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Case report

Bacterial osteomyelitis after varicella infection in children

Stefan Bittmann

Department of Pediatric Surgery University Children's Hospital Zurich University of Zurich, Steinwiess Str 75, CH8032 Zurich, Switzerland

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Introduction

Varicella is a common disease in children, and usually has a benign course. The majority of cases occur before 10 years of age [1], and most children recover with few sequelae. Infectious complications are known to occur, usually in infants and toddlers [2–6], usually as skin infections [3,6–8]. Osteomyelitis is a rare secondary complication [9].

Case reports

Case 1

A 3-year-old boy was brought to our department because of pain and joint immobility of his left shoulder. Eight days previously he had developed typical varicelliform eruptions on his trunk. Unusually, fever of up to 39.5°C was present 2 days before his admission to hospital. Febrile temperatures were found for a further 2 days. Conventional X-rays of his shoulder revealed swelling of the proximal humeral epiphysis and metaphysis with destruction of the bone over a length of 1 cm (Fig. 1). Computed tomography of the shoulder revealed massive inflammation of the joint on the left side, with involvement of the surrounding soft tissues. Therapy with intravenous Augmentin had been introduced by pediatricians 1 week before admittance to our hospital, but no improvement was noted. Inflammation was progressive, with involvement of the left proximal humeral metaphysis and diaphysis. Needle aspiration of the shoulder joint revealed infection with *Staphylococcus aureus*, and the therapy was changed to flucloxacillin. The child was discharged from hospital at the decision of his mother. He presented 1 week later, with his shoulder badly swollen, warm, erythematous, and immobile. His leukocyte count was 15 800/mm^3 and his erythrocyte sedimentation rate 100 mm/h. X-rays taken the same day showed progressive osteolysis of the humeral epiphysis and metaphysis. Periosteal widening was found, together with extensive inflammation of the diaphyseal humerus. Operative revision of the left shoulder was therefore necessary. Intraoperatively, massive necrotic debris and pus were found around the periosteum and removed. The humeral head was soft and destroyed by inflammation. A drainage tube was inserted for 9 days. Intravenous treatment with vancomycin and clindamycin was started and continued for 2 weeks. Ten days after the introduction of this new antibiotic therapy, an X-ray showed no further bone destruction. On the day of discharge from the hospital the erythema and swelling of the shoulder had been relieved, although his shoulder mobility was still restricted. The erythrocyte sedimentation rate was 50 mm/h and a normal leukocyte count was noted. Oral clindamycin was given for a further 8 weeks, when a final clinical check showed normal function and painless movement in the shoulder joint. An X-ray proved normal, and no further clinical investigation was necessary. Unfortunately, the immunological ability of the patient was not proved.

Case 2

A 16-month-old boy was admitted to our department, infected with varicella. Typical signs of chickenpox were present, together with swelling and erythema of both medial malleoli. Initial treatment with oral cephalosporin and anti-inflammatory ointment was

Offprint requests to: S. Bittmann
(e-mail: stefan.bittmann@kispi.unizh.ch)
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introduced. His clinical findings improved, and a hospital stay was not considered necessary. One month later, the child was readmitted with swelling and erythema of his right medial and lateral malleoli. Typical encrusted pockmarks were present on his chest and back. He had a warm and erythematous right talocrural joint with a swelling measuring 2 cm in diameter. An X-ray showed an irregular bone defect localized lateral to the distal tibial epiphysis and metaphysis (Fig. 2) with sclerosis and periosteal ossification. His erythrocyte sedimentation rate was 75 mm/h; C-reactive protein blood concentration was 2.7 mg/dl, but his leukocyte count was normal. Incision, drainage, and arthrotomy of the right talocrural joint were performed the same day. Subcutaneous necrotic debris and massive osteolysis of the medial distal tibia with destruction of the medial corticalis were present. Necrotic debris was removed and a drainage tube was inserted for 7 days. An intraoperative smear revealed group A β-hemolytic streptococcal infection. Intravenous therapy with clindamycin and penicillin G was introduced, and the clinical findings improved significantly under this therapy. The child left hospital 2 weeks after surgery. Oral clindamycin was given for a further eight weeks. An X-ray taken 16 weeks after surgery showed progressive recovery of the epiphysis and metaphysis of the distal tibia. As normal movement of the talocrural joint had recovered, antibiotic treatment was stopped. As in the first patient, immunological ability was not proved.

