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Can the practice of yoga be dangerous? Considerations over a case of epiphyseal separation of the distal tibia in a teenager

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Abstract We describe a fracture-separation of the epiphyseal plate of the distal tibia (Salter-Harris type III, or juvenile fracture of Tillaux) in a 15-year-old girl. The case is of interest, above all, in that the trauma occurred during the execution of a yoga posture. The literature does not speak of complications or traumatic consequences of this type of activity. Analyzing the biomechanics of the traumatic event, it appears that even a physical exercise characterized by slow

and gradual movements can cause severe damage, such as the injury described.

Key words Epiphyseal separation · Fracture of Tillaux · Growth plate ·

Introduction

The practice of yoga is part of the vast lore of the Indian civilization. It consists of physical and mental practices that favorably affect diverse body functions. Yoga developed, in the beginning, in the ancient Oriental cultures and later spread to the West.

Numerous studies have validated the efficacy of yoga in diverse fields, both in optimizing normal function and in treating pathological conditions; it is used in physiological, psychological, neurological, gynecological-obstetrical and pulmonary therapy, in geriatrics, and in rehabilitation [1–7].

Every available study has proven the benefits of yoga, while none has demonstrated any adverse effects. In particular, one does not find any indication of skeletal injuries connected with the practice of yoga. We report the case of a fracture-separation of the epiphyseal plate of the distal tibia in a 15-year-old girl who assumed the “lotus” position of yoga.

Case report

In March 2002, a 14-year-old girl came to the emergency room of our hospital with an “ankle sprain” that occurred the day before at school during a physical education class. Questioned about the mode of the trauma, the young patient related that the pain came on suddenly with a popping sound originating from her right ankle while she was attempting to assume the “lotus” yoga posture. The trauma did not seem important enough to seek immediate medical attention. Only the next day did it become necessary due to pain, swelling, and loss of function of the ankle.

Standard radiographs were taken of the right tibiotarsal joint in anterior-posterior, lateral, and oblique projections (Fig. 1). We detected a Salter-Harris type III fracture-separation of the distal epiphyseal plate of the tibia (“fracture of Tillaux”) [8]. The fracture presented with a minimum displacement of 3 millimeters that warranted conservative treatment by means of immobilization with a leg cast,



Fig. 1a, b Radiographs of the right ankle with Salter-Harris type III fracture (avulsion fracture of the tubercle of Tillaux). **a** Lateral view. **b** Anteroposterior view



Fig. 2 Radiographs of the ankle in cast: reduction of the fracture

properly designed to maintain reduction of the fragment. Radiographs of the leg in the cast confirmed the reduction from the orthopaedic treatment (Fig. 2). The young patient was sent home with instructions to avoid weight bearing for four weeks. The cast device was removed after four weeks, whereupon rehabilitation was undertaken for another three weeks. The healing, both clinical and radiographic, was complete without any appreciable sequelae.

Discussion

In the literature, we did not find any mention of skeletal lesions correlated with the execution of physical exercises of some practices of yoga. It is certain, however, that some particular postures stimulate gradually and repetitively, even if not violently or instantaneously, some structures of the capsule and ligaments.

The separation of the distal tibial growth plate (Salter-Harris type III fracture, or juvenile fracture of Tillaux) represents one of the injuries most frequently observed during the developmental age, with a greater prevalence occurring

in males (male-female ratio = 2). It is second only to the separation of the distal epiphysis of the radius, representing 15% of the lesions of this region and 5% of all the fractures observed during childhood [9, 10]. Primarily it occurs between ages of 12 and 15 years in boys and between 10 and 14 years in girls. The most frequent cause is sport injuries, followed by traffic accidents, and domestic accidents. The location of the epiphyseal plate separation has a diverse geographical distribution that reflects the type of sport popular in a particular country. For example, separation of the distal humerus is associated with juvenile baseball in the United States, separation of the distal tibia with soccer in Europe, and separation of the distal radius and the ulna with gymnastics in Eastern Europe and Asia.

The classification of Salter and Harris (Fig. 3) [8] adopts both anatomical and radiological criteria and is the most utilized. It is based on the mechanism of trauma, on the relationship between the line of fracture and the cellular layer of the physis, and on the prognosis of the consequential disturbances to growth.

The pathological mechanism behind this lesion consists of the supination-inversion of the foot: one can thus verify an epiphyseal avulsion in the area of the insertion

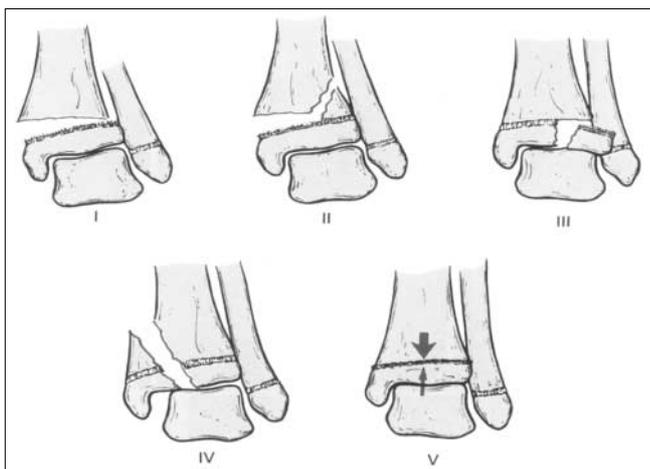


Fig. 3 Lesions of the distal tibial physis classified according to Salter and Harris [8]. I, separation through the physis; II, separation through the physis and fracture line into the metaphysis; III, separation through the physis and vertical fracture line into the epiphysis; IV, vertical fracture of the metaphysis, the physis, and the epiphysis; V, crushing fracture of the physis

of the anterior-inferior tibiofibular ligament. This lesion is commonly caused by a violent traumatic sprain mechanism such as that which occurs in soccer and other team sports, while running on uneven ground, or during traffic accidents. It is exceptional, however, for a trauma of very low force (if one can really call it a trauma) from a simple act of assuming a yoga posture.

The lotus position (Fig. 4) requires the ankle to be placed in a supination-inversion position with the foot upon the opposite thigh. This position involves all the structures of the outer compartment of the tibiotarsal joint, including the tibiofibular ligament, and causes maximum traction of its insertion on the anterolateral portion of the epiphysis.



Fig. 4 The “lotus posture” of yoga. The legs are crossed, the ankles are placed against the medial aspect of the opposite knee, and the feet are forced in supination-inversion

The practice of yoga involves the execution of some exercises in a slow and gradual way, held for a long time. With these characteristics, one may believe that yoga is absolutely non-traumatic.

Our advice is that adolescents must be considered to be at risk for skeletal lesions, in that the growth plate is still open and represents a weaker zone. Subjects in their formative years who present with similar disturbances must always be taken in serious consideration on the grounds of clinical history, the mechanism of the lesion, and the modality of the onset, without neglecting correct radiographic evaluation. The aim is to avoid misdiagnosing lesions of the chondroepiphysis in which not only important traumatic events but also less evident microtraumatic events can be implicated.

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