



Case Report

Ankle sprain injury in child and adolescent: Diagnostic pitfalls



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ABSTRACT

Introduction and importance: Sprained ankles in children and adolescents are rare. Certain diagnostic pitfalls must arise in the mind of the clinician because many differential diagnoses must be confirmed or refuted urgently. Among them, the infectious osteoarticular pathology including acute hematogenous osteomyelitis of the tibia or distal fibula and septic arthritis of the subtalar joint.

The main purpose of this work, through four clinical cases, we will discuss diagnostic pitfalls in the course of ankle trauma in children and adolescents.

Case presentation clinical: In this work, we have demonstrated through four cases some diagnostic errors in the context of ankle trauma in children and adolescents. Infectious and malignant tumor pathologies are real diagnostic and therapeutic emergencies. For all these cases, the initial diagnosis was a sprained ankle following a gambling or sports accident.

Discussion: Ankle trauma in children and adolescents is a frequent reason for consultation in emergencies. The fear of the orthopedic surgeon is to miss a serious pathology and wrongly make the simple diagnosis of a sprained ankle. Temperature measurement must be systematic. The clinical examination must be meticulous. The interpretation of the radiograph must be cautious. Acute hematogenous osteomyelitis and malignant tumor pathology should be on the surgeon's mind.

Conclusion: We have shown through these four examples that a serious pathology can simulate a sprain. Hence, a careful analysis of clinical, biological and radiological elements is the only guarantee of adequate care.

1. Introduction

Ankle trauma in children is a frequent reason for consultation in orthopedic emergencies. In the absence of a fracture on conventional x-ray images, ankle sprains are often labeled benign. They can occur as young as six to seven years old [1]. But, it is not always the case. A serious pathology, sometimes life-threatening, can constitute a diagnostic trap that should not be ignored. The main purpose of this work, through four clinical cases, we will discuss diagnostic pitfalls in the course of ankle trauma in children and adolescents.

This work has been reported in line with the SCARE 2020 criteria [2].

2. Case presentation

In this work we report four clinical cases of erroneous diagnosis within the framework of the traumatism of the ankle of the child and the teenager who consulted in second intention a university hospital center of pediatric orthopedics.

2.1. 1st clinical case

This is a six-year-old boy, no medical history, who suffered a trauma to his right ankle in a domestic accident. He consulted in the pediatric trauma emergencies. He had a physical examination and an x-ray of the ankle which was considered normal. Faced with the presence of edema

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and swelling over the external malleolus, the diagnosis of a sprain of the external lateral ligament is made. The child was immobilized by a boot splint. Six days later, the child consulted again for sleepless pain in the context of a fever. After the explorations, the diagnosis of pandiaphysitis of the tibia in the context of acute hematogenous osteomyelitis was made. The child was operated on several times with a change to the chronic form and bone sequestration of the entire tibia (Fig. 1 a). Bone stabilization is provided by an Ilizarov external fixator (Fig. 1 b). The hospital stay was long, absenteeism from school was frequent and the psychological impact was significant, both for the child and for the family. Bone consolidation is obtained after antibiotic therapy for three months and one year of immobilization with Ilizarov external fixator (Fig. 1 c). In front of a trauma of the ankle with a normal radiological assessment, the taking of the temperature and the thermal profile at home are obligatory.

2.2. 2nd clinical case

Ten-year-old girl, no medical history, who had a left foot inversion a week ago. On physical examination, she had functional impairment of her left lower limb and walked with a limp. Mobilization of the ankle in flexion extension was not painful. The temperature was at 38.1 °C. X-ray and ultrasound of the ankle did not show any abnormalities. A mild biological inflammatory syndrome which has been granted to an episode of the common cold. Forty-eight hours later, the temperature was 39.4 °C, a sharp pain in the ankle related to the mobilization of the subtalar or astragalocalcaneal joint. The ultrasound revealed an effusion at this level. The girl is operated. She had an antero-external ankle surgery exposing the subtalar (Fig. 2 a). The appearance was that of septic arthritis of the sub-talar. He was washed abundantly with physiological serum, an aspirating Redon drain was placed in subtalar joint (Fig. 2 b), immobilization in a splint and antibiotic therapy. Healing is obtained without sequelae. The patient had a regular follow-up every three months with biological and radiological control. After a year's follow-up, there are no sequelae.

2.3. 3rd clinical case

Fifteen-year-old, no medical history, patient who suffered a trauma to the right ankle in a gambling accident. He consulted in the emergency room. In front of the swelling of the external malleolus and the sensitivity to palpation of the external lateral ligament, an X-ray is required. She was found to be normal. The diagnosis of a severe sprain of the external lateral ligament is made. The action to be taken was immobilization of the ankle in a boot splint. When the splint is removed at check-up after two weeks, the ankle is more swollen (Fig. 3 a). The follow-up X-ray showed an aggressive lytic process of rapid evolution in the calcaneus. MRI bjectivated a tissue process invading the calcaneus and adjacent tissues (Fig. 3 b). Biopsy confirmed diagnosis of Ewing's sarcoma. Tumor extension was above any conservative surgery. The patient underwent neoadjuvant chemotherapy followed by leg amputation before repeating adjuvant chemotherapy. After two years, the patient had his leg prosthesis. The psychological and socio-economic impact was significant.

