyomyositis. Surgical drainage with evacuation of a purulent collection and fasciotomy was performed. Aminoglycoside-resistant Enterococcus faecalis was isolated in pure culture in three different samples of drained material and in the blood cultures. In order to rule out an infectious endocarditis, two separate transthoracic echocardiograms were performed over the course of 4 weeks and no modification in mitral regurgitation, valvular vegetations or in pacemaker electrode lead was found. Transesophageal echocardiogram could not be performed because of her oxygen requirement and recurrent episodes of bronchospasm. A virtual colonoscopy was performed to exclude colonic disease and two adenomatous polyps, one 2 cm polyp in the sigmoid colon and another 7 mm polyp in the descending colon, were identified and removed with standard technique.

Ampicillin and ceftriaxone were administered intravenously during a period of 6 weeks. The patient improved clinically, and after 6 months of follow-up, the patient remains asymptomatic.

Enterococci are catalase-negative Gram-positive cocci classified as Lancefield group D Streptococcus until 1984 when they were included in a new genus (4). Enterococci are part of the intestinal flora of humans and are low-virulent micro-organisms, although they can produce urinary tract infections, meningitis, bacteremia (especially in hospitalized patients) and endocarditis (4,5).

The majority of enterococcal bacteremias are caused by E. faecalis (60%), following by E. faecium (37%) and other Enterococci (3%) (6). Enterococci are responsible for 5% of community-acquired bacteremias and 10% of those that are hospital acquired. Community-acquired bacteremia is usually less frequent than hospital-acquired (30% vs. 70%), normally monomicrobial and more commonly associated with infectious endocarditis than hospital acquired. Moreover, community-acquired bacteremia is associated with lower mortality rates and generally has not an identified origin (4–8). In one study, enterococcal endocarditis was positively associated with three factors: community-acquired

Figure 1. Contrast enhanced CT of the lower limbs. Abscess with gas in the posterior compartment of the right leg (arrow), compatible with pyomyositis.
bacteremia, predisposing valvular heart conditions or audible heart murmurs and absence of an identified extracardiac focus of infection. On the other hand, the presence of polymicrobial bacteremia significantly decreased the likelihood of endocarditis.

Our patient had several predisposing risk factors for infectious endocarditis, such as previous mitral-valve regurgitation, a monomicrobial infection and community-acquired bacteremia. Consequently, as transesophageal echocardiogram could not be performed due to a severe respiratory disease, two transthoracic echocardiograms were performed on two separate occasions during the hospitalization. The absence of any changes between the two echocardiograms and an echocardiogram performed 2 years earlier allowed us to rule out infectious endocarditis. In any case, the patient received intravenous antibiotics for >4 weeks as it is recommended in patients with enterococcal bacteremia and predisposing valvular disease. Given the high risk of developing infectious endocarditis, the patient was treated with ampicillin and ceftriaxone, a combination of antibiotics that has been reported as an effective and safe option for treating aminoglycoside-resistant Enterococcus faecalis endocarditis.

Additionally, the patient had a pacemaker, which some authors consider a predisposing risk factor for enterococcal endocarditis. However, in our experience and in the experience of other authors, there are no cases of Enterococcus faecalis bacteremia originated outside the pacemaker resulting in an infection of the device.

In the exhaustive enumeration of causative agents responsible for PP collected in classical texts of infectious diseases, Enterococcus or group D Streptococcus is not reported. Furthermore, in the published series of PP from 1964 there are no reported cases due to Enterococcus, with the exception of a patient included in a recent review of 676 cases of PP; however, no clinical data were reported. Also, in the published series of enterococcal bacteremia, pyomyositis is not described as a potential complication or as a source of infection. Moreover, the lack of suppurative foci is one of the characteristic features of bacteremia produced by this micro-organism.

Enterococcus faecalis is an extremely rare cause of PP. Surgical drainage and a prolonged course of parenteral antibiotics are needed to achieve a complete resolution.

Conflict of interest: None declared.

References