CASE REPORT

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A tuber ischium avulsion fracture treated with modified subgluteal approach: a case report

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We report a 16-year-old soccer player with a displaced avulsion fracture of the ischial tuberosity sustained during a soccer match. Open reduction and internal fixation were performed using a longitudinal incision and subgluteal approach. The patient returned to sports 6 months following the operation and returned to his preoperative performance at the 16th month postoperative follow-up. Surgical treatment is often avoided for these types of fractures due to complications associated with the sciatic nerve and exposure difficulty. However, we believe that this incision is a safer alternative to existing methods, providing sufficient exposure and avoiding damage to the neurovascular structures. This article aims to review this alternative incision in the surgical treatment of avulsion fractures of the ischial tuberosity.

Key words: Athlete; avulsion fracture; fracture fixation; ischium.

The apophysis in the ischial tuberosity appears during puberty and fuses in late adolescence.[1,2] Avulsion fracture of the apophysis of the ischial tuberosity is a relatively rare injury. Injury mechanism is either a sudden, violent muscular contraction or an excessive amount of muscle stretch across an open apophysis.[2-4] This type of injury is almost exclusively encountered in sports, such as gymnastics and sprinting.[1,3,5] There is no consensus in the literature on the ideal treatment method. Some authors recommend non-operative treatment,[6,7] whereas others advocate surgical intervention for such fractures.[2,6,8]

We present a case of avulsion fracture of the apophysis of the ischial tuberosity treated surgically, using a modified subgluteal approach. The modified subgluteal approach is an important alternative incision in this anatomic region.

Case report

A 16-year-old boy was admitted to the emergency ward with acute pain and tenderness localized to the area of the buttock and upper thigh overlying the ischial tuberosity, two hours after sustaining a trauma during a soccer game. While playing soccer, he fell into a hole on the ground with his left foot, resulting in a forceful forward flexion of the left hip with the ipsilateral knee in extension. Physical examination revealed prominent tenderness over the left ischial tuberosity and pain with active hip extension and adduction. The patient was unable to move his left hip actively because of pain. During physical examination, passive movements of the left hip in every direction were also painful, and therefore, hip abduction, internal rotation or external rotation was not measured. There was no atrophy in the

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Fig. 1. Anteroposterior radiograph of the left hip, showing an avulsed ischial apophysis. The apophysis is displaced by 2.5 cm.

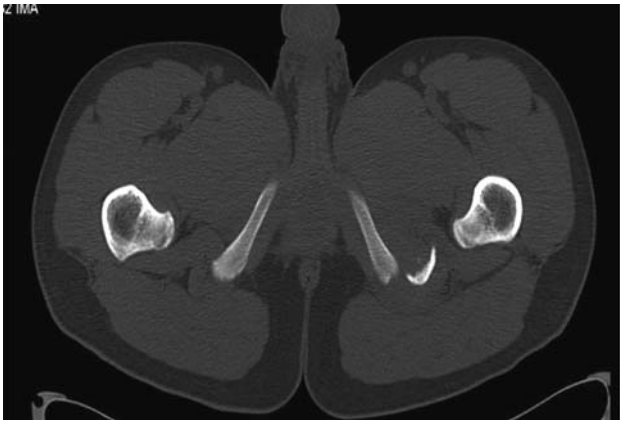

Fig. 2. CT image showing the fragment displaced by 2.5 cm.

Fig. 3. 3D-CT clearly depicting a shell-like fragment. [Color figure can be viewed in the online issue, which is available at www.aott.org.tr]

thigh muscles. The neurological examination results were normal. Routine radiographs of the pelvis and hip demonstrated a large osseous fragment of the left ischial tuberosity in the typical inferolateral location (Fig. 1). Computed tomography (CT) showed fragment displacement of 2.5 cm (Fig. 2) and a 3D-CT clearly depicted a shell-like fragment (Fig. 3). Magnetic resonance imaging demonstrated osseous and soft-tissue edema, along with an avulsion fracture of the left ischial tuberosity. We performed open reduction and internal fixation on the second day of hospitalization.

