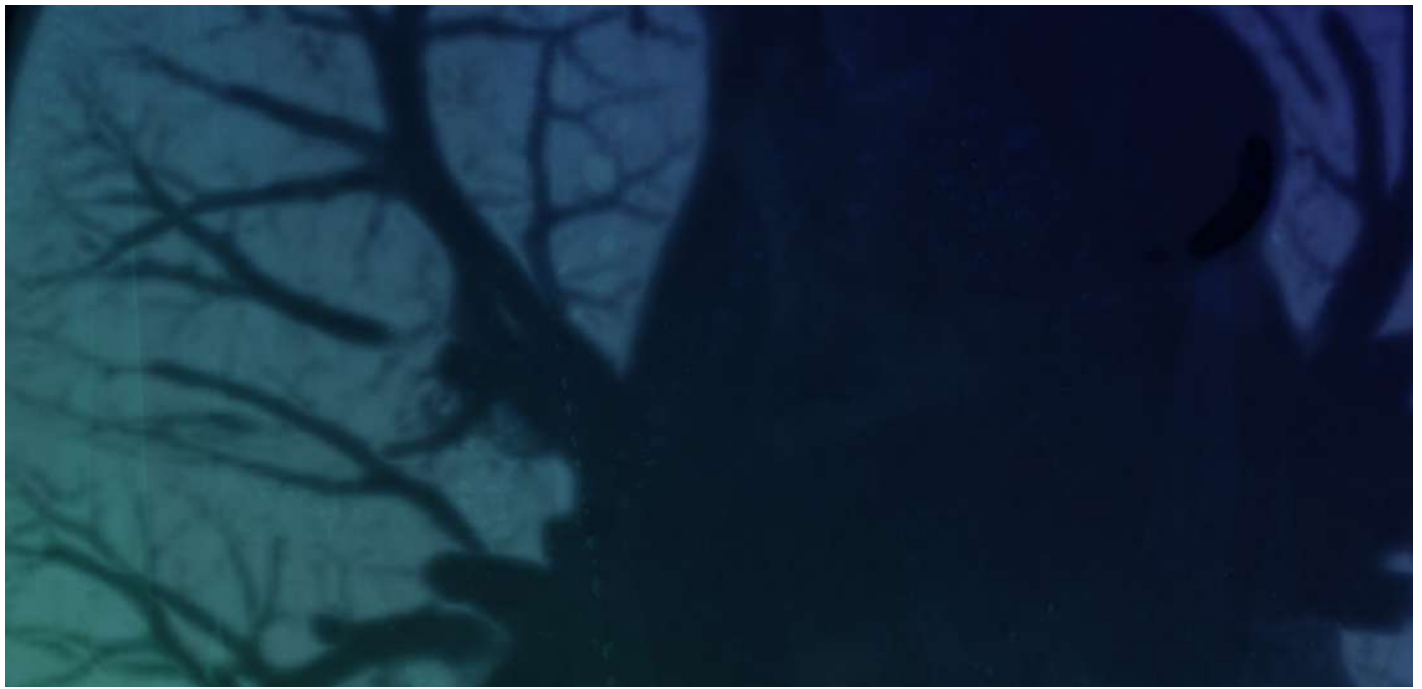


Ischial bone apophysitis: a clinical case

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Aim

To present a clinical case of ischial bone apophysitis.

Materials and methods

A 12-year old female patient with complaints on pubic pain and limited motion range.

Results

Computed tomography initially detected an avulsion fracture. To further evaluate the ischial bone, magnetic resonance imaging was done, revealing a left-sided apophysitis.

Conclusion

Multimodal imaging in the form of CT an MRI is pivotal for diagnostics of apophyses lesions. The radiologist must account for the normal age-related musculoskeletal findings. Such awareness allows for correct and timely diagnosis affecting patient management and treatment outcomes.

Keywords:

ischial bone apophysitis, computed tomography, magnetic resonance imaging.

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Relevance

Ischial apophysitis (apophyseal osteochondropathy, subacute inflammatory process) is a common trauma among children aged 13–15 years, occurring during the period of active growth (Fig. 1) [1].

