Mycotic aneurysm — a rare complication of acute osteomyelitis in a child

A case report

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Summary

A case of mycotic aneurysm formation of the right iliac artery is described. This unusual complication developed as a result of acute osteitis of the left tibia which was initiated by a kick on the lower leg. One month after treatment for osteitis of the tibia, the patient was readmitted because of unequivocal evidence of ischaemia of the right leg and a large pulsatile mass in the right iliac fossa, confirming the clinical diagnosis of mycotic aneurysm. The aneurysm was excised but because the wall of the artery was extremely friable simultaneous revascularization was deferred for fear of uncontrollable haemorrhage from the anastomotic line.

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Common complications of acute osteomyelitis include chronic osteomyelitis, sterile effusion into adjacent joints, septic arthritis, dislocation of joints, pathological fractures, limitation of joint mobility, bone deformities, septicaemia and thrombophlebitis; death can also occur.[1] Mycotic aneurysm formation, on the other hand, is seldom mentioned as a complication; in contrast septic aneurysm formation associated with subacute bacterial endocarditis secondary to dental infection is well known to final-year students.

The clinical findings in a case of mycotic aneurysm are presented not only because of the rarity of such reports but also because one of the most basic signs which must be heeded in the management of acute or chronic osteomyelitis had been overlooked when the patient was discharged at the end of his first hospital admission.

Case report

An 11-year-old coloured boy was referred to Tygerberg Hospital because of a painful swelling on the lateral aspect of his left tibia. He had been kicked there 2 days before admission. General examination was unremarkable with no signs of toxicity or chronic ill health except for a slight limp on the side of the painful swelling. Liver function tests, blood chemical tests, urinalysis and peripheral blood examination showed a white cell count of 22,0 x 10^9/l, eosinophils 8%, and an erythrocyte sedimentation rate (ESR) of 45 mm/1st h (Westergren); the rest of the results were within normal limits.

Examination of the left leg confirmed a diagnosis of abscess formation secondary to trauma and radiography ruled out chronic osteomyelitis. The abscess was drained under general anaesthesia. Pus was sent for culture and sensitivity testing and produced a growth of *Staphylococcus aureus* sensitive to fusidic acid and cloxacillin, which the patient received for 7 days.

The patient was discharged 4 days after admission with the request that he return 1 week later for routine follow-up examination. Unfortunately this request was ignored since he remained well until 3 weeks later when he again developed pain where the abscess had been drained. Radiography elicited unequivocal evidence of underlying osteomyelitis, which required surgical exploration and aggressive antibiotic therapy. His stay in hospital was uneventful and the expected follow-up visit was once again ignored. One month later he was brought to hospital by his mother because he complained of abdominal pain, pain in the legs, dizziness, nausea and vomiting.

On examination his temperature was 38,5°C, pulse rate 145/min, and haemoglobin 10,8 g/dl; mild neck stiffness was detected but no other neurological abnormalities. Laboratory studies revealed the following abnormal findings: lymphocytes 54%, monocytes 4%, eosinophils 8%, neutrophils 32% and ESR 55 mm/1st h (Westergren). Liver function was within the normal range for a child of his age.

A diagnostic lumbar puncture produced 5 lymphocytes, 47 polymorphs, protein 0,24 g/l, no globulin, glucose 2,9 mmol/l. The plasma glucose level was 5,5 mmol/l. There was no microbiological evidence suggestive of meningitis.

Examination of the cardiovascular system elicited absent tibialis posterior and popliteal pulses of the right leg, no palpable femoral pulse on the right and in addition a large pulsatile mass (7 x 6 cm) in the right iliac fossa. A systolic murmur was clearly audible on auscultation, confirming the clinical diagnosis of mycotic aneurysm.

Ultrasonography confirmed the clinical diagnosis and ischaemia of the right leg as reflected by a strongly positive Goldflam's sign when exercising the foot. Radiography revealed signs suggestive of sequestrum formation where the left tibia had been previously explored.

Because of the pyrexia and raised ESR, antibiotic therapy was started in the hope that the aneurysm would diminish in size before definitive surgery was undertaken. On antibiotic therapy and bed rest the patient's temperature gradually returned to normal. At no stage was a positive blood culture obtained but the ESR gradually decreased to 20 mm/1st h, at which stage an oblique lower extraperitoneal surgical exploration was performed.

The afferent and efferent vessels of the aneurysm were identified, taped and clamped. Dissection was hampered by inflammatory adhesions, resulting in its being inseparably adherent to the inferior vena cava (IVC) and cord vessels. The aneurysm was opened and the thrombus evacuated. Inspection

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of the lumen revealed a small arteriovenous fistula between the aneurysm and the IVC. The fistula was closed and the rest of the aneurysmal sac excised and sent for culture and sensitivity testing.