Following general anesthesia, the patient was placed in the prone position with the hip and knee in a slightly flexed position. A longitudinal skin incision of approximately 15 cm was used. The incision was done over the ischial tuberosity, starting at the gluteal crease and continuing distally (Fig. 4). A fasciotomy was performed in the line of the skin incision. The lower edge of the gluteus maximus muscle was freed and retracted proximally. The plane between the gluteus maximus and the hamstring muscles were divided and the gluteus maximus was traced proximally (Fig. 5). The hamstring tendons and the osseous fragment distally displaced by the hamstring muscles were identified. With the hip in extension and the knee in flexion, reduction was achieved after which, stabilization and fixation were performed using two 4 mm cannulated cancellous screws (Fig. 6).

The patient was allowed to semi-flex his left hip and sit up in bed while transferring his body weight on his right tuber ischium as tolerated on the first postoperative day. One week later, he was permitted to sit in a wheelchair with his hip slightly flexed. Gentle passive range of motion of the hip and knee was permitted along with non-weight bearing walking with crutches at the second postoperative week. Mobilization with partial weight-bearing on crutches was allowed at the fifth postoperative week. Thereafter, full weight-bearing was permitted, without any support. The patient was asymptomatic and complete union of the avulsion fracture of the ischial tuberosity was noted on radiographs obtained at the postoperative 4th month. The patient was permitted to participate in active sports following the rehabilitation program at 6 months. A consent form was taken from the patient for the scientific evaluation of his medical records.

Discussion

Avulsion fractures of the ischial tuberosity are rare injuries. Avulsion of the ischial tuberosity typically occurs in childhood and early adolescence when the ischial growth plate is open. The mechanism of injury is typically an eccentric contraction of the hamstring muscles as a result of a sudden, forced hyperflexion of the hip with the knee fully extended.[9,10] A careful history of the injury usually includes sudden, severe buttock or

thigh pain during strenuous athletic activity. Examination shows local tenderness and the possible presence of a palpable gap in the area of the ischial apophysis. Pain may be extreme. Amount of displacement of the ischial apophyseal avulsion is important in determining the treatment method.

Akova and Okay reported that conservative treatment was adequate in avulsions with less than a 2 cm displacement.[5] For a degree of displacement greater than 2 cm, as measured on a CT scan, surgery is the ideal treatment method.[4,8,11] Surgical management is also indicated if there is sciatic nerve involvement.[11] Patients with displaced fractures not treated surgically have increased risk of nonunion or fibrous union of the apophyseal fracture fragment which results in chronic pain and an inability to return to normal activities.[12-14] Chronic symptoms include an inability to sit, groin or buttock pain, muscle weakness, and decreased athletic ability.

As this type of injury is rarely seen, most orthopedic surgeons have limited experience in this anatomical location.[9] Therefore, orthopedic surgeons often avoid surgical treatment for these fractures, especially due to complications associated with sciatic nerve and exposure difficulty. We chose a longitudinal incision in our case because it allows for the extension of the incision if necessary and minimizes the risk of iatrogenic sciatic nerve injury. The literature provides no consensus on which surgical approach or technique is to be performed and only defines the surgical procedure.[8,15]

Kaneyama et al. reported that sufficient exposure and rigid internal fixation can be obtained by performing an isolated transverse incision of approximately 15 cm over the gluteal crease and blunt elevation of the gluteus maximus muscle after penetrating from the gap between gluteus maximus and the hamstring tendons.[8]

Miller and Webb recommended the use of the more cosmetic transverse gluteal crease incision and reported that a more extensive exposure could be obtained by the distal extension of the incision longitudinally.[15]

