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CASE REPORT OPEN ACCESS

A Case Report On: An Avulsion Fracture of The Ischial Tuberosity Treated with A New Surgical Approach Early After Injury

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A B S T R A C T

We report a case of an avulsion fracture of the ischial tuberosity treated with a new surgical approach early after injury. Although surgical treatment of this fracture is usually avoided because of the difficulty of the procedure and the risk of sciatic nerve complication, we believe our subgluteal approach is simple and safe. We therefore recommend it for treating avulsion fractures of the ischial tuberosity, especially when the fragment is displaced by >2 cm and the sciatic nerve is not involved. If there is clinical evidence of sciatic nerve disturbance, it is likewise an indication for surgery. However, the incision needs to be deepened to approach the nerve, along the lines of the incisions

Keywords: avulsion fracture, ischial tuberosity, surgical approach (subgluteal)

INTRODUCTION:

Avulsion fractures of the ischial tuberosity, although rare, are significant injuries that occur predominantly in adolescent athletes during forceful hip flexion with knee extension, such as sprinting or jumping. These injuries are typically the result of sudden and forceful contraction of the hamstring muscles that exceed the tensile strength of the apophyseal cartilage, leading to detachment of the ischial apophysis. First reported by Berry in 1912, such injuries have since remained a diagnostic challenge and a therapeutic dilemma due to their subtle radiological appearance and ambiguous treatment indication [1].

Conservative treatment has traditionally been favored in cases with minimal displacement, usually less than 2 cm. However, complications such as nonunion, chronic pain, sciatic nerve irritation, muscle weakness, and difficulty in sitting have been documented in cases where the fracture displacement is substantial [2,3]. These complications often prompt reconsideration of early surgical fixation in displaced cases, especially when the patient is an athlete or highly active individual[4,5].

Surgical approaches have evolved over time. Early recommendations by Milch advocated a perineal incision, although this technique posed risks due to the proximity of vital structures [6]. More recent literature supports posterior subgluteal approaches for safer and more effective exposure of the avulsed fragment[7-10]. However, standardized protocols are lacking, and the rarity of such injuries makes large-scale studies unfeasible.

This report details a successful case of ischial tuberosity avulsion fracture managed surgically using a modified subgluteal approach. The objective was to demonstrate the safety, efficacy, and simplicity of this technique in restoring functional mobility while avoiding sciatic nerve damage.

CASE REPORT

A 16-year-old, boy, high-school student felt a crack and severe pain in his left buttock during a jump while playing basketball and was unable to walk as a result. He was referred to our institution 3 hours after the injury. Clinical examination on arrival at our hospital revealed tenderness over the left ischial tuberosity. He could not move his left hip because of pain. No neurologic deficit was present. Radiographs of the pelvis showed a large osseous fragment inferior and lateral to the left ischial tuberosity (Fig. 1A). Computed tomography (CT) showed the fragment was displaced

Materials and Methods

This was a Case report carried out in the Department of Orthopaedics.

Patient Profile

A 16-year-old male presented with sudden onset pain in the left buttock following a jump during a basketball game. He reported a crackling sound and was unable to ambulate post-injury.

Clinical Evaluation

On physical examination, the patient had localized tenderness over the ischial tuberosity with restricted hip movement due to pain. No neurological deficits were observed.

Radiological Assessment

Pelvic X-rays revealed an avulsion fracture of the ischial tuberosity with significant displacement. CT imaging confirmed a 4.5 cm displacement of a shell-like osseous fragment.

