CASE PRESENTATION

A 14-month-old male infant with three weeks of fever up to 39 °C and diarrhea, presented to our emergency department. He was well until three weeks before arrival. On arrival he was alert but appeared pale and ill. Rectal temperature was 39.2 °C, heart rate was 166 beats per minute, blood pressure was 103/74 mmHg and oxygen saturation on room air was 95%. On physical examination he had normal peripheral pulses, normal heart sounds with no additional sounds or murmurs, and good air entry. He did not have enlarged lymph nodes and the throat examination revealed no abnormalities. His liver was not palpable below the costal margin, and he had mild splenomegaly. The rest of the physical examination was unremarkable.

Bacterial cultures of blood and stool were obtained and were negative. Blood tests revealed white blood cell count (WBC) 15,900/mm³ with 33% neutrophils, 54% lymphocytes and 13% monocytes, hemoglobin 9 g/dL, hematocrit 29%, mean corpuscular volume 72 fl and platelets 356,000/mm³. Serum electrolytes, glucose and liver function tests were normal. C-reactive protein (CRP) was 4.1 mg/dL.

Chest radiograph revealed moderate cardiac enlargement and echocardiography was done (Fig. 1).

Echocardiography demonstrated normal cardiac anatomy and function, moderate to large amount of pericardial effusion, and mild thickening (6 mm) of the right lateral superior atrial wall with no interruption of the superior vena cava (SVC) to the right atrium (RA) flow. No vegetations were seen. Electrocardiogram was normal except for sinus tachycardia. On the following morning there was an increase in the amount of the pericardial fluid with mild tamponade effect. An echocardiography-guided pericardiocentesis was performed, and a 6 Fr. Pigtail catheter was placed percutaneously into the pericardial sac. A 100 mL of fluid was drained, which contained 5000 red blood cells/µL, 800 WBC/µL of which 74% were neutrophils and 26% were lymphocytes, glucose was 81 mg/dL and LDH 1186 IU/L. No malignant cells were detected. Bacterial cultures of pericardial fluid were negative. Serology studies done on admission suggested recent EBV infection (positive anti EBV IgM antibodies and negative anti EBV IgG and EBNA antibodies). Workup for an underlying collagen disease was negative. The fluid was sent for PCR for enteroviruses and EBV.

The infant's general condition improved immediately after the pericardiocentesis. Repeat echocardiogram was done on the following day, and revealed thickening of the atrial wall up to 9 mm without re-accumulation of pericardial effusion. The indwelling catheter was removed two days later. The atrial wall thickening was attributed to either an organizing thrombus or an embryonic remnant of a venous valve. Thrombophilia workup was done to evaluate the former possibility.

Repeat echocardiogram nine days after admission revealed no change in the thickening of the atrial wall and...
no reaccumulation of pericardial effusion. The infant still had fever up to 39 °C, but was alert and in good condition. The fever resolved after ten more days. He did not return to further follow-up. EBV DNA was detected in the pericardial fluid by PCR analysis in both our hospital and another reference laboratory.

DISCUSSION
The most common causes of acute pericarditis in children are Infectious, collagen vascular diseases, genetic and metabolic diseases, neoplasms, postpericardiotomy syndrome and idiopathic (1–3).

Several viruses have been described as causing pericarditis, among them are coxsackie virus A and B, hepatitis viruses, human immunodeficiency virus, measles virus, mumps virus, varicella virus and others (4). A medline search yielded only four cases of EBV. The first case describes a 42-year-old man with signs of pericarditis that necessitated pericardiotomy due to heart failure. He had extremely high IgG titer for EBV and positive PCR for EBV in the pericardial fluid (5). The second case describes pericarditis in a 31-year-old woman, associated with EBV reactivation following allogeneic peripheral blood stem cell transplantation due to AML. In this case no pericardial fluid was drained, so the diagnosis is only probable but not proven (6). The third case describes a 73-year-old woman with a large pericardial effusion. Nested PCR analysis of the pericardial effusion revealed EBV, consistent with a localized pericardial EBV persistence or reactivation, without detectable systemic EBV infection (7). The fourth report is of a 39-year-old patient suffering from acute pericarditis accompanied by considerable pericardial effusion, most probably secondary to acute Epstein-Barr virus infection (8). To our knowledge, EBV pericarditis has not been described previously in a child.

The incidence of viral pericarditis and specifically due to EBV is probably underestimated. It is likely that many cases of idiopathic pericarditis are due to unrecognized viral infections. The number of diagnosed cases is dependent on the physician’s threshold of suspicion and the presence of specialized laboratories that are able to perform specific PCR and serologic tests.

EBV should be included in the differential diagnosis of pericarditis in infants and children. Culture negative pericardial fluid should also be examined for EBV by PCR analysis, especially when serological studies support EBV infection or reactivation. PCR is an important diagnostic tool in evaluating pericardial fluid, and its' increased usage may decrease the number of ’idiopathic’ causes of pericarditis.