The femoral artery measured 3 mm in diameter and no blood flowed through it from the aneurysm. A Fogarty balloon catheter passed down the lumen of the femoral artery showed that the arterial system was patent all the way down to the foot. The wall of the infected femoral artery was extremely friable and not suitable for simultaneous revascularization for fear of uncontrollable haemorrhage from the anastomotic line, false aneurysm formation, and sepsis.

Discussion

Acute or chronic osteomyelitis frequently presents with a wide spectrum of physical findings, often insidious enough to mask its severity. The most common findings include fever, local swelling, tenderness, limitation of joint movement, local heat, erythema, fluctuation, effusion into adjacent joints, weakness and nuchal rigidity, as in this case.

In 70% of cases infective skin lesions or trauma predispose to acute osteomyelitis.[1] In the series studied by Green *et al.*[1] *Staph. aureus* was the aetiological agent in 63% of cases and in 18,1% a ß-haemolytic *Streptococcus* was isolated; two mixed infections were encountered and attention is drawn to the fact that osteomyelitis may sometimes complicate brucellosis or salmonellosis. In 53% of cases examined by Green *et al.*[1] the organism was isolated from the blood. In 60% of cases of *Staph. aureus* osteomyelitis and 61% of streptococcal osteitis a positive blood culture was obtained. In this case no organism was isolated from the blood, but pus from the area where the bone had been drilled yielded a culture of *Staph. aureus.*

To avoid serious complications it is imperative to recognize, diagnose and treat osteomyelitis effectively with appropriate antibiotics. Unfortunately the diagnosis is often difficult during the first 10 - 14 days when obvious symptoms such as fever, pain, local swelling, malaise, loss of appetite, vomiting and local heat may be unremarkable. At this stage radiographic changes may remain negative. The results of blood culture for diagnosis may be disappointing but should be repeated as often as possible, especially during peaks of pyrexia.

The differential diagnosis of acute osteomyelitis covers a wide spectrum of disease conditions such as rheumatic fever, septicaemia, septic arthritis, poliomyelitis, bone tumours, soft-tissue tumours, haematoma, cellulitis, typhoid fever, fractures and serum sickness. Even leukaemia, scurvy, sickle-cell anaemia, and soft-tissue trauma may at times mimic acute osteomyelitis. The correct diagnosis is often arrived at by exclusion.

The clinical picture of osteomyelitis in children and infants may differ considerably from that in teenagers or adults. In the infant the swelling may be silent or may strongly resemble a neoplasm of bone. Radiographic differentiation may be impossible, particularly as bone tumours may produce bone destruction, bone formation and periosteal thickening. Periosteal thickening in the infant may at times assume the onion-peel appearance believed to be pathognomonic of Ewing's sarcoma. It is important for the clinician to be aware of the plethora of conditions that may mimic osteomyelitis in the child.

Nuchal rigidity is an indication for routine diagnostic lumbar puncture; in this case it produced a high white cell count, normal chemical findings but no pathogens. Because of the high white cell count, computed tomography of the brain was requested; this showed a brain lesion suggestive of previous trauma, thus ruling out the clinical diagnosis of metastatic brain abscess formation to explain the patient's vomiting, dizziness and neck rigidity.

Classically, more than 90% of mycotic aneurysms are initiated by infective endocarditis. Small infected emboli are dislodged from heart vegetations and carried peripherally to where they become lodged or impacted in the vasa vasorum, leading to weakening of the arterial wall.[2] In other circumstances the emboli may lodge in a small branch of the major artery, in which case infection reaches the main artery by spreading along peri-arterial tissue. This lodgement of septic emboli in the vasa vasorum is usually insidious and painless yet the symptomatology includes pain almost from the beginning of development.[3] Why mycotic aneurysms should be more painful than arteriosclerotic or luetic aneurysm formation remains speculative. It is possible that atherosclerotic and luetic aneurysm formation develops over a longer period of time, thus denervating the arterial wall, in contrast to a mycotic aneurysm, which develops in an artery in which the nerve supply is unaffected. The brachial artery is a frequent site in the upper extremity but mycotic aneurysms are known to occur in mesenteric vessels,[3] after ligation of a ductus arteriosus,[2] secondary to *Listeria monocytogenes* chest infection,[4] and in the groin of drug addicts who attempt intravenous heroin injection.[5]

Infected aneurysms differ little in external appearance from their atherosclerotic counterparts except for the wall, which may be more friable, as in this case, and often intimately adherent to contiguous structures. Infected aneurysms carry a poor prognosis, so it is mandatory to obtain adequate material for culture and sensitivity testing to enable a suitable combination of antibiotics to be selected.

In this case the persistently increased ESR (55 mm/1st h) was unfortunately regarded as unimportant when the patient was discharged after the second admission to hospital. No doubt this signified either the start of osteitis where the abscess had been drained or possibly the beginning of the clinically undetectable mycotic aneurysm.

To the clinician a raised ESR is often more important and helpful in diagnosis than a battery of highly sophisticated investigations, which may give negative results in the early phase of the disease.

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