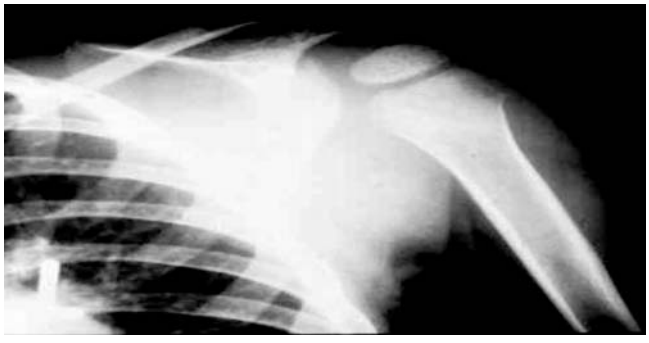

Fig. 1. Bone defect at the proximal humeral metaphysis (case 1)

Discussion

Varicella is a common, highly contagious self-limiting illness caused by the varicella zoster virus. Complications are uncommon in immunocompetent individuals. Infection triggers the proliferation of a specific T-cell subset, which, in turn, suppresses the overall host immune response, leading to secondary bacterial infections [10]. Osteomyelitis is a rare complication, having been reported in 2 of 2534 cases [9]. Septicemia occurred in 14 of these: 13 were due to *Streptococcus pyogenes*, and 1 was due to *Streptococcus pneumoniae* [9]. The port of entry seems to have been the varicella pocks [11]. Spread of the infection to the bone can occur either directly or via the blood [12]. *Staphylococcus aureus* and *Streptococcus pyogenes* are the most frequent bacterial pathogens responsible for secondary infections in such patients [13]. In our two patients, *Staphylococcus aureus* and group A β-hemolytic streptococcus were isolated as causative agents by blood culture. Infection with group A β-hemolytic streptococcus is more common in patients with osteomyelitis after varicella than in patients with bacterial osteomyelitis [14].

There is still controversy as to whether operative or conservative treatment is most effective in treating

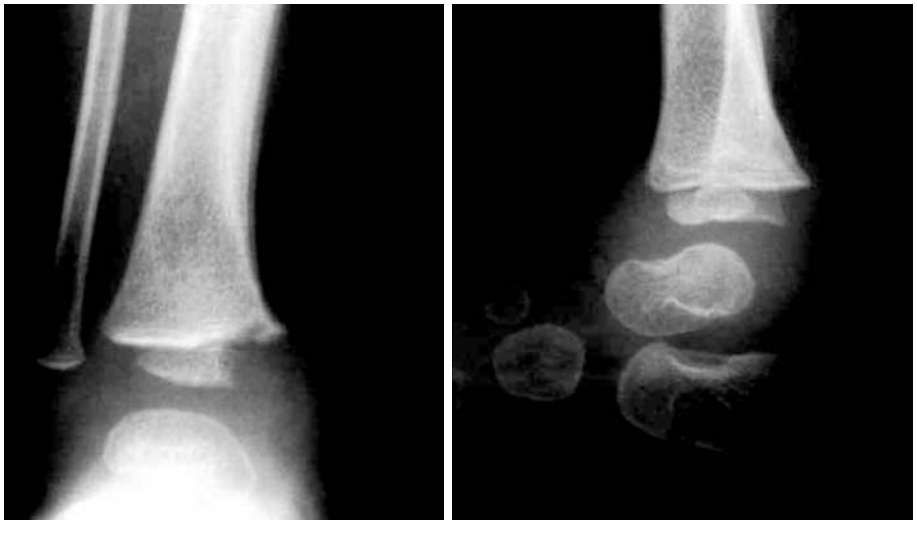

Fig. 2. Irregular bone defect of the distal metaphysis and epiphysis (case 2)

acute osteomyelitis. Before the antibiotic era, surgical drainage was the only available treatment; however, it led to high morbidity and mortality. During the early years of the widespread use of antibiotics, surgery still played a primary role and antibiotics decreased the complication rate [15]. It was strongly advocated that incision and drainage followed by antibiotics was the optimum treatment for acute osteomyelitis [15], and the average cure rate for patients with acute osteomyelitis treated this way was up to 90% [16]. In our first case, the child was treated with antibiotics alone for 6 weeks without improvement. In our second case, the initial antibiotic treatment was given for 2 weeks, but also with little improvement. Surgical intervention produced complete healing in both patients. In retrospect, we consider that the degree of epiphyseal destruction in both children could have been diminished by earlier surgical intervention.

Acute osteomyelitis is now a curable disease. The chance of cure is directly related to five factors: first, the virulence of the organism causing the infection and the resistance of the host to the spread of that infection; second, the initial choice of antibiotics used; third, the site of infection; fourth, the duration of treatment with antibiotics; and last, the time taken between the onset of symptoms and the initiation of correct therapy. Acute osteomyelitis should always be considered in any child who develops pain in a limb during or after varicella infection, and early surgical treatment seems to reduce its spread. The prophylactic employment of antibiotics to prevent secondary bacterial infections after varicella infection does not seem to be necessary.

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