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Case report

Proximal fibular stress fracture in adolecent soccer player. A case report

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Abstract. Fibular fractures are the third most common stress fractures in children and adolescents. Proximal fibular location is a very rare finding, with few reports in the literature and, frequently, careful investigations before a definitive diagnosis could be necessary. The authors report a case of an adolescent 13 years old soccer player with a proximal fibular fracture that was initially underestimated and misdiagnosed and ultimately confirmed as a stress lesion by MRI. (www.actabiomedica.it)

Key words: fibula, stress fracture, adolescence, soccer

Introduction

Stress fractures are a rare occurrence usually associated with repetitive movements and endurance based activities. These lesions are well documented and studied in the adult population but there are less data on their incidence and few reports in childhood and adolescence (1). Fibular fractures are the third most common site for stress fractures. Several studies suggest that these injures comprise up to 30% of all stress fractures in athletes (1,2). They usually occur in the diaphysis or in the distal third of the bone and less frequently in its proximal third (2). The authors report a case of a 13 years old soccer player with gradual onset of proximal postero-lateral right leg pain that was ultimately diagnosed as a proximal fibular stress fracture.

Case report

A 13 years old male soccer player (midfielder) presented with proximal postero-lateral leg pain on the right calf and a little swelling which developed after a friendly match at the end of the season without any traumatic reported event. He was initially treated with pain killers and rest with benefit. At the beginning of the following sport season, after 2 weeks of training, he complained again of the same signs and symptoms. Preseason practices were held every day and lasted approximatively 2 hours per day. He denied any change in equipment or playing surfaces. His past medical history was not remarkable. He had no prior history of injury and his pattern of growth was normal. Examination revealed bilateral cavus foot deformity associated with varus hindfoot (figure 1). Greater loads were localized on the external portion of the feet (initial presence of calloses). Patient was submitted to ultrasound and radiographs (figure 2) which respectively showed edema of the soft tissues around the proximal fibula and irregularity of the posterior cortex of this bone (figure 2). In the suspicion of stress fracture an MRI (figure 3) confirmed the diagnosis.

Treatment initially consisted in avoiding loading activities and using long pneumatic splint in association with magnetotherapy. No pharmacologic treatment was prescribed. After 1 month x-rays (figure 4) showed bone callus formation. A strengthening and flexibility program for the dorsiflexors, plantar flexors,

peroneals and hamstrings was consequently begun as well as progressive weight bearing. Two months after injury MRI (figure 5) demonstrated advance healing phase and the athlete increased progressively his loading activities and training. The patient became asymptomatic and non tender 40 days after diagnosis. At this time a computed study of the distribution of the loads of the lower legs was performed and dedicated orthoses of both feet were applied (figure 6) 24 hours per day. By 2.5 months he had resumed full soccer participation without the return of symptoms.

Figure 1. Clinical view with cavus deformity and varus hindfoot alignment.

Discussion

Stress fractures have been first described in the soldiers of the Prussian army in 1855 by doctor Breithaupt after long marching sessions (3). Since then, stress fractures were considered only as a common injury in the military population but more recently they have been associated also with sports and endurance based activities (1,4,5).

It has been suggested that these injuries in athletes occur less frequently in children and adolescent than in adults. This datum was also confirmed by Orava (4) who showed that stress fractures are more often found in adult athletes than in adolescent; in this period, the age when this type of injuries are more common is between 13 and 15 years. Their incidence is between 1.5% and 3.9% of overall injuries in young athletes (6,7).

They are usually located in the tibial shaft, metatarsal and distal third of the fibula. Only few cases of proximal fibular stress fractures have been described in