Case 2: a five-year-old girl with low-grade fever and pain in the leg

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CASE
A 5-year-old girl was hospitalized with sudden progressive pain in her left leg since one day. She refused to stand, walk or sit up straight. There was no history of trauma. Physical examination at first showed moderately impaired and painful passive endo and exorotation of the left hip, but repeated examinations were not consistent. The temperature was 38.2 °C. On admission, C-reactive protein was 41 mg/L, leukocyte count was 10.2 × 10⁹/L. X-ray and ultrasound of the hip were normal. Serology for Borrelia and Bartonella henselae was negative. Two blood cultures remained negative. Sedimentation rate was 100 mm in the first hour, liver transaminases and creatinine were normal, calcium was 2.63 mmol/L, phosphate 1.39 mmol/L, parathyroid hormone 0.2 pmol/L, α-1-fetoprotein 1.1 kU/L, urinary catecholamines were negative, as well as anti-nuclear antibodies, citrulin antibodies (< 25 U/mL), rheumatic factor (2 U/mL), HLA-B27 and the Mantoux reaction. After six days, a bone scan showed diffuse enhanced blood flow in the left sacroiliac region, without other hot spots (Fig. 1). After nine days, magnetic resonance imaging (MRI) showed oedema in the left os ileum and the adjacent part of the iliopsoas muscle (Fig. 2). Because of spontaneous improvement of C-reactive protein and inconsistencies in the patients’ complaints, a conservative course of action was taken. 14 days after the initial presentation she developed a high fever (39.4 °C). A third blood culture was taken; C-reactive protein had increased to 272 mg/L, leukocyte count was 5.8 × 10⁹/L. Cefuroxim was started intravenously. After two days the blood culture revealed growth of Staphylococcus aureus.
DISCUSSION

Acute haematogenous osteomyelitis is a well-known entity in childhood. The exact incidence is not clear, a decline in incidence over the last decades has been reported (1). Osteomyelitis typically occurs in long bones. Involvement of the pelvis is rare, 1–11% of all cases of haematogenous osteomyelitis, and leads to diagnostic difficulties (2,3,4). Our differential diagnosis in this patient included osteomyelitis, other chronic infections (like tuberculosis and cat scratch disease), rheumatic disease and malignancy.

The mean age of children with pelvic osteomyelitis varies in different reports from 2–5 years (2) to 7–14 years (4). Osteomyelitis in general occurs more often in boys than in girls, but the male to female ratio in pelvic osteomyelitis is lower (1.5:1) than in the total group (2,4). Authors agree that the ilium is affected most often (2–4). A history of preceding trauma is less common than in osteomyelitis of the long bones (2–4). Other factors that can be associated with pelvic osteomyelitis are urinary tract infections and Crohn’s disease (4). Three different syndromes of pelvic osteomyelitis have been described: abdominal, gluteal and lumbar, according to the presentation and localization of the pain (5).

Establishing the correct diagnosis is difficult. Several reports describe these diagnostic difficulties with misdiagnosis in up to two thirds of cases (2,3). There are multiple causes for this. Children can poorly localize the pain caused by pelvic osteomyelitis (2,3,4). This was also a problem in our patient, where repeated physical examinations were not consistent and for this reason very difficult to interpret. The affected children often only have low-grade fever (2,3,4). Our patient only developed high-grade fever 14 days after the initial presentation.

Leukocytosis is absent in 30–70% of patients and sedimentation rate is normal in 6–12% (2–4). Our patient initially had mildly elevated and even spontaneously improving C-reactive protein levels, and a normal leukocyte count. Only 14 days after the initial presentation, when she developed a high-grade fever, did her CRP increase to a level indicative of a bacterial infection.

A fourth reason is the lack of abnormalities in radiographic examinations in almost all patients at presentation. Even bone scan can be negative in 10–20% of cases. MRI might be better to show the presence of osteomyelitis, but in all reports MRI’s were performed later on in the course of the infection (2,3,4). We also found a normal X-ray, but did find increased uptake in the left sacro-iliac region on bone scan (Fig. 1) and additional MRI investigations showed a high-intensity area at the left sacroiliac and psoas region, indicative of infection (Fig. 2).

Blood cultures are positive in a maximum of 50% of patients. The most common pathogen is Staphylococcus aureus in 40% of cases, other pathogens are group A Streptococcus, Streptococcus pneumoniae, Salmonella and anaerobes (2,4). We found Staphylococcus aureus in our patient, but only after repeated blood cultures were taken over time. Eventually, the blood culture during the episode of high-grade fever yielded the causative organism.

Treatment consists of intravenously administered antibiotics. The role of surgery is uncertain, some propose early decompression, others suggest drainage only when the patient is not responding to antibiotics or when an extra osseous abscess develops (2,4). The prognosis is generally good. Patients with long-term sequelae like recurrent osteomyelitis or deformity have been described and usually had long delay (1–6 months) in initiation of therapy because of initial misdiagnosis (2,3,4).

Our patient was diagnosed with osteomyelitis of the left os ileum after a delay of 14 days. Antibiotics were changed to flucloxacillin. A second MRI was performed to exclude abscess formation. Fever subsided within three days and the pain diminished slowly. C-reactive protein decreased to 26 mg/L in one week, and only normalized completely after four weeks. She was treated with intravenous antibiotics for a period of six weeks. She showed no sequelae at follow-up 10 months after the infection.

DIAGNOSES

Case 1
EBV pericarditis.

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Case 2: a five-year-old girl with low-grade fever and pain in the leg


Case 2

Osteomyelitis of the left os ileum.

References
