

Case Report

Acute Haematogenous Osteomyelitis of the Patella in Childhood

Claudia Kallfelz¹, Reiner Wirbel^{2*}, Merten Kriewitz³, Alexander Stölben⁴ and Lutz von Laer⁵

¹Department of General and Pediatric Surgery, Verbundkrankenhaus Bernkastel-Wittlich, Germany

²Department of Trauma, Hand and Reconstructive Surgery, Verbundkrankenhaus Bernkastel-Wittlich, Germany

³Department of Paediatrics, Verbundkrankenhaus Bernkastel-Wittlich, Germany

⁴Institute of Diagnostic Radiology, Verbundkrankenhaus Bernkastel-Wittlich, Germany

⁵Basel, Switzerland

***Corresponding author**

Reiner Wirbel, Department of Trauma, Hand and Reconstructive Surgery, Verbundkrankenhaus Bernkastel-Wittlich, Koblenzer Str. 91, D-54516 Wittlich, Germany, Tel: 49-6571-1532310; Fax: 49-6571-1532390; Email: r.wirbel@verbund-krankenhaus.de

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Abstract

The rare case of an acute haematogenous osteomyelitis of the patella in a 9-year old boy is presented. Primarily, the symptoms were misinterpreted as tonsillitis or acute rheumatoid arthritis. MRI was helpful to confirm the correct diagnosis. Sequestration of the patella required surgical debridement. Recurrence after seven weeks could be cured by renewed sequestrectomy. The actual examination after two years did not present signs of relapse.

Presenting an updated algorithm, the problems of the diagnostic and therapeutic process in acute haematogenous osteomyelitis in childhood are discussed.

ABBREVIATIONS

CRP: C-Reactive Protein; ENT: Ear Nose and Throat; MRI: Magnetic Resonance Imaging

INTRODUCTION

There is a large spectrum of differential diagnoses of knee pain in childhood. The analysis of post-traumatic knee pain as a result of injuries of the bone, ligaments, or the cartilage is inherently very difficult. The list of non-traumatic causes of knee pain in childhood is even more extensive. While clinical symptoms and simple diagnostic procedures will rapidly determine the therapeutic regime in traumatic cases, the course in non-traumatic cases is often prolonged. The initially symptomatic pain therapy is often followed by extensive diagnostic procedures before specific treatment can be started.

Diagnostic investigations before specific treatment are justified in most of the cases, but there exist some exceptions. These exceptions require the primary treatment before the diagnostic procedure is completed. The acute haematogenous osteomyelitis represents one of these cases.

The different clinical stages (1. acute phase, 2. incipient chronic stage, 3. established chronic stage) have to be recognized and to be included in the specific treatment regime.

The often used term of sub-acute osteomyelitis is deceptive and mistakes the primary chronic osteomyelitis for the chronic stage of acute osteomyelitis as well as for the afebrile acute progress of an acute haematogenous osteomyelitis [1,2].

Presenting a case report, the purpose of this paper is to demonstrate an algorithm of diagnostic and therapeutic procedures in cases of non-traumatic knee pain in the childhood.

CASE HISTORY

A 9 year-old boy complained about pain in his left knee after BMX-biking, but without any trauma. The next day, he was presented to a surgeon because of persistent pain. The primary statement did not reveal swelling or intraarticular effusion. The range of motion of the left knee joint was not restricted, but prepatellar pain was reported at the maximum of flexion. The plain film X-ray did not reveal any pathologic result.

After two days the patient was presented again because of increasing pain and incipient swelling of his left knee. Now, the boy felt sick complaining about a sore throat and fever. White coverings could be found at the tonsils. The blood counts as well as the titres of antistreptolysine and of borrelia were negative. The patient was transferred to an ENT doctor, where the tonsillar findings could be confirmed. Oral antibiotics (amoxycycline) were prescribed. Because the temperature exceeded 38.5°C

amoxycycline (5x500mg) was taken, but without considerable improvement of the findings of the knee. At the 6th day after beginning of the symptoms the patient was admitted to our hospital.

Clinical findings

The left knee of the presented sick boy was clearly swollen and warmed. To prevent pain the knee joint was fixed at 70°C of flexion. The left-sided inguinal lymph nodes were swollen and painful. The body temperature of 39°C was not reducible by nurofene.

Laboratory investigations

Under the suspicion of a rheumatoid disease extensive blood tests were performed but did not reveal any pathologic result including normal results for leucocytes and CRP-value (leucocytes 7600/ml; CRP-value 5mg/l).

