

TUMOR-LIKE RECTUS FEMORIS PELVIC OSSIFICATION IN A TEENAGE ATHLETE – CASE PRESENTATION

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Abstract

In the current practice, clinicians are often placed in the difficult situation of diagnosing and treating rare lesions. Bony over-use injuries are a known fact among young performance athletes. These types of lesions pose challenges in differential diagnosis and therapeutic decisions.

We present a patient treated in our clinic a few months ago. He was referred to our clinic with pain during sport practice and during high range of motion hip mobilization. The lesion was detected on pelvic X-rays and CT scan as a bony structured lump situated on the anterior edge of the pelvis, proximal to the acetabular rim. Our treatment of choice was block-resection of the tumor and histopatologic tests performed on the extracted fragments. At 3 months after surgery, the patient has no residual pain, no range of motion restraint, is back to practicing sport and presents with a good overall outcome.

Even though it may be considered a complicated process to manage, these types of lesions must always be differentially diagnosed with tumors. Concluding, overuse manifestations should be suspected but tumors should be first excluded

Key words: heterotopic ossification, rectus femoris origin, overuse injury, young athletes, encondroma, snapping hip.

Introduction

Overuse lesions in young athletes are a known issue which poses a great deal of difficulties for orthopedic surgeons. They are known to affect young boys who practice performance sport and have a very active lifestyle. For this reason, the feeling of not being able to practice sport is what pushes the patient towards the doctor, not the pain itself.

Overuse injuries are sports-related microtraumas that result from repetitively using the same parts of the body, usually by overtraining. The peak incidence for sport related injuries is situated between 5 to 14 years of age with more than 750.000 visits to the doctor being estimated in the U.S.A.[1]

This group of affections includes golfer's elbow, jumper's knee (patellar tendonitis), osteochondritis dissecans, Osgood-Schlatter disease, Sever's disease (calcaneal apophysitis), shin splints, spondylolysis, swimmer's shoulder, tennis elbow. The treatment methods range between rest, physical therapy, corticosteroids and

infiltrations and surgery. The reason for this higher incidence in young athletes is because sports-oriented children tend to push themselves, ignore the pain, or are not able to connect it to certain repeatable actions they make.

The rectus femoris muscle arises from two tendons. One – the anterior or straight originates from the anterior inferior iliac spine, while the other – the posterior or reflected tendon originates from a groove above the rim of the acetabulum. These two tendons unite at a sharp angle and form the aponeurosis from which the muscle arises. This type of anatomy makes it possible for many problems to appear during effort and overusage.

A very common injury of the rectus femoris is a tear in one of its tendons. Garcia et al studied a series of ten professional soccer players that presented with rectus femoris proximal ruptures. All of them were treated surgically, either by direct suture with non-absorbable sutures (6 cases) or by the use of bone anchoring sutures. A consensus regarding the optimal treatment was not found, but it is clear that surgical treatment has a low recurrence rate and it is a steady indication for these cases.

Spindel et al. described a case of pelvic chondroma in a 15yo male, which was operated multiple times prior to diagnosing, for multiple chondro-osseous exostoses. The patient underwent two more major surgical interventions until the pelvic mass was removed. The follow-up was good, the urinary retention was gone, locomotion improved and the gastrointestinal disturbances ceased. One must always keep in mind that from dealing with ossifications, the situation can change drastically in a short period of time.[2]

Great caution must be taken when differentially diagnosing a tumor in this age group, as the disease has a greater life impact than it would on elders. This is where the experience of the doctor and the advances in modern medicine comes into place. The surgical procedure is very demanding and requires for a very well thought pre-operative planning.

Case presentation

Medical history

A 14yo male was referred to our clinic for persisting hip pain, which aggravated during sport activities. Medical history revealed that the pain had started 3 months ago, insidiously, without the existence of a significant starting trauma. The patient had no other medical history, presented with no loss of weight over the past months.

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Clinical examination

He presented with stable vital signs and a normal clinical examination overall. The range of motion of his right coxo-femoral joint was slightly affected due to pain and impingement. The complaints usually involved specific moments of the sport activity, climbing steps and running on faulty terrain.

