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Case Study

Tarsal Coalition in Children and Adolescent And Recurrent Sprain Frequency

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Abstract

Tarsal coalitions correspond to an abnormal fusion of one or more tarsal bones. Tarsal coalitions cause pain, stiffness, recurrent sprains, and contracted valgus flat feet in children and adolescents, detrimental to the functional prognosis. They can be difficult to diagnose on standard x-rays, so it is vital to be aware of the indirect radiological signs that may be suggestive. When in doubt, cross-sectional imaging techniques should be used. Despite the fact that it can cause radiation, CTscan is still the gold standard, providing a three-dimensional approach to the bone bridge and allowing comparative bilateral studies.
We report the case of a 12-year-old boy with unilateral talo-calcaneal left-wing coalition, who presented with pain, a notion of repeated sprains, stiffness of the back foot with a significant limitation of daily activities and sports.

Keywords: Tarsal coalition, recurrent sprains, ossification, resection-interposition

INTRODUCTION

Tarsal coalitions (TC) are rare malformations, affecting 1 to 3% of the general population [1-2]. They are a cause of functional walking disability in adolescents [3]. TC are manifested by pain with, in extreme cases, a contracted foot and/or various deformities of the foot in children, mainly a flat foot, which clinical examination will show to be inflexible and will lead to a search for this diagnosis.

In 1769 Buffon [4] was the first to describe this condition and Zuckerkandl in 1877 [5] described the anatomy of the talocalcaneal coalition. Harris and Beath in 1948 [6] associated the tarsal coalition with the spastic fibular flat foot, hence the erroneous name "Peroneal Spastic Flat Foot".

Clinical presentation

A 12-year-old male patient had been complaining of mechanical pain of the tarsus and lateral malleolus of the left foot for 2 years, with repeated sprains treated by plaster cast immobilization each time. The symptoms had worsened over the previous three months, with progressive limitation of walking and cessation of sporting activities. There was no history of direct or indirect trauma. Various treatments had been tried, with no convincing

results: analgesics and non-steroidal anti-inflammatories, and plaster cast immobilization.

Examination

On examination, the limp was the equivalent of a toe-toe syndrome. It was impossible to walk on the toes. On inspection, there was cyanotic discoloration of the ankle, local edema and valgus flatfoot, significant limitation of passive mobilization of the talocrural and medial tarsal joints associated with contracture of the fibular muscles.

Investigation

Radiological study of the foot on frontal, lateral weight-bearing and oblique 3/4 views suggested the possibility of a tarsal coalition. A CTscan showed (complete) talocalcaneal fusion.

Treatment and follow-up

After conservative treatment has failed, surgical treatment is indicated, with resection of the coalition zone with interposition of fat tissue. Passive mobilization rapidly after resumption of inflammatory phenomena in pro-supination. Additionally, discharge for four weeks and rehabilitation programme (joint mobilization, muscle strengthening, proprioceptive stimulation and gait training) were conducted. The patient's progresses were favorable, with disappearance of pain, normalization of walking and return to sporting activity.

DISCUSSION

TC corresponds to an abnormal fusion of one or more tarsal bones. This fusion may be complete, in which case it is bony (synostosis) (figures 1,and 2). If the fusion is incomplete, it may be cartilaginous (synchondrosis) or fibrous (syndesmosis) [1-2].

Congenital in the majority of cases, it is inherited in an autosomal dominant fashion [7, 8], as a result of an anomaly in the differentiation or segmentation of the mesenchyme. Less frequently, the condition may be secondary to trauma, infection, surgery or joint pathology, in which case the term ankylosisis used [1].

The incidence is between 1% and 3% in the general population [1-2]. However, this rate is likely to be higher, as these subjects are frequently asymptomatic and the coalition is discovered incidentally.

CTscan are classified based on the bones affected [1-9].The two most common types are calcaneonavicular (extra-articular) and talocalcaneal (intra-articular) [2-1], accounting for around 90% of all coalitions [1-10].



