# Displaced Ischial Stress Fracture Following Revision Total Hip Arthroplasty

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## Abstract

Stress fractures of the ischium are uncommon and are most likely caused by excessive stretching or contracture of the hamstring muscles. In addition, revision total hip arthroplasty (THA) may weaken the ilium, and metabolic bone disease may also contribute to a fracture. Treatment is usually conservative and prognosis is favorable.

We present a rare case of spontaneous displaced fracture of the entire ischium following revision THA that healed without requiring operative intervention.


Stress fractures of the ischium are uncommon and are not reported as often as avulsion fractures of the ischial tuberosity. The mechanism of both injuries is similar, involving excessive stretching or injury to the hamstring muscle group.[1] There has been 1 reported case of an avulsion fracture of the ischial tuberosity in conjunction with THA.[2] However, we present a rare case of an ischial stress fracture not involving the ischial tuberosity that occurred after revision THA. The patient provided written informed consent for print and electronic publication of this case report.

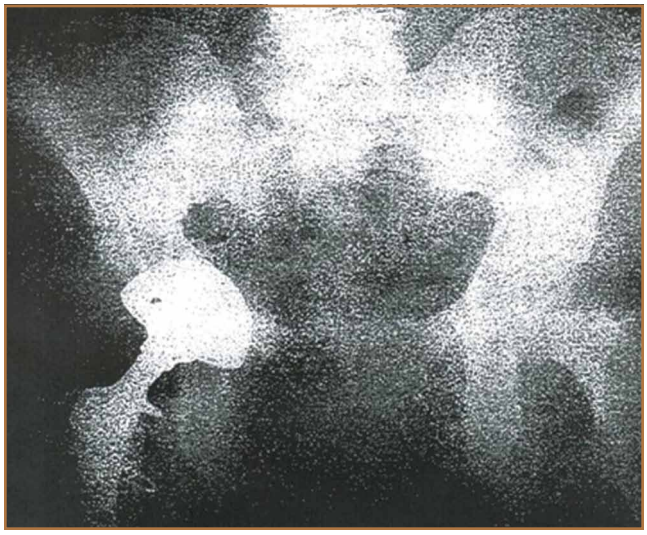
## Case Report

A 68-year-old man underwent right THA for severe osteoarthritis of the hip. Press-fit components with a metal-on-polyethylene bearing and a 28-mm head were used. The operating surgeon found that the hip was a bit loose; therefore, the leg was lengthened a few millimeters with +7.5-mm neck length, and a 10° elevated lip liner was placed posteriorly. Three months after surgery, the hip dislocated anteriorly and the patient was treated with closed reduction and a hip brace. Again 5 months later, his hip dislocated anteriorly and he was again reduced and placed in a brace. At that time, the patient was referred to Dr. Wagner for consideration of revision hip arthroplasty. His past medical history was significant for the following: body mass index of 34, renal function at 45% of normal, and heart disease with previous stent placement. The position of his components appeared acceptable (though mildly more vertical and anteverted than preferred), there was no evidence of loosening, and his past medical history placed him at increased risk; therefore, he began physical therapy to strengthen his abductor muscles.

Two years later, the patient's hip again dislocated with minimal provocation and he elected to undergo revision hip arthroplasty. As his leg lengths were relatively equal and the component version appeared acceptable, the initial plan was for modular head and liner exchange with trochanteric advancement. At the time of surgery, the greater trochanter was osteotomized with maintenance of the abductor and vastus lateralis attachments. His acetabular component with the posterior elevated lip liner appeared to be anteverted roughly 45°; therefore, the 60-mm well-fixed acetabular component was removed with minimal bone loss, and a 64-mm component with screws was placed with 20° of anteversion.

The femoral component was well fixed and in good position. The head size was increased to 32 mm and the neck length increased from +7.5 mm to +10 mm. The greater trochanter was advanced roughly 1 cm and repaired with 2 cables (**Figure 1**). The postoperative course was uneventful, the patient gradually became more active, and he did not have any

Figure 1. Anteroposterior view of the pelvis demonstrating revision of total hip arthroplasty with trochanteric osteotomy and advancement.