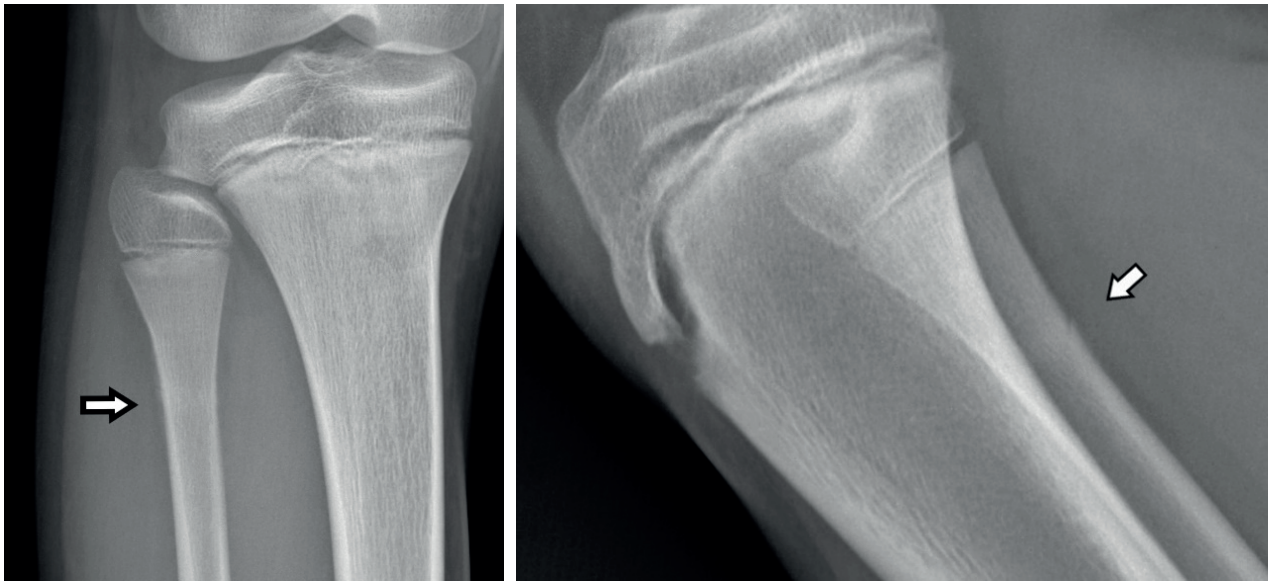

Figure 2. X-rays with irregularity of the posterior cortex of the fibula (arrows).

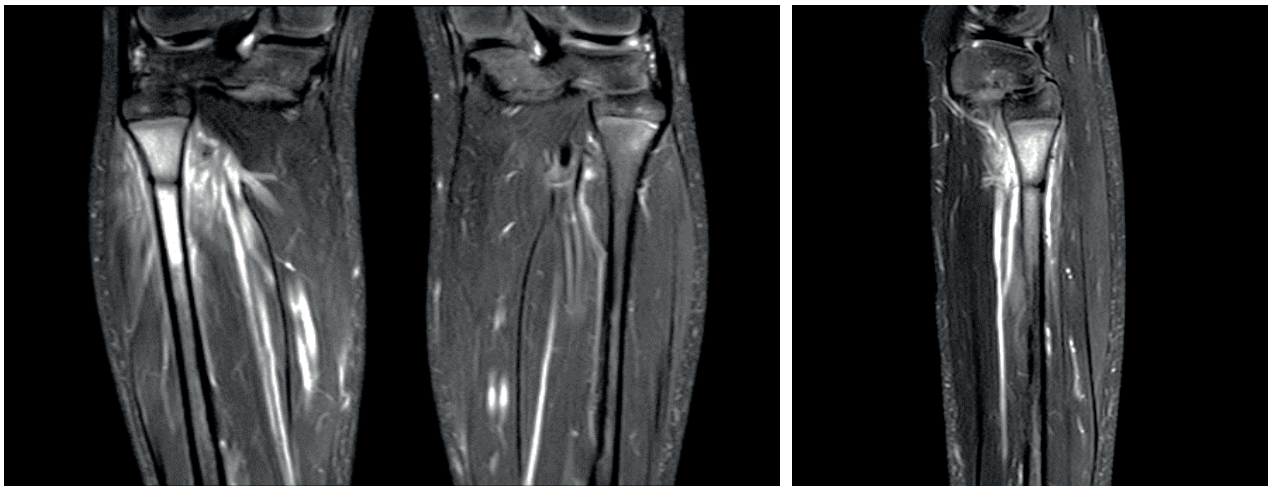

Figure 3. MRI images with soft tissues and marrow edema associated with a fracture line through the cortex of the proximal fibula.

the literature in both military and athletic population (2,5,8-10).

There is no consensus over possible risk factors of proximal fibular stress fractures (1,4,11,12). Sarpong (13) observed that the majority of patients affected by proximal fibular stress fractures had hindfoot varus alignment. By contrast, the majority of those who sustained distal fibular stress fractures exhibited hindfoot valgus alignment. Biomechanically, a valgus hindfoot alignment would lead to a greater amount of axial force through the lateral distal tibia and fibula, thus increasing the relative amount of weight that the fibula bears during ambulation. It is less clear how a varus hindfoot could potentially play a role in a proximal fibular stress fracture. Hong (10) published a retrospective study in order to evaluate the possible mechanism behind the