Surgical Procedure

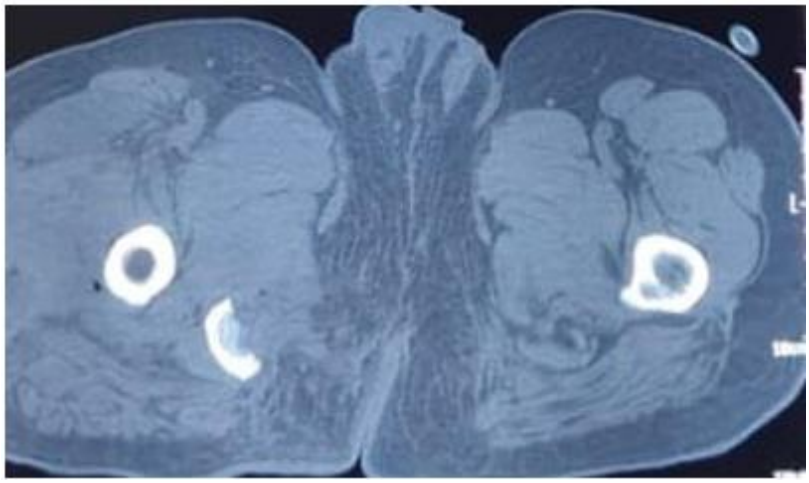
Under spinal anesthesia and in prone position, a 15-cm vertical incision was made. Blunt dissection was used to identify the gluteus maximus, which was elevated to access the fracture. The fragment was reduced and fixed using three 4-mm cancellous screws.

Postoperative Protocol

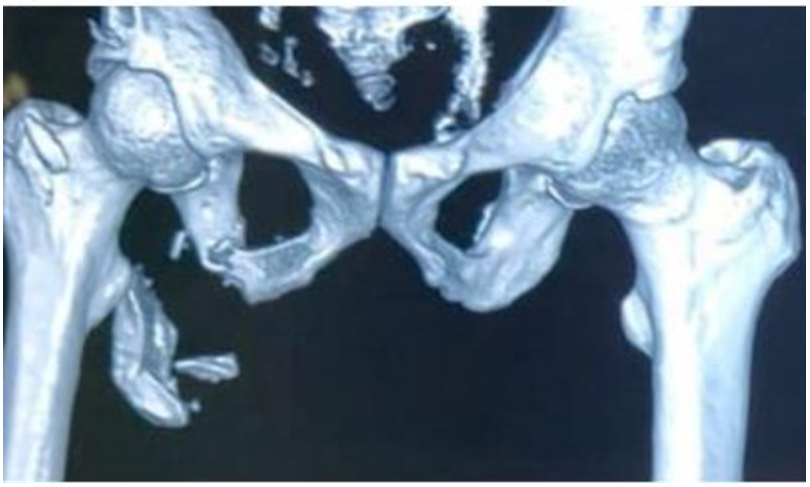
Day 1: Bed sitting as tolerated
Week 1: Wheelchair ambulation with slight hip flexion.
Day 10: Non-weightbearing ambulation with crutches.
Week 3: Full weightbearing walking.
Month 3: Return to jogging.
Month 4: Resumed all normal activities.

In the present study 4.5 cm and a reconstructed, three-dimensional CT clearly depicted a shell-like fragment (Figs. 1B, 1C). Although there was no neurologic deficit, the fragment itself and the displacement of the fragment were both so large that surgical intervention to repair it was proposed and accepted by the patient and family.

A



B



C

FIGURE 1. Imaging studies at time of injury. A, AP pelvis showing a displaced avulsion fracture of the ischial tuberosity. B, CT showed a 4.5-cm displacement of the fragment. C, Reconstructed three-dimensional CT clearly illustrating a shell- like fragment

SURGICAL APPROACH

After spinal anesthesia, the patient was placed in the prone position with his hip and knee in a slightly flexed position (Fig. 2). A 15-cm longitudinal incision was made (Fig. 3).

FIGURE 2. Prone position at time ofsurgery with patient's hip and knee ina slightly flexed position.