Imaging studies

The antero-posterior and lateral view X-rays that we performed on his pelvis revealed a bony prominence located on the anterior edge of the right pelvic bone, directly above the acetabular rim. It had approximately 4cm in diameter and it stood on the insertion point of the rectus femoris muscle. The MRI findings showed shape and signal modifications at the level of the antero-inferior iliac spine, presented under the shape of a septated formation of 42/26mm which had no other influences on the surrounding tissue. We performed a CT scan with 3D reconstructions that pointed at a benign tumor, most probably an exostosis (fig.1 and 4).

Laboratory workup

Our patient's blood tests revealed no signs of inflammatory process or infection, but instead showed an increased level of AP (alkaline phosphatase) of 245U/L.

Surgical treatment

Excision surgery was performed through an 8cm incision with an anterior, modified Smith-Petersen approach. The superficial and deep layers were dissected through, until the ossification was reached. High attention was aimed at not harming the lateral femoral cutaneous nerve, the femoral nerve and the ascending branch of the lateral femoral circumflex artery. After the removal of the mass, a biopsy was sent to the lab in order to get the exact histopathologic provenance of the tissue.

Histopathological exam

The histopathologic findings were as follows: osseous remodeling aspect, most probably reactive, and callus-like aspect or heterotopic ossification. After putting it into a clinical setting the latter was our final diagnosis.

Follow-up visits

After surgery we performed CT and X-ray scans for visual and documented confirmation of the excision (fig 3, 2, 5). The antero-posterior and lateral view X-rays showed no more evidence of the existing ossification, while the CT scans and the 3D reconstructions ensured us that the lesion was gone. Confirmation MRI was not needed, as it was only an investigation used for differential diagnosis. Range of motion was fully regained by the patient, especially hip flexion and abduction (which was the hardest point of motion to achieve before surgery). The patient now presents with no pain considering what existed before the surgery. The patient's recovery period of 10 weeks has fully re-integrated him in his daily activities and he has now returned to his sport activity routine, carrying out demanding physical exercises.

Differential diagnosis

Enchondromas – are usually located at the level of the proximal humerus, distal femur and the short tubular bones

of hands and feet. Patients usually are in their third decade when affected by enchondroma. The disease is equally spread at men and women. It's long and oval shape resembles our lesion but all the rest of the criteria do not match.[4]

Osteoma – Widely met at the bones of the skull and face, this type of benign tumor is known to appear at the level of the pelvis as well. It is thought to be some sort of inflammatory reaction since it is often found in the ear canal of cold water swimmers or divers, but the etiology still remains unclear. Enneking described the X-ray aspect of osteomas as "one-half of a billiard ball" attached to the underlying bone. [5]

Femoroacetabular impingement - arises from an unfit incongruence between the femoral head and the acetabulum. Though it may present with the same symptoms as our patient, this affection is easily excluded with the aid of X-ray and MRI visualization.

Epiphyseolysis capitis femoris juvenilis lenta – usually occurs between 10 and 15 years old and consists of the separation between the head and neck of the femur at the level of the growth cartilage, after repeated micro-trauma due to intense physical activity. This results in a deformity that can be measured on X-ray.

Proximal rectus femoris rupture – is a common traumatic injury sustained by soccer players during sporting activities. 90% of the cases were acute ruptures, while the rest were chronic.[3] The injury often occurs while hitting the ball, when a large amount of pain can be felt at the level of the groin. MRI is used to confirm the diagnose the lesion, and usually after the surgical procedure, every patients can restart running after a mean time of 2 months and can play soccer again after a mean time of 3.8 months.

Anterior snapping hip – is usually met in athletes, with a good muscle development and high sporting activities. Usually the snapping sensation is not painful, but in time it can create a bursitis of the joint, thus creating inflammation and pain. As the hip is bent, the rectus femoris tendon shifts across the head of the thighbone, and when it comes back to a straight position, the tendon shifts again. Clinical diagnosis can be easily performed and the treatment ranges from physical therapy (stretching exercises) to open or arthroscopic surgery.

Discussion

Overuse injuries in young athletes are a common and controversial discussion amongst orthopaedic practitioners. This is partially due to the high number of affections that can be seen surrounding this joint and affecting this type of patients.