Fig 1: 2D bone talo-calcaneal coalition
(Source: Traumatology-Orthopedics Department, SHE Salim Zemirli)



Fig 2: 3D bone talo-calcaneal coalition
(Source: Traumatology-Orthopedics Department, SHE Salim Zemirli)

Calcaneocuboid, talonavicular and cubonavicular fusions are less frequent [3]. In 30-70% of patients, the coalition is bilateral [10]; there may also be several coalitions on the same foot. Pain is the most common symptom, although many patients may be completely asymptomatic [1-2]. There is often a history of painful episodes described as sprains [10]. Usually, it is discovered in the second decade of life, often between the ages of 12 and 16 years. This is because the painful symptoms only appear when the interosseous bridges ossify, which is generally after the age of 8 for the calcaneonavicular coalition and after 12 for the talocalcaneal coalition. Clinical examination usually reveals a stiff valgus flatfoot. Contracture of the fibular muscles is evident [1-2]. There is a reduction in the amplitude of inversion and eversion movements. As a rule, this condition should be suspected in any child with flatfoot that is painful or does not respond well to orthopedic treatment [3]. The iconographic study of CTscan should begin with conventional radiology [1-3]. Frontal and lateral views in weight bearingshould are supplemented by a 45° internal oblique view, which is essential for showing calcaneonavicular locations [1-10]. Secondary radiological signs for the presence of a calcaneo-navicular coalition are the "anteater nose" sign and hypoplasia of the talus [9]. Talocalcaneal coalitions can be difficult to visualize on the three conventional views, due to the orientation of the subtalar joint [9]. Several secondary radiological signs have been described for talocalcaneal localization, including talar beak, narrowing of the posterior region of the subtalar joint, rounding of the lateral talar process and the "C sign" [9] (fig 3). Scintigraphy shows hyper-uptake at the level of the coalition, and can be useful when the results of conventional radiographs are equivocal [1]. Computed tomography (CTscan) allows easy diagnosis of coalitions and associated degenerative changes, and is essential for the choice of surgical technique [9]. Similarly, magnetic resonance imaging (MRI) can confirm the presence of a coalition. It can also distinguish a cartilage bridge from a bone bridge.

Initial treatment should be conservative, with the aim of relieving symptoms. There is a consensus in favor of the use of an arch support or a small immobilization brace in a neutral or slightly varus position. Non-steroidal anti-inflammatory drugs or local infiltration may be prescribed in the most symptomatic cases [1-2]. About a third of patients respond to conservative treatment.



Fig 3: C sign
(Source: Traumatology-Orthopedics Department, SHE Zemirli)

If this fails, or if the deformity is too severe, or in painful cases, surgical treatment is indicated, with a resection of the coalition zone (especially in young patients) with or without interposition of fat tissue (Fig 4) [11]. The triple arthrodesis is often only considered in older patients, if the coalition is greater (>50%) or if there is marked degenerative damage to the subtalar [2-11]. An associated procedures, in cases of associated valgus flatfoot, were combined lengthening of the calcaneal tendon by vulpius-type aponeurotomy, lengthening of the short fibular tendon in its white part, advancement of the posterior tibialis tendon, and mosca-type calcaneal lengthening osteotomy described since 1991 (34, 35). Calcaneal lengthening osteotomy has been recommended, with or without resection of the coalition, because of its role in correcting hind foot deformity and preserving mobility of the talonavicular and calcaneocuboid joints. It was suggested that this therapeutic approach was justified, as treatment of valgus deformity appeared to be as important as that of the coalition. Arthrodesis is indicated at the end of growth if functional surgery fails.



Fig 4: Child 12 years old - Resection of the talo-calcaneal coalition with fat interposition (Source: Traumatology-Orthopedics Department, SHE Salim Zemirli)

CONCLUSION

Tarsal coalitions are rare lesions that usually occur during childhood and adolescence and are responsible for impaired ability to walk. Clinically, they are frequently interpreted as recurrent sprains. They can be difficult to diagnose on standard x-rays, so it is vital to be aware of the indirect radiological signs that may be suggestive. When in doubt, cross-sectional imaging techniques should be used. Despite the fact that it can cause radiation, CTscan is still the gold standard, providing a three-dimensional approach to the bone bridge and allowing comparative bilateral studies.

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