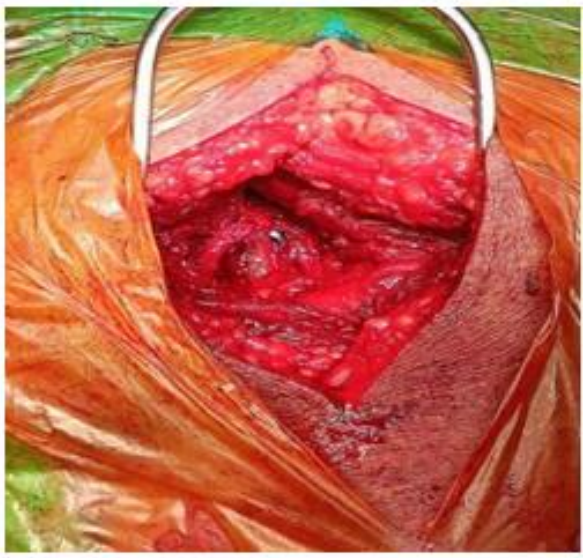


FIGURE 3. Vertical / longitudinal incision given as fracture fragment displaced 4.5 cm

FIGURE 4. AP pelvis taken after conclusion of surgery showing completereduction of the fragment.

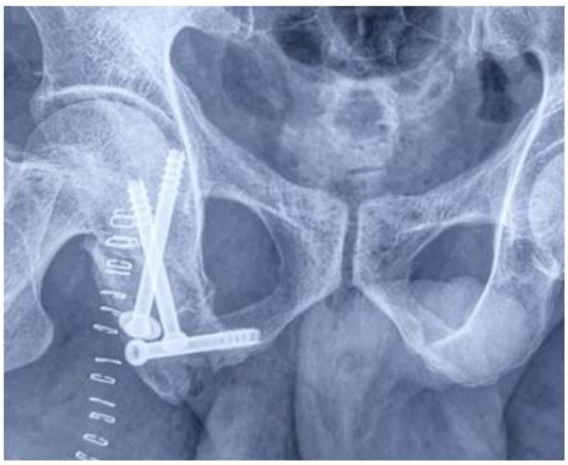


FIGURE5.PostopAPPelvisradiograph.

The inferior edge of the gluteus maximus was defined and elevated with blunt dissection. The plane between the gluteus maximus and the hamstring muscles was divided, and the gluteus maximus was traced proximally. The avulsed fragment was present at the proximal end of the hamstring muscles. The fragment was easily reduced with the patient's hip in an extended position and the knee in a flexed position, and was fixed with 3 cancellous screws (4 mm each) (Fig. 4) and obtained post-op radiograph (Fig. 5)

POSTOPERATIVE COURSE

On the day after surgery, the patient was allowed to sit up in his bed as tolerated. One week later, he was permitted to sit in a wheelchair with his hip slightly flexed.

Ten days after surgery, he started non-weightbearing walking with crutches, and at 3 weeks postoperatively he was able to walk with full weightbearing. He started jogging at 3 months after surgery. At the last follow-up, 4 months postoperatively, the patient had resumed all of his normal activities, including driving as he was Auto- rickshaw driver.

POSTOPERATIVE COURSE

Bony avulsion fractures from the ischial tuberosity are relatively infrequent. Berry7 in 1912 reported the first case in the literature. Since Milch8,9 reported in 1926 and 1953, many authors have recommended nonoperative treatment of this fracture.1–3,9,10 Contrary, Martin and Pipkin,11 Pruner and John- ston,4 Rogge and Romano,5 and Wootton et al6 argued that nonunion, fibrosis, or overgrowth of the ischial tuberosity tends to occur when there is a large displace-ment, and those avulsions seem to cause buttock pain, muscle weakness, and pain with sitting. Akova and Okay12 pointed out that nonoperative treatment was adequate in avulsions with <2 cm displacement.

DISCUSSION

Avulsion fractures of the ischial tuberosity typically affect adolescents due to the vulnerability of unfused apophyses. The management of these fractures depends on the extent of displacement and the presence of neurovascular compromise. When displacement exceeds 2 cm, nonunion and fibrous healing with persistent symptoms have been commonly reported [11].

Various authors have advocated for early surgical intervention in such cases. Wootton et al. suggested that displaced fragments result in functional limitations and advocated open reduction with internal fixation (ORIF) for optimal outcomes [12]. Similarly, Muscato et al. highlighted that ORIF restores anatomical alignment and preserves hamstring integrity [13].