The *ultrasound* did not show intraarticular effusion or cortical defect of the bony structures, but an extensive swelling of the parapatellar soft tissue could be detected.

Treatment and further course

Under the suspicion of a juvenile rheumatoid arthritis the previous antibiotic treatment was stopped and intravenous pain medication was started. In spite of intensive local and systemic therapy pain relief could not be noted, and increasing redness became obvious. The aspiration of the knee joint did not prove effusion. Bacteriological findings were negative as well as the titres of rheumatic diseases or borrelia.

The consulted paediatric surgeon initiated a *MRI* of the left knee joint supposing an acute haematogenous osteomyelitis. Definite osteolyses of the bony structures and intraarticular fluid could not be found. However, peripatellar swelling of the soft tissue was detected (Figure 1). The controls for the white blood cell account and the CRP-value showed increased values (leucocytes 12.000/ml; CRP-value 83, 5 mg/l).

Thereupon, conservative treatment by intravenous antibiotics (fosfomycine and clindamycine) was attempted. Once the symptoms improved for the next two days, they deteriorated again. White blood cell account and CRP-value were still elevated (leucocytes 11.000/ml; CRP-value 80 mg/l). Thus, the indication for surgery was seen at the 5th day after starting of the conservative treatment.

The preoperative *plain film X-ray* revealed a sequestration of the patella. Thus, the diagnosis of an acute haematogenous osteomyelitis could be confirmed (Figure 2).

Two sequestrae could be detected and removed intraoperatively without penetration into the knee joint. The general conditions as well as the local clinical findings improved rapidly. Two days after the surgery, values of leucocytes and CRP decreased (9000/ml and 23.5 mg/L, respectively). The antibiotic medication was finished after 12 days up to the CRP-value returned to normal. Further oral antibiotic medication was not arranged. Physiotherapy could be started immediately after the surgery. The patient could be successively mobilized using two crutches with full weight bearing achieved after 4 weeks. Full



Figure 1 MRI of the left knee, (a) sagittal and (b) axial view: swelling of the soft tissue over the patella was recognized; an osteolytic hem in the ventral patella was detected, retrospectively.



Figure 2 X-ray control of the left knee (lateral view) before surgery: a great sequestrum in the centre of the patella became obvious.

range of motion of the knee joint was possible 2 weeks after the surgery. After 7 weeks postoperatively, recurrence of the knee pain was detected, but the range of motion of the knee joint was not restricted. Laboratory investigations gave normal results including white blood cell account and CRP-value (leucocytes 8000/ml; CRP-value 5 mg/l). The plain-film X-ray (Figure 3) showed again a sequestrum of the patella. A large sequestrum of 2 x 3 x 0.5cm could be removed by simple surgical debridement and curettage. The wound was closed without a drainage or instillation of local antibiotics. Single shot intravenous antibiotic treatment (clindamycine) was applied perioperatively without further oral medication. Now, the further course was uneventful. Immediate physiotherapy with full weight bearing was started to maintain the free range of motion of the knee joint.

The actual clinical control, two years after surgery, reveals free range of motion of the left knee joint. The boy does not complain about any pain. The scar is without pathological findings. Full weight bearing as well as all school and recreational sport activities are feasible. The plain film X-ray shows a normalized patella without pathological findings.

The patient and his parents were informed that data from the case would be submitted for publication, and gave their consent.

DISCUSSION

In the industrial countries the incidence of the acute haematogenous osteomyelitis in childhood could be reduced, but discreet rise of its incidence can be noted within the last years [1,2].

Early diagnosis is often not feasible, especially in cases of rare localization. Involvement of the patella is an extreme rarity; there exist only a few case reports [3,4]. Roy *et al.*, [4] reported a series of four cases.

The diagnosis of an acute haematogenous osteomyelitis of the patella is often delayed [3,4] resulting in several complications possible: (1) the penetration of the patellar infection into the

knee joint with subsequent septic arthritis, (2) the chronic manifestation requiring surgical treatment and additional antibiotic medication necessary, and (3) the smooth transition in a chronic sequestering stage of the osteomyelitis resulting in distinct bony defects possible requiring additional surgical treatment. The penetration of the infection into the knee joint depends definitely upon the virulence of the bacteria, the progress of the infection, the previous oral antibiotic medication, and upon the date of surgical intervention. Despite the prolonged course penetration into the knee joint was fortunately not detected in our case.

