



Available online at
SciVerse ScienceDirect
www.sciencedirect.com

Elsevier Masson France
EM|consulte
www.em-consulte.com/en



CASE REPORT

Flare-up of previously quiescent chronic osteomyelitis 20 years after childhood skeletal traction: A report of two cases

A. Courvoisier, M. Grimaldi, B. Rubens-Duval, C. Chaussard, D. Saragaglia

Orthopaedic and Trauma Surgery Department, Joseph Fourier University - Grenoble, South Grenoble Hospital, BP 217, 38043 Grenoble cedex 9, France

Accepted: 23 May 2011

KEYWORDS

Skeletal traction;
Osteomyelitis;
Pin track;
Brodie's abscess

Abstract Management of lower limb fractures in children involves many approaches, spanning from conservative treatment to open reduction and internal fixation. A number of intermediate treatments have also been shown to be effective, notably skeletal traction. However, each of these techniques has its own advantages and disadvantages in terms of complications.

In this report, we describe two new cases of chronic osteomyelitis that manifested (many years) after childhood skeletal traction. After analysing these two cases, we proposed measures that can be implemented to avoid such complications, along with a simple, appropriate, reproducible treatment approach.

© 2011 Elsevier Masson SAS. All rights reserved.

Introduction

Lower limb fractures in children have a very good prognosis. Union in growing long bones is almost always achieved, which is why conservative treatment is most often used to treat long bone fractures in young children. For many years, the treatment of femur fractures consisted of skin traction at the zenith in very young children and tibial skeletal traction in older children. The traction was then followed by cast immobilisation. Traction beforehand is practically not being done anymore and is becoming obsolete because these techniques are being replaced by flexible intramedullary nailing.

However, the use of skeletal traction in treating lower limb fractures in children was widespread [1,2].

External fixation of long bones is known to result in complications. Infection of the K-wires or rods is a typical complication during extended treatment with external fixators. These infections are mostly superficial and are usually easily accessible to local treatment, with or without antibiotic therapy [3]. Although rare, a superficial infection can become a deep infection [4]. These are very often acute infections that may require surgical and antibiotic treatment. Very few cases of a chronic infection on the K-wires have described, all the more one with a delayed manifestation.

The goal of this report is to describe the appearance of a remarkably delayed manifestation of two cases of chronic osteomyelitis after childhood skeletal traction.

E-mail address: acourvoisier@chu-grenoble.fr (A. Courvoisier).



Figure 1 Case n° 1. A. Standard radiograph: sclerotic diaphysis. B. Bone scan: uptake in the proximal diaphyseal-metaphyseal area. C and D. MRI: intramedullary accumulation without signs of malignancy.

Clinical case n° 1

The first case involves a 34-year-old male, admitted to the emergency ward for pain in the right knee that seemingly appeared recently, without any identified trauma. The patient was afebrile upon clinical examination. Weight bearing was not possible, but knee joint range of motion was maintained and symmetric. Examination revealed pain upon palpation of the proximal tibial metaphysis, without signs of skin inflammation. Detailed history taking revealed an ipsilateral femur fracture 22 years ago, which was treated with continuous, tibial skeletal traction for three weeks and then a cast for three weeks. There were no complications at that time. The patient mentioned a few episodes of knee pain that spontaneously resolved and were not evaluated. Radiographs performed in the emergency ward did not point to any signs of fracture or bone lysis (Fig. 1A). C-reactive protein (CRP) was below 5 mg/L. However, because of the persistence and significance of the symptoms, a bone scan was performed, which revealed diffuse uptake of the contrast medium in the proximal diaphyseal-metaphyseal area of the tibia (Fig. 1B). An MRI showed an accumulation of intramedullary liquid, with increased signal at the borders (Figs. 1C and D). Surgical biopsy under fluoroscopic guidance found a purulent liquid; bacterial analysis identified a sensitive strain of *Staphylococcus aureus*. In a second procedure, we performed an open curettage of the lesion. The patient was then provided with dual antibiotic treatment (rifampicin and ofloxacin) for 3 months. Full weight bearing with crutches was allowed immediately after the surgical procedure. At a follow-up of 18 months, the patient was asymptomatic. Imaging showed that the proximal tibia was completely restored.