Ekstrand et al concluded, after a big cohort study carried out on almost 3000 soccer injuries, that more than 92% of all of the injuries recorded affected the 4 main muscular groups of the lower limb (hamstrings – 37%, adductors – 23%, quadriceps – 19% and calf muscles – 13%). These muscle injuries represented one third of all time-loss injuries in soccer.[6]

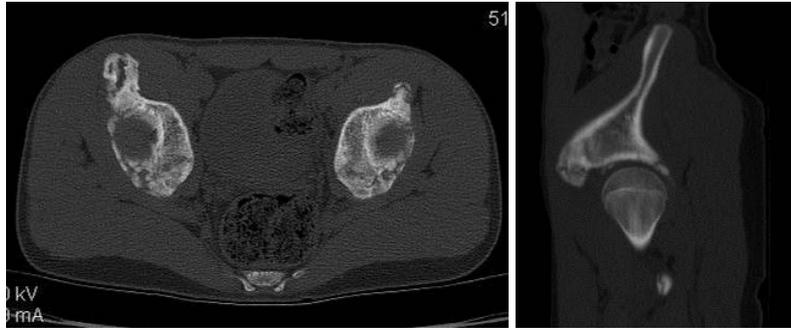


Fig.1. Axial and sagittal CT scans revealing the ossification located on the anterior side of the iliac crest.

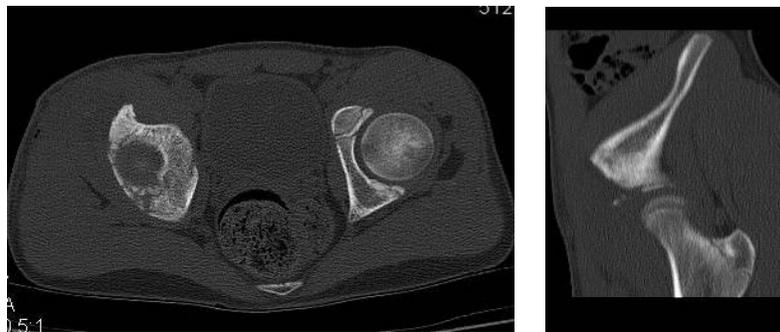


Fig. 2. Axial and sagittal CT scans showing the excision spot and the local bony anatomy after the surgery



Fig. 3. Antero-posterior and lateral X-ray views of the right hip, that show no more evidence of the ossification.



Fig.4. 3D reconstruction of the specified location that gives us a better understanding of the direction the ossification is going at and the possible reasons for its appearance.



Fig.5 Before and after, 3D reconstructions of the patient's pelvis which can easily point out the resection limits

In 2003, Straw et al presented a case report on the surgical of a chronic rupture of the rectus femoris muscle in a soccer player. Surgical reattachment was obtained by a 20cm incision, No 2 Ethibond sutures were used for tendon suture. After 6 months, the patient presented with no pain, with a clinically normal thigh and good functional results.[7]

In a recent article, Hjort et al, brought up slipped capital femoral epiphysis as a concerning problem amongst children with immature skeleton. Groin, hip or knee pain are a few of the simptoms wich can be found and they are always aggravated by sports. Early diagnosis is crucial regarding this affection, as a late doctor presentation can lead to disabling complications.[8]

Kaplan stated in one of his articles that femoroacetabular impingement is often a caouse of groin pain. Physical examination and careful x-ray analysis is very important in diagnosing and treating these patients before the impingement begins to create further chondral lesions that will lead to arthritis.[9]

In 2012, Herget et al presented a study case of a 21yo boy, proffesional bodybuilder which presented with progressive hip pain and increasing disability in carrying out daily routine. His initial response do NSAIDs was satisfying, and after the arthroscopic intervention and the biopsy, sinovitis was revealed to be the cause of the inflammation. After a re-evaluation and a CT scan, it was clear that the signs wer pointing out to an osteoid osteoma,

causing cam impingement and monoarthritis. Arthroscopic excision and femoral neck trimming were performed with good postoperative results.[10]

In another study, Donthineni et al performed a retrospective review of 115 cases of patients diagnosed with enchondroma. The concluded that most of these patients were diagnosed accidentally, the main source of problem being the effect this tumour has on the adjacent joint. More resources should be spend on teaching radiologists and general orthopaedists how to diagnose such maladies, as most of them were mistaken with sarcomas.[11]

Heterotopic ossiffications are a common known complication of repeated sport trauma. In a study conducted in 2009, Jackson et al. tried to evaluate the osteogenic potential of the mesenchymal progenitor cells (MPCs) that appear in traumatically injured muscle. Upon osteogenic induction, MPCs showed increased alkaline phosphatase activity, but their final conclusion was that these traumatized muscle-derived MPCs have the potential to function as osteoprogenitor cells when exposed to the appropriate biochemical environment.[12]

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