The date and the circumstances of a penetration of the osteomyelitis into the joint cannot be definitely clarified by review of the literature [1,2]. Obviously, the penetration is considered to occur very late.

In most cases of primary intraarticular fluid it is a sympathetic effusion without bacteria detectable in the aspirate of the joint [1,2,5,6]. In cases of absent intraarticular fluid or negative microbiological result in the aspirate, arthrotomy is not allowed to prevent introducing of bacteria into the joint.

Diagnosed in early stage provided, the acute haematogenous osteomyelitis generally can be treated conservatively without the complication of bony defects after healing [1,2,5-7]. However, in cases of septic arthritis additional local surgical debridement will always be necessary.

Before the antibiotic era diagnosis of haematogenous osteomyelitis usually implicates indication for surgery. In most of the cases chronic stages and late complications such as sequestrations have to be treated. But the problem remains to diagnose the acute haematogenous osteomyelitis as early as possible. But the early stages are not indicated by the duration and the level of the fever, and also not marked by the occurrence of osteolyses. Theoretically, the end of the acute phase is arrived, when the primary focus starts sealing so that antibiotics even in large doses cannot reach it and cannot eradicate the pathological germs. The end of this stage cannot be determined neither by clinical nor by histological features.

The response to the antibiotic medication within the first 2-3 days seems to correlate with the end of the acute phase. It is usually characterized by a rapid decrease in pain and swelling, by a fall of the body temperature and of the CRP-value [5-7].

In our case we supposed that conservative treatment can be justified due to the normal MRI findings. But the further course has demonstrated that there was an established chronic stage of acute haematogenous osteomyelitis, which could be confirmed by the preoperative plain film X-ray as well as by the intraoperative findings. In our case the primary surgical debridement was undoubtedly not radical enough. Therefore, a second sequestrum could develop. Only the re-surgery with rigorous necrectomy could stop the progress to a chronic manifestation.

Local treatments by antibiotic chains or sponges are differently discussed in the literature [6,7]. In our mind it cannot hide the fact that rigorous surgical debridement and necrectomy are essential. Antibiotic chains usually require a second procedure to be removed.



Figure 3 X-ray of the left knee (lateral view) 7 weeks after the primary surgery demonstrated a new sequester in the centre of the patella.