The subgluteal approach described in this case offers several advantages:
Minimal muscle dissection.
Direct visualization of the fragment.
Avoidance of sciatic nerve injury.

Feasible screw fixation with minimal complications.
Spinner et al. and Miller et al. proposed gluteal fold or extensive gluteal incisions when sciatic nerve involvement is suspected [14,15]. However, in the absence of neurologic deficits, limited subgluteal access is sufficient.

Despite being based on a single case, this approach corroborates the findings of Kujala et al. and Akova et al., who emphasized individualized treatment protocols considering the patient's activity level, displacement, and symptom [16,17]. Additionally, early mobilization post-surgery facilitated quicker functional recovery without complications.
Woot-ton et al6 and Muscato et al [18]recommend surgical treatment, especially when the displacement is >2 cm.

In the literature, only a few authors have described details of a surgical procedure or approach. Milch, although he never recommended operative intervention, proposed ''a perineal incision'' used for resection of the ischium if surgeons opted for surgery on their patient. In this procedure the patient is placed in a lithotomy position and an incision is made from the inferior border of the pubis to approximately 3 inches posterior to the ischial tuberosity along the bony ridge. Then the lower edge of the gluteus is detached from the ischiopubic ramus [19] However, this approach is not appropriate for open reduction of the ischial tuberosity because it requires hip abduction and flexion, which makes the displacement of the fragment greater. In addition, there are many important organs in the perineal area, making it difficult and dangerous to approach through this incision.

Both Miller et al [15] and Kaneyama S et al [20] detailed surgical approaches for those cases with sciatic nerve complications. Miller suggested an incision in the gluteal fold, with proximal retraction of the gluteus maximus, and exposure of the hamstrings, the fragment, and the sciatic nerve. Spinner recommended a wide incision along the gluteal

crease continuing distally along the posterolateral thigh, tracing the sciatic nerve from its distal to proximal location, and release of the gluteus maximus from its insertion, thus allowing proximal retraction.

The Kocher-Langenbech approach, which is ordi- narily used for hip surgery, has been used in some cases. [21,22]The ischial tuberosity is located at the bottom of this incision, so that reduction and fixation of the avulsed fragment is difficult with this procedure. In addition, this approach needs necessitates invasion of the gluteus medius. We used a subgluteal approach, similar to Miller's, by which we could easily and safely access, visualize, and reduce the fragment. However, our subgluteal approach was not as deep as Miller's, and we did not expose the sciatic nerve in our case. Although the sciatic nerve and posterior femoral cutaneous nerve are located on the lateral and deeper side of the ischial tuberosity, a medial approach allows the surgeon to locate the tuberosity first, thus avoiding potential complications involving the nerves.

Therefore, this subgluteal approach is recom- mended if there is no clinical evidence of sciatic nerve injury and only fixation of the fragment is needed, because there are no important structures to protect during the course of dissection. In addition, reduction of the fragment can be performed easily by extending the hip and flexing the knee. Although details of a similar approach were first outlined by Miller, this is the first report describing the details of a subgluteal approach [23-27].

On the basis of 1 case only and a review of the literature, we recommend surgical treatment of an avulsed ischial tuberosity fragment when the fragment is dis- placed >2 cm, or when the sciatic nerve is involved, or both. Our subgluteal approach is a simple and safe procedure for treating avulsion fractures of the ischial tuberosity with no sciatic nerve injury. If there is clinical evidence of sciatic nerve disturbance, the incision needs to be deepened to approach the nerve, along the lines of incisions advocated by both Miller and Spinner.

CONCLUSION

Surgical management of ischial tuberosity avulsion fractures is justified in cases with >2 cm displacement or when the patient is highly active. The subgluteal approach used in this case proved to be effective, safe, and allowed early return to function with excellent radiological and clinical outcomes. We recommend this approach for similar cases, particularly when there is no sciatic nerve involvement.

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DECLARATIONS:

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Consent to participate: There is consent to participate.
Consent for publication: There is consent for the publication of this paper.
Authors & contributions: Author equally contributed the work.

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