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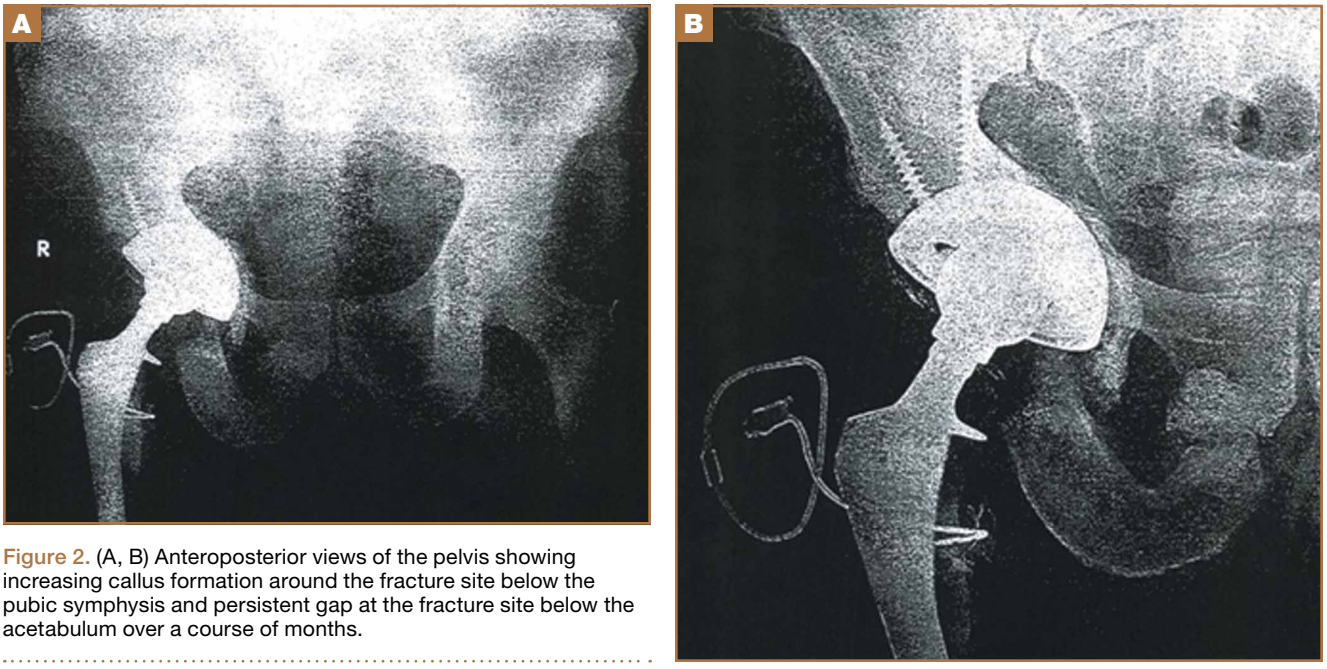


Figure 2. (A, B) Anteroposterior views of the pelvis showing increasing callus formation around the fracture site below the pubic symphysis and persistent gap at the fracture site below the acetabulum over a course of months.

further dislocations. He returned for routine follow-up 1 year after the revision complaining of mild groin pain and persistent limp, but overall he was satisfied with his pain relief and function. Radiographs revealed a nonunion of the trochanteric osteotomy with a broken cable. The risks and benefits of revising the trochanteric osteotomy were discussed with the patient, and he decided his symptoms did not warrant surgery.

The patient next presented nearly 3 years after the revision hip arthroplasty with increasing groin pain worsened by weight-bearing activities, requiring him to ambulate with a walker. There was no history of antecedent trauma. Radiographs revealed a displaced fracture of the ischium on the operative side, with fracture lines located below the pubic symphysis and the acetabular component; the components appeared stable. Callus formation was apparent around the fracture below the symphysis. The patient's bone density was normal, calcium level was 9.8 mg/dL, and vitamin D level was 22 ng/mL, and calcium and vitamin D intakes were addressed by his nephrologist. He was instructed to use a walker for another 6 weeks. Over the next few months, he became more comfortable and was able to ambulate without ambulatory aids. Radiographs of his pelvis showed increased callus formation around the fracture site below the pubic symphysis; however, the fracture site below the acetabulum was unchanged (**Figures 2A, 2B**).

One year later, radiographs showed a persistent 2-cm gap of the ischium fracture below the acetabular component and bony union at the pubic side of the fracture. The patient no longer complained of pain around his right hip and was satisfied with his function.

## Discussion

Recurrent dislocation of a hip replacement may be related to component position and soft-tissue tension. In this patient, soft-tissue tension initially appeared to be the greater issue; therefore, a trochanteric advancement seemed to be the best option to avoid increased leg-length discrepancy and possible future problems with a constrained liner. Unfortunately, the trochanteric osteotomy resulted in a nonunion and persistent limp. In retrospect, given the patient's large acetabular shell size, an even larger femoral head with the correction in cup anteversion probably would have resulted in resolution of instability without the risk of trochanteric nonunion.

Stress fracture of the ischium rarely occurs in relation to THA. There has only been 1 reported case of avulsion fracture in conjunction with hip arthroplasty.[2] Avulsion fractures of the pelvis are common in athletic adolescents between ages 15 and 18 years in whom the ischial apophysis is weak.[3] However, by age 25 years, the ischial apophysis is united, and any fractures of the ischium that occur after this age are most probably due to injury of the hamstring muscles.[1]

The ischium is the strongest pelvic bone and serves as an attachment site to the hamstring muscle group at the ischial tuberosity. Excessive stretching or contracture of these muscles can occur by flexion at the hips with extended knees. This can place increased force on the ischial tuberosity while the rest of the bone is supported by the sacrotuberous ligaments, causing ischial fractures.[1] Patients often complain of pain in the groin or buttocks, and sciatic symptoms rarely occur.[4]

Osteoporotic bones are especially predisposed to these types of fractures.[2] The patient reported here had metabolic bone disease due to chronic renal disease, and though uneventful, the acetabular component revision weakened his ischium. Furthermore, tension applied by increased femoral neck length and hamstring stretching during physical therapy may have contributed to the fracture.

Treatment of ischial stress fractures is usually conservative and has a good prognosis.[2,5] This case demonstrated healing of the fracture located below the pubic symphysis but a persistent

gap below the acetabular component; nevertheless, the patient did not feel that his symptoms warranted further treatment.

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*This paper will be judged for the Resident Writer's Award.*