Clinical case n° 2

The second case involved a 40-year-old male, admitted to our department of chronic knee pain at the upper part of

the left tibia. The patient was afebrile upon clinical examination. Weight bearing was possible but painful; knee joint range of motion was maintained and symmetric. Examination revealed pain upon palpation of the proximal tibial metaphysis, without signs of skin inflammation. Detailed history taking found that the symptoms had progressed over a year, slowly worsening but persistent. In the history, the patient reported having had a diaphyseal fracture of the ipsilateral tibia at the age of 15, which was reduced by calcaneal and proximal metaphyseal bipolar traction under general anaesthesia (Braun traction frame) and then casted. The K-wires were left in place for 2 months and then removed at the same time as the cast. There were no complications at that time. Thirty years later, radiographs performed in our department found lysis of the proximal tibial metaphysis, with sclerotic tissue around the injury site (Figs. 2 A and B). CRP was at 61 mg/L. Diffuse uptake of the contrast medium in the proximal tibial metaphysis was observed on a bone scan (Fig. 2 C). An MRI showed a focal collection of intramedullary liquid surrounded by sclerotic bone (Fig. 3). Surgical biopsy under fluoroscopic guidance found a purulent liquid. An open curettage of the injury was carried out. Bacterial analysis identified a sensitive strain of *Staphylococcus aureus*. The patient was then provided with dual antibiotic treatment (vancomycin and ofloxacin) for 3 months. Full weight bearing with crutches was allowed immediately after the surgical procedure. At the last follow-up, the patient was asymptomatic. Imaging showed that the proximal tibia was completely restored.

Discussion

A delayed manifestation of chronic osteomyelitis on a K-wire is rare. Chronic osteomyelitis had an insidious progression and the clinical signs are often crude. Thus the diagnosis is often delayed. Many cases of Brodie's abscess have been described in the literature, with delays in diagnosis ranging from 6 months to 2 years, but never greater than 20 years [5,6].



Figure 2 Case n° 2. A and B. Standard radiographs showing lysis with sclerotic area around the periphery of the injury. C. Bone scan revealed diffuse uptake of the contrast medium in the proximal metaphysis.

These two cases confirm the difficulty of making a diagnosis of chronic osteomyelitis in the tibia [4]. Patient n° 1 had no biological signs of inflammation or infection, but had bone pain that increased (in magnitude) over time. But before each patient was admitted, they reported having chronic knee pain that was never evaluated with additional radiographs. Surgical treatment by curettage with appropriate antibiotic treatment was sufficient. Such a slow disease

progression suggests that the causal microorganism was not virulent. In both cases, a sensitive strain of *Staphylococcus aureus* was isolated. This has been described in the published literature as the microorganisms responsible for the formation of chronic abscesses. Gram-negative bacteria are however more likely to cause a recurrence. A bone graft is recommended in cases of recurrence or injury greater than 3 cm in diameter [5]. The duration of the antibiotic treatment is controversial. In our experience, 3 months of treatment seems to have been effective; others recommend a shorter 45-day treatment [5].

Complications that are secondary to the use of skeletal traction in children bring up questions about the current validity of these treatment methods. Skeletal traction as a treatment for femur fractures in children has been the method of choice for some (surgeons) at a time when the use of flexible intramedullary nailing (FIN) was not widespread. There is a growing consensus that intramedullary fixation in older children and closed reduction with a spica cast in younger children is the best approach. A period of skin traction can be necessary if there is the intervention is delayed, but it is no longer the basis for treatment. Skeletal traction for femur fractures is a method that is outdated and has been abandoned in daily practice in paediatric orthopaedic departments.

Few publications describe bipolar traction for tibial fractures in children. It consists of the placement of a transcaneal K-wire and a trans-tibial K-wire under the anterior tibial tuberosity to avoid injuring the growth plate. Traction stirrups are installed onto these K-wires and placed under tension in the Braun traction frame. With the fracture reduced, a fluoroscope is used to take A/P and lateral views. A long-leg cast is put on, leaving the K-wires visible or embedded in the cast. This method is rarely used because small alignment defects in the frontal or sagittal plane can be tolerated in children. This clinical case emphasizes the

