Avulsion fracture of anterior inferior iliac spine complicated by hypertrophic malunion causing femoroacetabular impingement: Case report

Ghalib Ahmed Alhaneedi, Abdullah Saad A. Abdullah*, Syed Imran Ghouri, Yousef Abuodeh, Mohammed M. Al Ateeq Al Dosari

Orthopedic Department, Hamad General Hospital, Hamad Medical Corporation, Doha, Qatar

1. Introduction

Avulsion fractures of the anterior inferior iliac spine are rarely encountered and most commonly associated with trauma or overuse [1–4]. This injury occurs most frequently in sports that involve kicking like football, soccer and rugby [5,6].

Femoroacetabular impingement is caused by structural abnormalities on both acetabular and femoral sides that lead to chronic groin pain and progressive degenerative changes [7,8].

However, femoroacetabular impingement due to hypertrophic malunion of avulsed fracture of anterior, inferior iliac spine has rarely been reported [9–12].

2. Case report

A 17 year-old man was referred to our clinic with a 2 years history of persistent right groin pain and inability to return to his sport activity. The onset of pain was sudden after trying to kick the ball forcefully during a competitive game of football. In his medical history, he was treated as a case of adductor strain in a private clinic. Pelvic X-rays, CT scan and MRI were taken and the patient was treated with rest, analgesia, and physiotherapy. The patient continued to have right groin pain and inability to return to his sport activity. The patient was referred to Hamad General Hospital to do bone scan in order to rule out the possibility of avascular necrosis of femoral head and the bone scan result revealed to be negative. Examination of his lower extremities and pelvis showed tenderness at the anterior aspect of hip, painful limitation of flexion and internal rotation, positive impingement sign and positive cycling test. Considering the history, clinical examination and a review of his previous imaging studies, the diagnosis of avulsion fracture of the anterior inferior iliac spine was suspected. New pelvic X-rays were done which revealed an abnormal hypertrophic malunion of the anterior inferior iliac spine fracture causing an extra-articular femoroacetabular impingement (Fig. 1). The CT scan revealed an...
inferiorly displaced bony fragment from the right anterior inferior iliac spine (Fig. 1). Conservative treatment in the form of nonsteroidal anti-inflammatory drugs and physiotherapy was started and continued for 12 weeks but without any response (Fig. 2), then surgical excision of the hypertrophic malunited fragment was done through the anterior hip approach. Postoperative course was uneventful and the patient was discharged from hospital after 3 days. Postoperative physiotherapy in the form of range of movement and strengthening exercises was started after 2 weeks. At 6 weeks follow up, examination of the right hip revealed full painless range of motion, negative impingement and cycling tests. The patient was followed up as an outpatient for two years post-operatively and the patient was asymptomatic with no sign of recurrence during the follow up period (Fig. 3).

3. Discussion

Avulsion fractures of the anterior inferior iliac spine are less frequent than other pelvic avulsions with an incidence of 14.8–22.1% among acute avulsion fractures of pelvis in young athletes. Pelvic
avulsion fractures are more common in male [5,13], adolescents and young adults between 14 and 23 years of age, and when the ratio of muscular strength to the physical strength is considerably high. The mechanism of anterior inferior iliac spine avulsion fracture is due to the pull of the straight head of the rectus femoris muscle [1,3] which usually occurs with hip joint extended while the knee joint in a flexed position, and it is usually seen after sports that involve mostly forceful kicking or running like soccer, rugby and tennis players [5,6]. A high index of suspicion is needed for the diagnosis of anterior inferior iliac spine fractures and generally is established with proper clinical history, physical examination and radiographs of the pelvis [1,2,12].

The anteroposterior and oblique radiographs of the pelvis should be interpreted with caution and the affected side should always be compared with the other side since the avulsed fragment is generally minimally displaced [3,12]. To confirm the diagnosis, CT scan is indicated [14]. Thus, during the evaluation of the groin pain, a careful history, clinical signs and radiological findings should be assessed properly. Avulsion of anterior inferior iliac spine should be kept in mind even in skeletally mature patients [12].

Treatment of avulsion fracture of anterior inferior iliac spine is generally non-operative and consists of rest, ice and analgesia followed by course of physiotherapy in the form of protected weight bearing, range of movement exercises for hip and knee, and strengthening muscle exercises to restore the joint function. Athletic activity may be resumed when full strength and full range of movement have been restored in the affected joint [15]. Avulsion fracture of anterior inferior iliac spine treated conservatively usually requires 6–8 weeks to heal [15].

Femoroacetabular impingement can result in structural changes of the hip and induces early osteoarthritis of hip joint, especially in young and active persons [7,8].

The hip flexion and internal rotation will be significantly limited if the anterior inferior iliac spine is extending to the acetabular rim or more distally which may justify operative decompression [16]. More recently a case series study is demonstrating successful arthroscopic decompression of the anterior inferior iliac spine impingement as an extra-articular source for hip impingement [4], but there is no evidence that currently supports arthroscopic over open surgical excision [17,18].

In this case report, the lesion was extra-articular and the intraoperative examination revealed right hip impingement between the hypertrophic anterior inferior iliac spine and the anteromedial femoral head–neck junction.

In our case, the right anterior inferior iliac spine showed obvious hypertrophy with malunion. The muscle traction was causing fragment displacement and that combined with excessive callus formation resulted in hypertrophic malunion of the fractured anterior inferior iliac spine in this patient.

4. Conclusion

Malunited avulsion fracture of anterior inferior iliac spine can cause an extra-articular femoroacetabular impingement. Extra-articular femoroacetabular impingement should be kept in mind as a differential diagnosis in the assessment of hip pathology. Diagnosis of such cases needs proper clinical and radiological examinations. After unsuccessful conservative management, surgical excision of hypertrophic fragment has to be done to relieve the symptoms and to avoid degenerative changes of hip joint especially in athletics.

Conflict of interest

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Ethical approval

The patient provided his consent to the publication of this report.

Consent

Informed consent was taken from the patient for publication of the case and related data.

Authors contribution

Dr. Chalib Alhaneedi – consultant orthopedic and the primary physician of the patient and data collection and first author.

Dr. Abdullah Abdullah – resident orthopedic involved in writing the discussion and first author.

Dr. Yousef – secondary contributor to data collection.

Dr. Sayed – secondary contributor to data collection.

Dr. Al Dosari – honorary author.

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