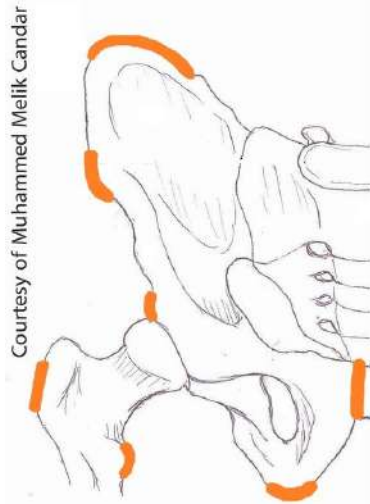


Figure 1. Schematic representation of bony pelvis with apophyses highlighted in orange

Before their synostosis, apophyses are prone to detachment or inflammation [2]. The pathological conditions are most common among physically active children involved in gymnastics, basketball, football. Ischial avulsion injury is caused by “pullup” jump or falls from a great height. Apophysitis develops gradually with regular stress on the biceps femoris, semimembranosus, and semitendinosus muscles. After synostosis, the same injuries usually lead to stretching of muscles mentioned above [1].

Clinically, apophysitis manifests as discomfort and exercise-related pain, especially with stretching. Prolonged rest alleviates the pain. Inadequate rest or treatment combined with continuous exercise will exacerbate the patient’s condition, impeding an active lifestyle.

Normal apophysis on radiographs and computed tomography is often interpreted as avulsion fractures that may occur during physical exertion.

Clinical case

A 12-year old female was admitted to the Department of Pediatric Traumatology with complaints of persistent pain in the pubic area and difficulty in performing the left longitudinal splits. She was professionally engaged in artistic gymnastics. Per the complaints above, the patient was hospitalized in the Department of Pediatric Traumatology with subsequent pelvic CT scan. The report indicated an ischial avulsion fracture (Fig. 2). We performed magnetic resonance imaging to assess the ligaments and muscles of the posterior compartment of the thigh. The scan did not reveal any ligamentous injury nor ischial avulsion fracture. T2 and STIR images detected edema of the ischial bone (anterior and posterior branches) (Fig. 3 a, b, c).

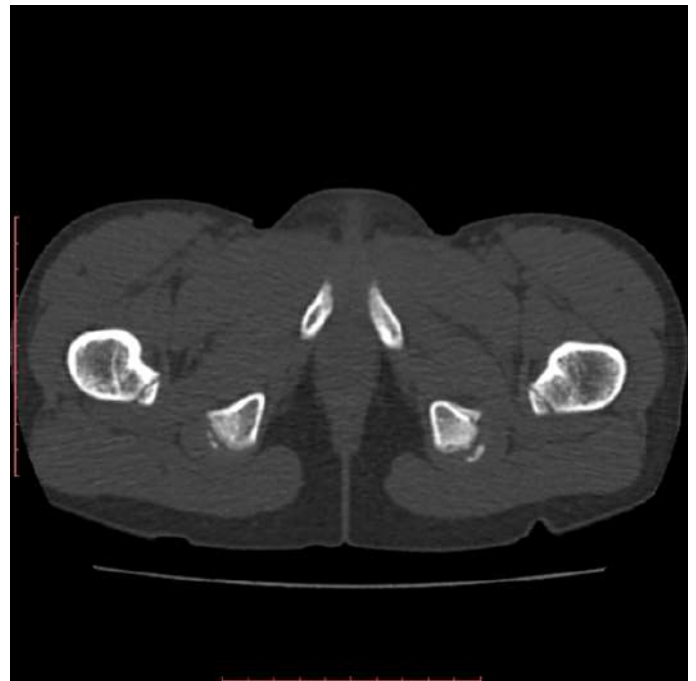


Figure 2. Pelvic CT scan. Axial slice, bony window. Well-defined bony lesions with distinct margins are present in the area of the ischial tuberosities. The ischial bones have fuzzy contours posteriorly. The depicted lesions are apophyses with developing ossification centers.