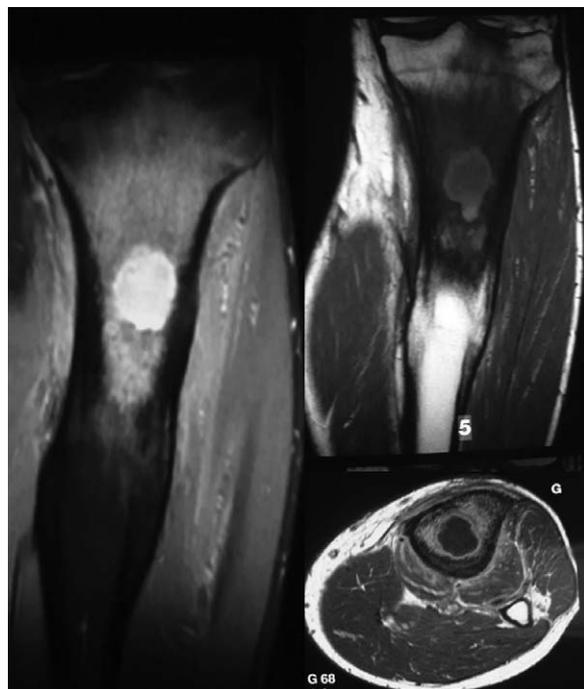


Figure 3 Case n° 3. MRI confirms the accumulation of an intramedullary liquid surrounded by sclerotic tissue, without signs of malignancy, which suggests chronic osteomyelitis.

advantage of this technique on unstable and comminuted tibial fractures that are suitable for conservative treatment, as an alternative to FIN, which can be very tricky in this type of fracture. However this treatment is not harmless.

Infections in these two clinical cases recall the typical complications associated with external fixators. Particularly in paediatrics, infections related to the external fixator during limb distraction are very common [7,8]. They are often minor, superficial infections at the K-wire entry point. Local treatment is almost always effective. Preventing these infections requires that the K-wire entry points be cleaned during showering. Antibiotic treatment or even surgical curettage of the K-wire tract is sometimes needed in cases of deeper infection. Also, infections along the K-wires happen mostly if they are inserted into cortical bone [4]. Cancellous bone areas are thus preferred. These methods can certainly prevent most of the infections but chronic osteomyelitis can develop and manifest itself later on, despite removal of the K-wires.

As far as we know, no other cases have been published with such a delayed appearance. The benign nature of the infections in the two cases presented here led to a satisfactory outcome with appropriate treatment.

These two cases highlight the importance of a clinical examination for the evaluation and diagnosis of a bone abscess. Although standard radiographs do not always add information, they can help with the diagnosis if an area of lysis is found, and should in principle be carried out with any case of chronic knee pain. Based on our experience, an MRI was performed to confirm the diagnosis and evaluate the involvement of soft tissues, which would help to distinguish between chronic osteomyelitis and a bone tumour [9]. MRI is currently the gold standard to evaluate bone injuries.

Conclusion

Chronic osteomyelitis is an insidious disease that can develop under the radar for many decades. The diagnosis is

easier with a CT scan or preferably an MRI. Changes in surgical practice has led to traction being gradually abandoned in favour of flexible internal fixation in children, but the increasing use of external fixation in children can also lead to this type of complications. In addition, many adult patients were previously treated with skeletal traction methods, so it would be good to remember that chronic osteomyelitis can develop and manifest itself later on, despite removal of the K-wires.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References

- [1] Ryan JR. 90-90 skeletal femoral traction for femoral shaft fractures in children. *J Trauma* 1981;21:46–8.
- [2] Winant EM. The use of skeletal traction in the treatment of fractures of the femur. *J Bone Joint Surg Am* 1949;31A: 87–93.
- [3] Nigam V, Jaiswal A, Dhaon BK. Local antibiotics: panacea for long term skeletal traction. *Injury* 2005;36:199–202.
- [4] Green SA, Ripley MJ. Chronic osteomyelitis in pin tracks. *J Bone Joint Surg Am* 1984;66:1092–8.
- [5] Stephens MM, MacAuley P. Brodie's abscess. A long-term review. *Clin Orthop Relat Res* 1988;(234):211–6.
- [6] Dunn EC, Singer L. Operative treatment of Brodie's abscess. *J Foot Surg* 1991;30:443–5.
- [7] Antoci V, Ono CM, Antoci Jr V, Raney EM. Pin-tract infection during limb lengthening using external fixation. *Am J Orthop (Belle Mead NJ)* 2008;37:E150–4.
- [8] Boisrenoult P, Beaufils P. Infection associated with orthopaedic fixation devices. *Rev Prat* 2007;57:979–84.
- [9] Shimose S, Sugita T, Kubo T, Matsuo T, Nobuto H, Ochi M. Differential diagnosis between osteomyelitis and bone tumors. *Acta Radiol* 2008;49:928–33.