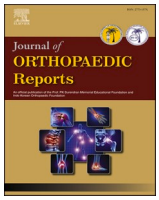
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Bilateral synchronous Sinding-Larsen-Johansson and Sever Disease in a 10-year-old boy: A case report

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ABSTRACT

Introduction: Growing pains are frequent in children, recognizing several causes and sometimes requiring management. Among these conditions, apophysitis and osteochondrosis may interest children who practice sport activities. In this case report, we found an association between a form of osteochondrosis, the Sinding-Larsen-Johansson Disease and a type of apophysitis, the Sever Disease in the same patient.

Case Description: A 10-year-old boy presented with a 3-month bilateral non-specific anteroinferior knees and posterior heels pain history with worsening in the last month particularly after athletic activities. Patient presented mild swelling of the bilateral heel face, antalgic gait, bilateral painful palpation over the patella inferior pole and bilateral heel pain. Based on the clinical and instrumental evaluation, bilateral Sinding-Larsen-Johansson Disease and Sever Disease was diagnosed. Temporary abstention from sport and conservative approach led to complete symptoms' regression after three months and to the gradual return to sport.

Discussion and Conclusion: This is a singular case of a combination of Sinding-Larsen-Johansson Disease and the Sever Disease in both lower limbs and with painful symptoms present at the same time. The correct dosage of physical activity and training intensity, education to healthy lifestyle habits, can represent preventive strategies to avoid overuse of childhood diseases.

1. Introduction

Lower limb pain in growing children have different etiology and sometimes requires management.[1] Among these conditions, apophysitis is one of the most common causes, often involving children practicing sport activities and involving different ossification nuclei in a variable way up to bilateral involvement.[2] Apophysitis pathogenesis is in repetitive traction injury in the tendon cartilage and bone insertion site.[3,4] Conversely, osteochondrosis is less frequent leading to a degenerative-necrotic process affecting the epiphyseal bone ossification nuclei, probably due to a temporary interruption of the blood supply to the bone-cartilage complex.[5] In this case report, we found an association between a form of osteochondrosis and a type of apophysitis in the same patient: the Sinding-Larsen-Johansson Disease (SLJD) and the Sever Disease (SD). SLJD is an osteochondrosis characterized by pain at the distal pole of the patella, that increases combining flexion with loading on the knee, associated with subpatellar swelling, lower pole tenderness at compression and range of movement (ROM) limitation.[3] It occurs most frequently in athletic children between 10 and 12 years.[6] On the other side, SD is a calcaneal apophysitis and it is the most common heel pain cause in children and teenagers, especially playing running or jumping activities with an estimated incidence of 2%–16 % in 8–12 years children[7] and a clinical onset characterized by heel tenderness to compression.[8] Diagnosis is based on clinical features, X-rays images and ultrasonography (US).[1] Nevertheless, apophysitis is a self-limiting condition that resolves at the end of growth when cartilages fuse.[3,8] Nowadays, the cornerstone for both diseases management is the conservative rehabilitative treatment including stretching, relative rest, employing first only activities limited to pain tolerance, followed by muscle strengthening exercises and physical reconditioning.[9] Pharmacological treatments (i.e., oral acetaminophen, oral and/or topical NSAIDs) may be helpful to reduce pain.[9] Recently, first clinical case series reported both safety and effectiveness when SD was treated by using radial extracorporeal shock wave therapy (ESWT).[10] Based on our

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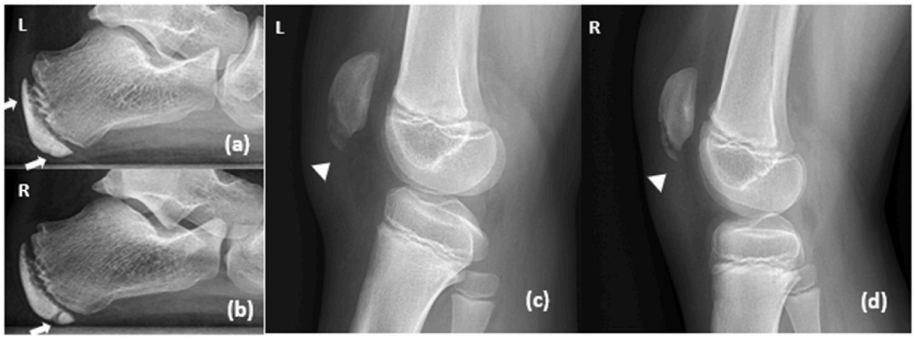