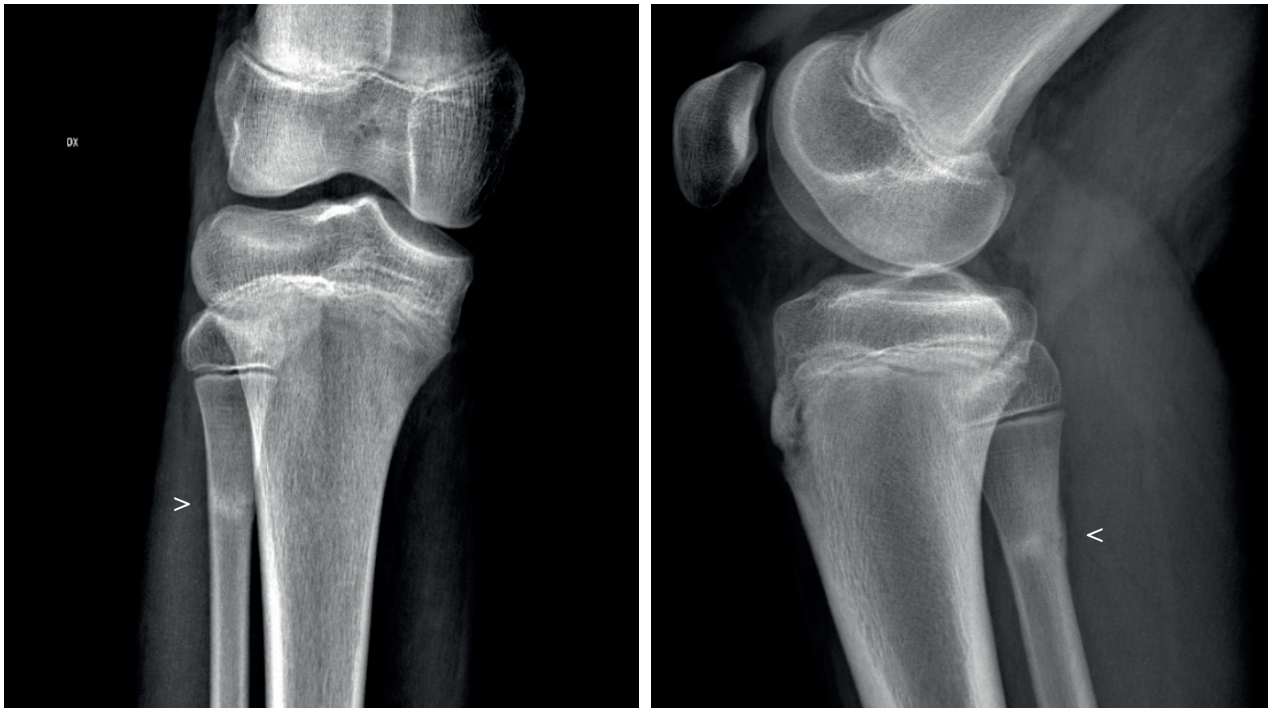

Figure 4. X-rays 1 month after injury with callus bone formation (signs).