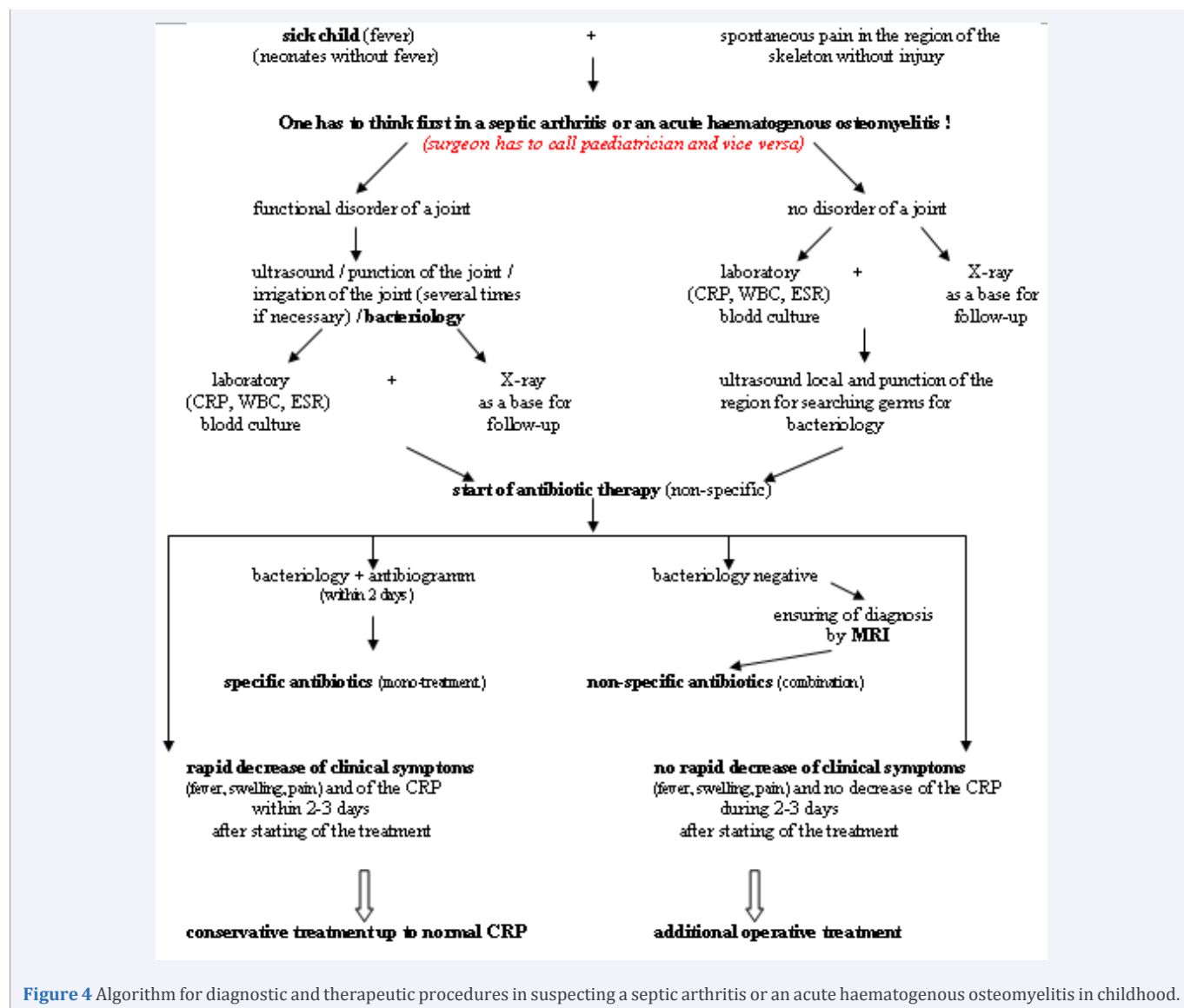


Figure 4 Algorithm for diagnostic and therapeutic procedures in suspecting a septic arthritis or an acute haematogenous osteomyelitis in childhood.

In our case cultures obtained intraoperatively and by the preoperative aspiration were negative maybe due to the previous oral antibiotic medication. After the age of 3 to 4 years, staphylococcus aureus is considered to be the most frequent causative organism. The proportion of methicillin-resistant staphylococcus aureus increases over the last years [5-7].

It is essential to sensitize oneself and the committing colleagues to consider the presumption of the diagnosis of an acute haematogenous osteomyelitis in every sick child complaining about localized pain of the musculoskeletal system. Fever is considered to be the cardinal symptom in infants in contrast to the neonates. The period of the fever can vary from one day to several days [5-7].

First of all involvement of the joint has to be excluded. Ultrasonic investigation will help to confirm or to exclude intraarticular effusion. In case of doubt, the aspiration of the joint has to be performed. When involvement of the joint is proved, immediate lavages have to be performed several times if necessary. Additional systemic antibiotic medication must be

applied after blood cultures were taken [5-7].

Ensuring the diagnosis, the identification of the causative organism has to be focused primarily. Beside blood cultures, the aspiration of the local focus will help to increase the chance to identify the causative organism up to 80% [5]. After that, broad-spectrum antibiotic treatment mostly used as a combined medication has to be started.

The MRI is helpful to confirm the diagnosis. The scintigraphic investigation is considered to be irrelevant in the acute stage; it is maybe a helpful tool to exclude further lesions in the stage of chronification [8].

When the diagnosis of an acute haematogenous osteomyelitis is confirmed, the intravenous antibiotic treatment has to be continued up to the CRP-value and the clinical symptoms return to normal. If necessary, the antibiotic medication has to be modified when the causative organism is identified [5-7]. The need for a subsequent oral antibiotic medication is not generally accepted by review of the literature. There is no clear evidence about the

duration of intravenous antibiotic treatment; the average period is reported to be 3 to 10 days [7]. When the intravenous antibiotic treatment does not respond within 2-3 days, or when increasing pain and fever appear again, the indication for surgery should strongly be taken into consideration to stop the development of a chronic manifestation. All necroses have to be eradicated completely. The indication for surgery can also be dependent on patient's age, location of the osteomyelitis and type of bacteria.

Most of the reported cases of recurrences [6] are considered to be secondary chronic manifestations of an acute osteomyelitis, which may rest for a long period and relapse up to adult age.

The acute haematogenous osteomyelitis requires an expeditious identification and treatment to prevent a chronic progress or persistent defects after healing. The presented algorithm (Figure 4) summarizes the recommended procedure. Thereby, one of the most important requirements is the primary co-operation of pediatricians and surgeons and vice versa - to guarantee a prompt and successful treatment, and to prevent late complications.

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