Fig. 1. Radiographic imaging. X-rays of left (a) and right (b) foot showed an increased density and fragmentation (white arrow) of the calcaneal apophysis. Lateral left (c) and right (d) knee radiograph showed bilateral patellar tendons calcification at the patella inferior pole (white triangles).

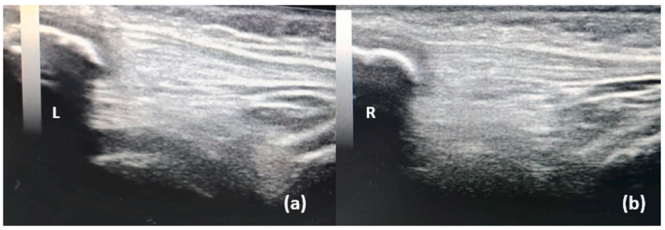


Fig. 2. Ultrasound imaging after first evaluation. Left (a) and right (b) knee with bilateral patella lower pole fragmentation and modest right patellar tendon fibers alterations.

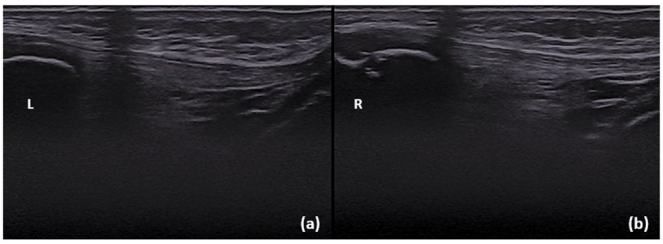


Fig. 3. Ultrasound imaging after 3 months. Left (a) and right (b) knee showed improvement of bone profile and realignment of tendons fibers.

knowledge, we report the first case of SD and SLJD simultaneously present at both knees and heels in an athletic 10-year-old boy.

2. Case description

A 10-year-old boy (D.C.) presented with a 3-month bilateral non-specific anteroinferior knees and posterior heels pain history with worsening in the last month. In medical history he only had diabetes insipidus with mild developmental delay. He led an active life and played soccer for the past 3 years (3 times per week). In the last three months, he started to complain about the appearance of this pain after athletic activities, to both lower limbs, with more left-sided involvement. In addition, the parents reported gait alterations and considerable difficulty in climbing stairs and kneeling. Neither he nor his parents reported any previous traumatic event. Nevertheless, after soccer training, he reported a considerable bilateral knees and heels pain with 9/10 on the Wong-Baker scale. Clinical examination was carried out the day after a soccer training session. On examination, there was mild swelling over the bilateral posterior calcaneal tuberosities, an antalgic gait with a limp on the left, and moderate difficulty climbing and descending stairs. Lower limbs mobilization showed complete joint ROM. Palpation over the patella inferior pole and the patellar tendon elicited severe bilateral pain, especially on the left side, and bilateral heel pain with positiveness of the heel squeeze test. Moreover, Achilles' tendon palpation in the insertional and the pre-insertional regions caused severe bilateral pain, particular on the left side. Differential diagnoses included retrocalcaneal bursitis, Achilles or patellar tendinopathy, osteomyelitis, plantar fasciitis and juvenile idiopathic arthritis. Blood tests were normal. Standard X-rays was performed showing signs of bilateral patellar tendons calcification at the origin of the patella inferior pole, and increased density and calcaneal apophysis fragmentation on both sides (Fig. 1). US confirmed bilateral patella lower pole fragmentation, more pronounced on the right knee, with modest right patellar tendon fibres alterations and thickening, cartilage swelling and a serous distension of the synovial bursa with fluid situated between the patellar tendon and the lower pole of the patella (Fig. 2).