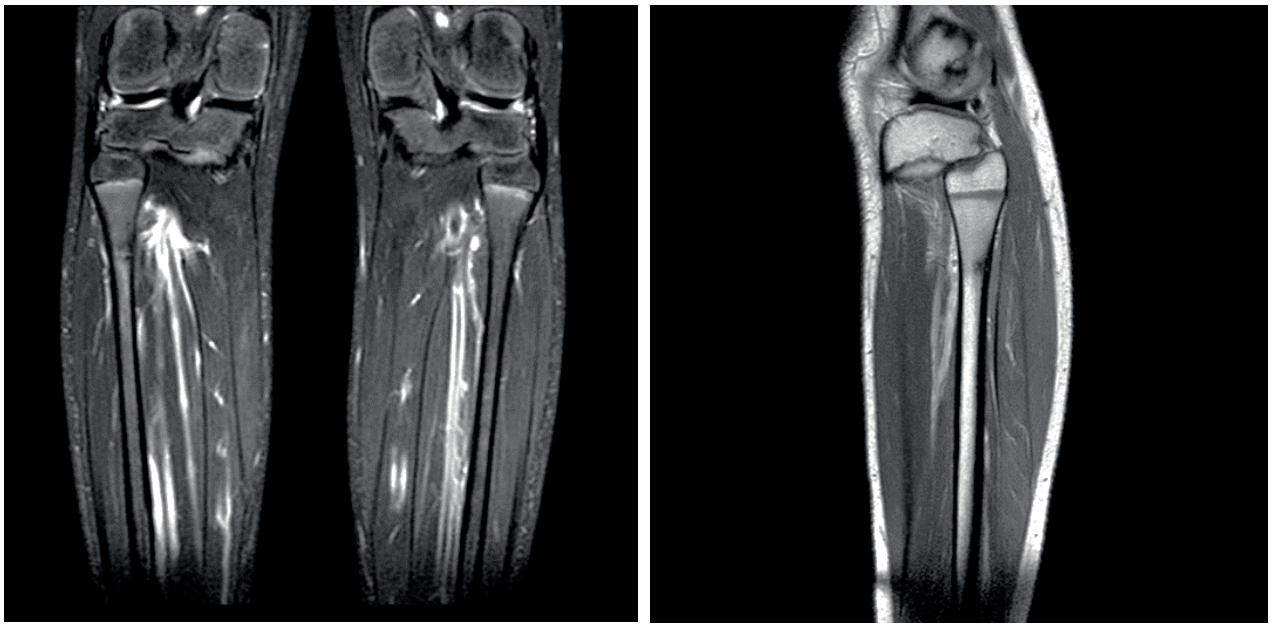

Figure 5. MRI views in healing phase and advanced edema resorption.

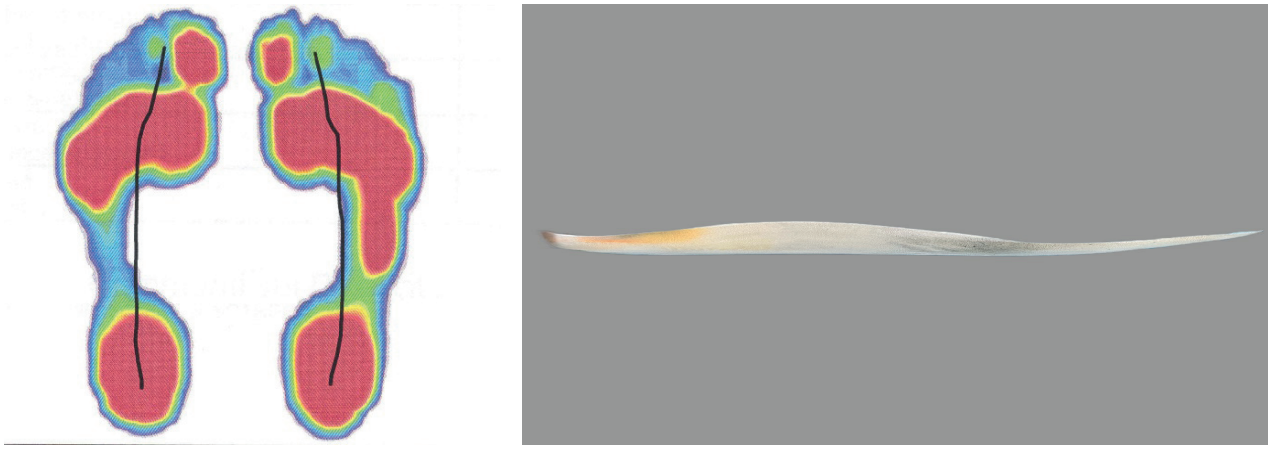

Figure 6. Distribution of loads and image of the orthosis applied.

stress fractures of the proximal third of the fibula in 13 Korean soldiers. He hypothesized that the alternating contraction of the soleus and the peroneus brevis muscle during walking rather than during jumping in a squatting position may place shearing forces on the proximal fibula and the repetitive stress causes the fractures.

The diagnosis of proximal fibular stress fractures remains not simple and it is often delayed. Usually athletes complain of pain and tenderness around proximal leg and x-ray examination is not so sensitive to detect the fracture. It has been demonstrated that on the initial radiographs only 10-29% of these lesions are detected and between 40-54% in later x-ray studies (14). MRI have a much higher sensitivity in detecting this type of injury showing bone marrow edema, periosteal reaction, and intra-cortical signal anomalies (15). Nevertheless, imaging features and clinical

pictures, especially in initial phases of the disease, are very similar to those seen in osteomyelitis and neoplastic lesions making these differential diagnosis extremely critical.

In the choice of correct treatment of stress fractures (conservative or surgical), anatomical localization, healing capability and risk of a new fracture have to be considered (16). Proximal fibular stress fractures are considered "low risk" lesions according to Diehl (16) and, consequently, in the majority of the cases they are treated conservatively.

This case report confirms all these assumptions. The diagnosis was delayed and the suspicion of stress fracture was confirmed only by MRI. Bone healing was complete, without recurrence, through a conservative treatment. Furthermore, authors wants to highlight that application of dedicated orthoses in order to correct associated feet deformities may help healing as well as prevention of recurrences.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

Statement of Informed Consent: Informed consent from the patient to published the case (included images, case history and data) was obtained.

Author Contributions: FC and EV contributed to the study conception. Material preparation and data collection were performed by AL, UF and PS. . FP and FC are the senior surgeons supervising the writing of the article. AP assessed the scientific contents and the writing. All authors read and approved the final manuscript.

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