2.4. 4th clinical case

A three-year-old boy, no medical history, with a lameness related to pain in the right calcaneus that has been progressing for six days without fever. The standard radiography is without abnormalities, the initial CBC was normal, checked after five days showed pancytopenia. The MRI showed a signal abnormality in the calcaneus. The myelogram confirmed the diagnosis of acute lymphoblastic leukemia. The child was referred for management in a university medical center for clinical hematology.

3. Discussion

Traumatic ankle and foot injuries represent a daily problem and a real challenge for pediatric orthopedists and radiologists [3]. The child has specific bone fragility which changes with age. He can also present ligament injuries which remain poorly understood [3]. The diagnosis of a tibio-tarsal sprain in children has many pitfalls such as the ignorance of

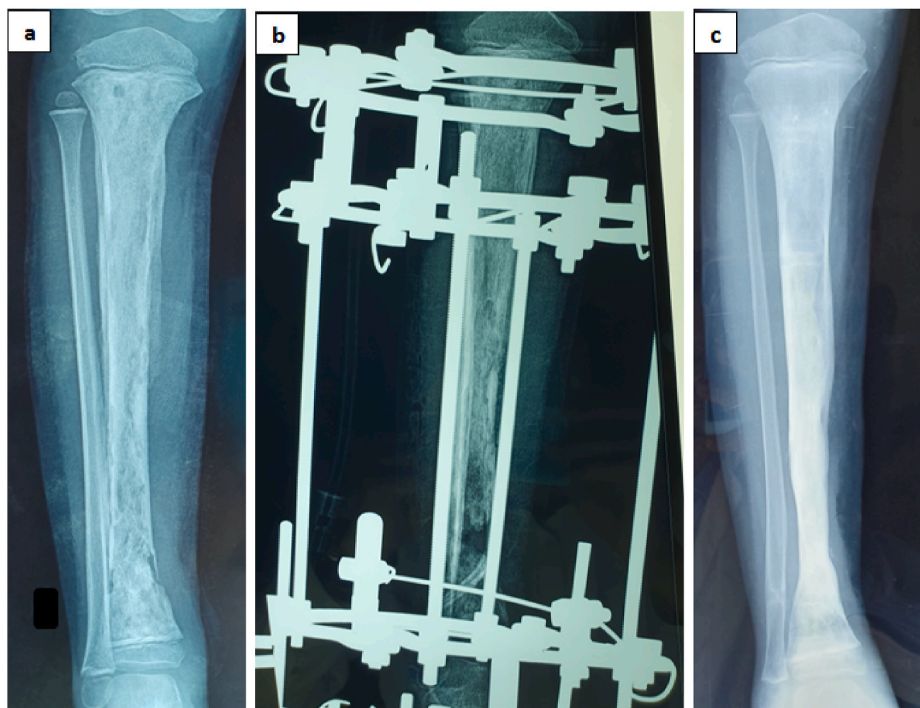


Fig. 1. A-P X-ray of right leg: a. pandiaphysitis of the tibia, b. stabilization by an Ilizarov external fixator, c. x-ray at one year.

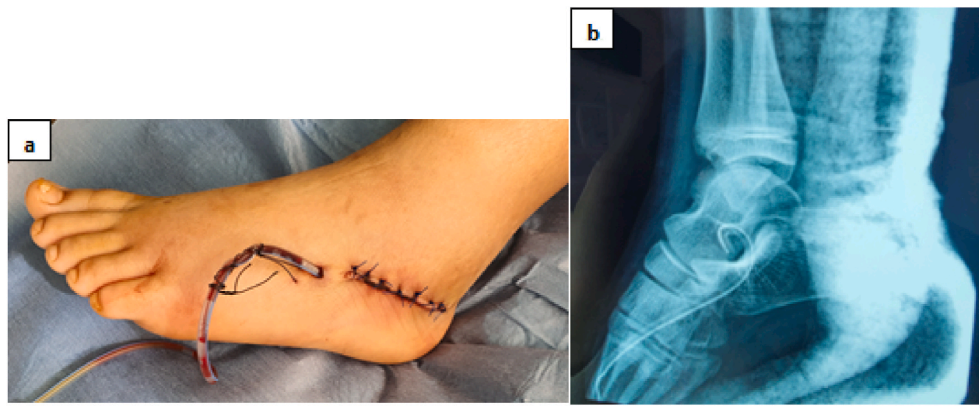


Fig. 2. a. post-operative photography, b. post-operative radiography.