Discussion

The apophysis is the normal bony outgrowth arising from an ossification center and subsequently fusing with the bone. Ligaments and muscles of the posterior thigh compartment attach to the ischial apophysis. The ischial ossification center develops between the ages of 13–15 years and exists until the full synostosis at 16–25 years. In the pediatric population, the ligaments and tendons are stronger than the attachment site; therefore, excessive loads cause damage to the apophysis. After synostosis intense physical activity can lead to muscle strain or rupture. Repetitive sports-related traction loads on posterior thigh compartment muscles can cause apophysitis.

Apophysitis diagnostics requires an integrated approach. Careful history taking, physical examination, and radiography improve diagnostic accuracy and allow prescribing adequate treatment. Usually, it includes the avoidance of physical activities and the prescription of anti-inflammatory medication [1].

Apophysitis has to be differentiated with an ischial avulsion fracture and musculoligamentous injury. As such, the probability of misdiagnosis with X-ray or CT is rather high. For example, an impression of apophysiolysis can lead to surgical intervention. Therefore, the preferred radiological method in apophysitis is MRI, allowing for accurate lesion detection and treatment response evaluation.

In the acute phase of ischial apophysitis, MRI shows increased signal on T2-weighted images and decreased signal on T1-weighted images, corresponding to edema. This clinical case is an illustration of these changes. Edema resolves with treatment and rest, possibly leaving sclerotic changes, depicted as low signal on all

pulse sequences [3].

The prevention of acute and chronic traumatic injuries is essential, especially for young athletes. Sports physicians and trainers need to educate the athletes on the features of immature musculoskeletal system and risks of apophysitis or avulsion fracture [1]. Many athletes seldom have this information, increasing the trauma likelihood, delays appropriate therapy, and adequate rehabilitation. All this can lead to a vicious cycle with complications, decreased quality of life due to chronic pain, and abrupt termination of a sports career [1].

The prevention of the trauma mentioned above includes limiting intensive training during the growth spurt [1]. Therefore, measurements are taken every three months. The training regimen should exclude repetitive strenuous exercises, which can lead to trauma. In this scenario, quality is more important than quantity. The regular monitoring of an athlete's physical health has to be a vital part of the program. During the recovery period in apophysitis, it is necessary to exclude contact sports for up to 6 months. At the same time, radiological follow-up is carried out at intervals of 3–6 months for two years [4, 5].

Conclusion

Thus, when a young athlete visits a doctor with complaints of pain associated with intense regular physical exertion, the doctor must act quickly. A multimodal radiological investigation (CT and MRI) will help to perform differential diagnostics in the shortest possible time correctly. In turn, timely treatment initiation and a lengthy rehabilitation period are the keys to returning to sports without any short or long-term risks.



Figure 3. Pelvic MRI scan. Coronal slices. T2 (a) and STIR (b) images reveal the hyperintense signal in the left ischial bone. In T1 (c) images, the region of interest has a hypointense signal. This corresponds to edema of the left ischial bone. T костей таза. Коронарная проекция. На T2 (a) и T2 STIR (б).



References

1. Umile Giuseppe Longo, Mauro Ciuffreda, Joel Locher, Nicola Maffulli, Vincenzo Denaro. Apophyseal injuries in children's and youth sports. *British Medical Bulletin*. Volume 120, Issue 1, 1 December 2016, Pages 139–159, <https://doi.org/10.1093/bmb/ldw041>
2. Calderazzi F, Nosenzo A, Galavotti C, Menozzi M, Pogliacomi F, Ceccarelli F. Apophyseal avulsion fractures of the pelvis. A review. *ABM*. 15 Nov. 2018; 89(4):470-6
3. Kujala, U., Orava, S., Karpakka, J., Leppävuori, J., & Mattila, K. (1997). Ischial Tuberosity Apophysitis and Avulsion Among Athletes. *International Journal of Sports Medicine*, 18(02), 149–155. doi:10.1055/s-2007-972611
4. Koehler SM, Rosario-Quinones F, Mayer J, et al. Understanding acute apophyseal spinous process avulsion injuries. *Orthopedics* 2014;37:e317–21.
5. Launay F. Sports-related overuse injuries in children. *Orthop Traumatol Surg Res* 2015;101:S139–47.