Surgical treatment is preferred in ischial tuberosity avulsion fractures with non-union in the late period using the Kocher-Langenbeck approach.[1] However, reduction and fixation of the avulsed fragment is difficult as the ischial tuberosity lies distal to the incision field in this approach. Additionally, it is a more aggressive approach due to the necessity to include the gluteus medius muscle in the proximal part of the dissection field to obtain sufficient exposure.[8]

Although the transvers subgluteal incision has a cosmetic advantage, we used the longitudinal incision and subgluteal approach for our patient. The longitudinal approach provides a better exposure, especially in chronic cases in which extended soft tissue dissection is needed.[15] Sciatic nerve exposure was not performed as

Fig. 4. Postoperative view of the longitudinal incision. [Color figure can be viewed in the online issue, which is available at www.aott.org.tr]

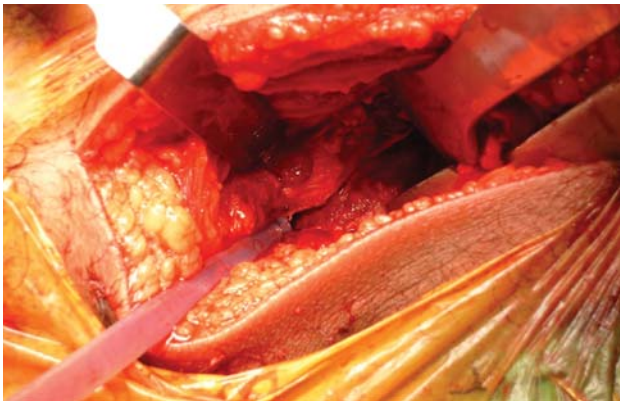

Fig. 5. Intraoperative image from the surgery. [Color figure can be viewed in the online issue, which is available at www.aott.org.tr]

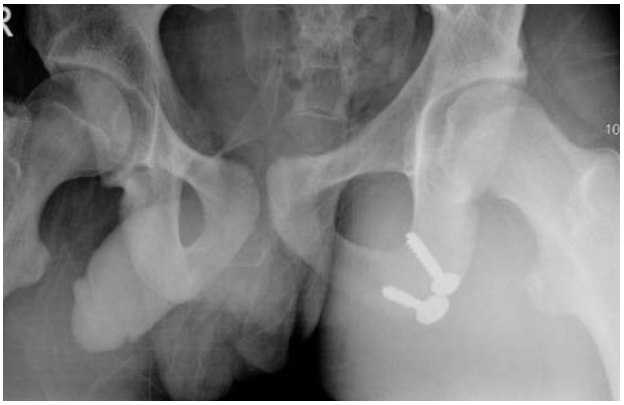

Fig. 6. Reduction and internal fixation of the left ischial apophysis in the anteroposterior radiograph.

there was no neurological deficit in our patient. However, a deep longitudinal incision can easily and safely provide a better exposure to the anatomic structures, especially the sciatic nerve, in both the mediolateral and craniocaudal directions when needed.

Conservative treatment is indicated for avulsions less than 2 cm. Metzmaker and Pappas[16] described a 5-grade rehabilitation program in which patients are not permitted to participate in sport activities for 2 months. In the first 7 days of treatment, the patients receive nonsteroid, anti-inflammatory medication and physical therapy. Athletic activity is not permitted. In the second and third weeks, isometric and stretching exercises for hip joint muscles, and light endurance exercises are used. In the third phase, a guided resistance exercise program is added to the treatment. Approximately one month into the third phase, limited athletic activity is allowed and muscle-strengthening exercises are continued. When muscle strength and range of motion are fully regained, patients are allowed to return sports. Recurrence risk is high if physical activity is begun before healing is complete.

In conclusion, in view of current literature, we believe that avulsions of less than 2 cm can be treated conservatively while longitudinal incision and subgluteal approach is a safe and easy surgical technique to be performed for the treatment of ischial tuberosity avulsion injury in patients with greater than 2 cm displacements or neurological injury.

Conflicts of Interest: No conflicts declared.

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