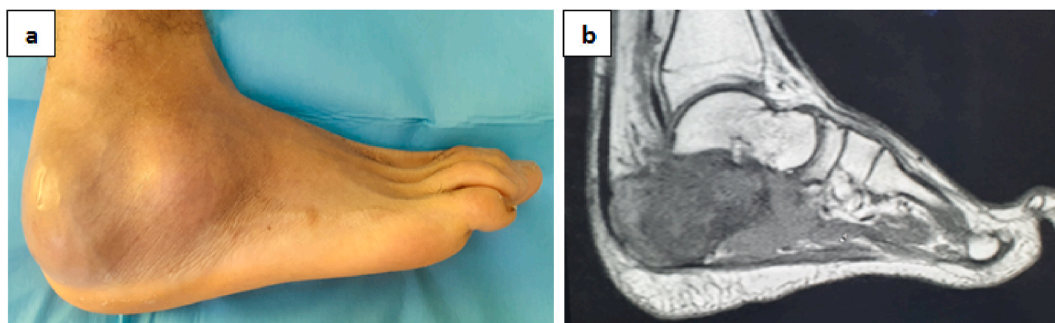


Fig. 3. a. subcutaneous protrusion of tumor tissue in the hindfoot, b. MRI: Hyposignal T1 of the calcaneus.

an iterative pathology of postural origin, the blaming of a sprain of a different pathology [4]. Some diagnostic pitfalls are specific to the child and can have a functional or even life-threatening prognosis.

When x-rays do not show traumatic bone lesions, which is the case in more than 90% of cases [5], the diagnosis made by default is often that of sprain or contusion.

However, through these four clinical cases, we have shown that it is necessary to carry out a good clinical examination with a focused interrogation, to correctly interpret the radiological assessment and not to forget to measure the temperature, or even to ask the parents to carry out a thermal profile home.

Acute hematogenous osteomyelitis does not pose a diagnostic problem in the typical forms of febrile bone pain with biological inflammatory syndrome. Localization at the ankle is rare. In 40% of cases, it follows a trauma. Acute hematogenous osteomyelitis may be unrecognized in the atypical forms with an insidious onset or when taking antibiotics or corticosteroids which only camouflage the course of the infection. In doubtful cases, it is recommended to do an MRI. It makes it possible to make the diagnosis of acute hematogenous osteomyelitis at the medical stage, that is to say stage 1 according to the classification of Essaddam and Dargouth. The treatment is then medical with a cure without sequelae.

Septic arthritis of the subtalar or talar-calcaneal joint is also an underestimated condition. The diagnosis is often late because it is a loose joint and is forgotten during the clinical examination. It is clinically manifested by lameness, pain and reduced mobility of the hindfoot. The standard x-ray is normal at the arthritis stage without bone involvement. Ultrasound may ignore the early forms because joint effusion is minimal. MRI is efficient and makes the diagnosis early.

In bone and joint infection, pain is often the only symptom. Fever may not be a dominant feature at presentation, but it increases the likelihood of acute hematogenous osteomyelitis or septic arthritis [6]. Gadolinium MRI is the most sensitive and specific non-invasive test for

diagnosing acute hematogenous osteomyelitis [6]. Bone marrow edema is the first sign on MRI [7].

Malignant bone tumors in the foot are rare. They can be primary (Ewing's sarcoma) or secondary (metastasis from a neuroblastoma). The mechanism and symptoms may be that of a sprained ankle. Local pain and swelling of the ankle are the primary symptoms of patients [8]. At the infra-radiological stage, there is only MRI that can objectify bone lesions. The 5-year prognosis is correlated with early diagnosis.

Ewing's sarcoma of the calcaneus is rare [9,10]. Symptoms are insidious, progressing over several months before the onset of palpable swelling [10]. Here again, MRI is the most efficient complementary examination to objectify bone and tissue lesions at the infra-radiological stage. Biopsy for histological and molecular study confirms the diagnosis.

Hematologic malignancies, in particular acute lymphoblastic leukemia, can be seen in 25–40% by bone pain before the change in CBC. Bone pain is commonly one of the presenting features of acute [11]. This form of presentation can lead to delays in the diagnosis of acute leukemia in childhood. The medullary puncture revealing a medullary infiltration by acute lymphoblastic leukemia.

4. Conclusion

The diagnosis of a sprained ankle in children should not be easily made. We have shown through these four examples that a serious pathology can simulate a sprain. Hence, a careful analysis of clinical, biological and radiological elements is the only guarantee of adequate care.

Ethical approval

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Author contributions

Mohamed Zairi: Writing drafting the article. Rim Boussetta: revising it critically for important intellectual content. Ahmed Msakni: conception and design. Ahmed Amin Mohseni: revising it critically. Mohamed Nabil Nessib: final approval of the version to be published. Walid Saied: final approval of the version to be published. Sami Bouchoucha: final approval of the version to be published. Chaker Jaber: revising it critically. Mohamed Laroussi Toumia: Writing drafting the article.

Consent

Written informed consent was obtained from the patient's guardian for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Guarantor

Mohamed Zairi.

Declaration of competing interest

The authors declare no any conflicts of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amsu.2022.104540>.

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