Based on the clinical and instrumental evaluation, bilateral SLJD and SD was diagnosed. A medical treatment with NSAIDs (ibuprofen) as needed, cryotherapy, physiotherapy, involving lower limbs passive mobilization, muscles stretching and isometric exercises for 2 months, and sport abstention for at least 8–12 weeks were prescribed. The two months follow-up showed clinical improvement with reduction in pain (Wong-Baker scale 3/10), no limp and no stairs difficulty reported. Therefore, the rehabilitation program continued with muscle strengthening exercises and swimming (crawl and backstroke) for one month. The US follow-up showed a significant reduction in synovial bursa volume and the realignment of tendons fibres and gradual return to play was allowed (Fig. 3). Because of the regression of symptoms, we preferred not to perform X-rays. After this period, he reported no more symptoms and the return to daily activities. Family gives consent for the publication of identifiable details (imaging, case history and/or patient details) and signed an informed consent form.

3. Discussion

Pain in growing children is a common clinical problem, sometimes with a recognized etiology, sometimes without.[1,11] Although apophysitis recognize tendons traction and overuse as the cause,[4] osteochondrosis frequently does not recognize a cause.[6] Our patient represented a singular case of a combination of SLJD and SD in both lower limbs and with painful symptoms present at the same time. SLJD is a form of osteochondrosis that occurs in growing athletes and is related to an excessive and repeated stress in the extensor mechanism.[5] On the other side, SD is often attributed to calcaneal apophysitis due to tensile forces applied by the Achilles tendon[3] and causes limited ankle joint dorsiflexion, discomfort and severe pain often forcing the child to limp just to take weight off the affected heel.[2] Symptoms are worse during sports season or during a growth spurt.[1] In pediatric patients, the apophysis is considered the weakest point in the muscle-tendon-bone attachment, as opposed to the tendon in adults. Excessive tensile force, whether applied to the inferior patellar pole (e.g., SLJD), or calcaneus tuberosity (e.g., SD), may partially separate a segment of the incompletely developed

cartilage, which can eventually ossify, and therefore appear as an "accessory" or a separate ossification region. Our patient showed a simultaneous ossification disorder, probably caused by an abnormal response of enchondral ossification to mechanical sport-related repetitive stress.[3] As several other authors, we used X-rays, and US to confirm the diagnosis. As stated before, abstention from sporting activity and conservative treatment is the first choice in such a case.[4] The rehabilitation program was structured on two phases, i) pain-free ROM, muscular stretching, and isometric exercises and ii) gradual reintroduction of incremental physical activity. This rehabilitative approach led to the complete symptoms' regression after three months and to the gradual return to sport. In the pediatric population, to prevent overuse condition may be useful encouraging practice of various sports to avoid overtraining in specific technical gestures.[12] Although there is previous evidence of bilateral SD[9,13,14] and a strong association between SD and Osgood-Schlatter disease[15] or with overuse pathologies,[16] in our knowledge there is no description of a contemporary presentation of apophysitis and osteochondrosis involving four different regions, so the authors feel that this case may be of great interest to those approaching paediatric rehabilitation. The correct dosage of physical activity and training intensity, avoiding overloads and overtraining according to the child's age and to the cartilage maturity,[17,18] the analysis and the correction of concerns linked to sports equipment, the education to healthy lifestyle habits, and the avoidance of premature specialization can represent preventive strategies to avoid SLJD and SD appearance.[12] If overload symptoms occur, a thorough clinical and instrumental examination can assist in defining the diagnosis and choosing the tailored rehabilitation program. Even if the symptomatology affects numerous districts at once, an early conservative approach can help prevent structural abnormalities from being developed and can allow the symptoms to fully remit.

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Informed consent

Written informed consent was obtained from the parents for publication of this case report and accompanying images.

Ethical standard statement

All procedures performed in the study involving the human participant were in accordance with the ethical standards of the institutional ethical committee and with the 1964 Helsinki declaration and its later amendments.

Credit author statement

A. A.: Conceptualization, writing - original draft. M. C. M.: Methodology, writing - review & editing. I. S.: Writing - original draft, visualization. D. L.: Supervision, writing - review & editing.

Declaration of competing interest

The authors have declared that no competing interests exist.

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