SAS Journal of Surgery
Abbreviated Key Title: SAS J Surg
ISSN 2454-5104
Journal homepage: https://www.saspublishers.com

OPEN ACCESS

Surgery

Aseptic Nonunion of an Intertrochanteric Femoral Fracture in a Young Adult: A Case Report

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DOI: https://doi.org/10.36347/sasjs.2026.v12i07.001 | **Received:** 11.04.2026 | **Accepted:** 27.05.2026 | **Published:** 03.07.2026

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Abstract | **Original Research Article**

Background: Intertrochanteric fractures generally demonstrate high union rates owing to the rich vascular supply and osteogenic potential of the trochanteric region. Consequently, nonunion is an uncommon complication, particularly in young adults, in whom preservation of the native hip joint remains a major therapeutic challenge. ***Case Presentation:*** We report the case of a 32-year-old male patient presenting with aseptic nonunion of an intertrochanteric femoral fracture initially treated with a standard gamma nail. The patient was lost to follow-up after the index procedure and subsequently presented with severe hip pain, inability to bear weight, limb shortening, and varus deformity following a low-energy fall. Radiographs and computed tomography revealed fracture nonunion associated with implant failure and a residual cervico-diaphyseal angle of approximately 105°. Clinical examination, laboratory investigations, and imaging findings excluded infection. ***Intervention:*** Revision surgery was performed through a lateral approach. The procedure included removal of the failed implant, debridement of the nonunion site, excision of fibrous tissue, correction of the varus deformity, and fixation using a long gamma nail. Biological enhancement was achieved with a corticocancellous autograft harvested from the ipsilateral iliac crest. ***Results:*** Postoperative radiographs demonstrated restoration of the cervico-diaphyseal angle to approximately 130°, satisfactory implant positioning, and adequate filling of the nonunion site with bone graft. Mechanical stability and anatomical alignment were successfully restored. ***Conclusion:*** Aseptic nonunion of intertrochanteric fractures is a rare but challenging condition in young patients. Residual varus malalignment is a major contributor to fixation failure and impaired healing. Successful management requires restoration of both mechanical stability and biological healing potential through deformity correction, stable fixation, and bone grafting when indicated.

Keywords: Intertrochanteric fracture; Nonunion; Young adult; Gamma nail; Varus deformity; Revision surgery; Bone grafting; Implant failure.

INTRODUCTION

Intertrochanteric fractures, located between the greater and lesser trochanters, are extracapsular fractures and account for approximately 50% of proximal femoral fractures. [1] These fractures are commonly encountered in elderly patients but may also occur in young adults following high-energy trauma. Most cases heal uneventfully due to the metaphyseal location of the fracture and the rich vascular supply of this region. However, in rare situations, nonunion may develop, generally as a consequence of suboptimal osteosynthesis.[2]

In elderly patients, management is usually less complex since treatment often consists of total hip arthroplasty. Conversely, management in young adults remains particularly challenging because preservation of the native hip joint and bone stock is of paramount importance.

MATERIAL AND METHODS

In this case report, we present the management of an intertrochanteric fracture nonunion treated in the Department of Orthopedic and Trauma Surgery at Ibn Sina University Hospital in Rabat [Moulay Youssef Hospital].

The case involved a 32-year-old male patient with a 10 pack-year smoking history, alcohol abuse, and daily cannabis consumption, with no other significant medical history. He had undergone surgery in our department in 2022 for a left intertrochanteric fracture

treated with a standard gamma nail. The initial postoperative course was favorable; however, the patient was subsequently lost to follow-up due to incarceration.

RESULTS

The patient was referred to the emergency department of Moulay Youssef Hospital for severe left hip pain associated with inability to walk following a fall from standing height.

Clinical examination revealed complete functional impairment of the left lower limb with varus deformity, a positive log-roll test, and shortening of the left lower limb, without any local [fistula, discharge] or systemic signs of infection.

Standard radiographs [Figure 1] demonstrated nonunion of a left intertrochanteric fracture associated with implant failure at the level of the cervical screw orifice, as well as varus displacement of the left hip with a cervico-diaphyseal angle estimated at approximately 105°. Radiological assessment was completed by a CT scan, which confirmed the diagnosis of nonunion without evidence of any identifiable fluid collection. Laboratory investigations were unremarkable, with normal C-reactive protein levels and white blood cell count.

The patient underwent surgical management in October 2025. He was positioned in the right lateral decubitus position through a lateral approach. The first step consisted of removal of the gamma nail, debridement of the fracture site, and excision of the perifractural fibrous tissue. This was followed by correction of the varus deformity and stabilization using a long gamma nail associated with a corticocancellous autograft harvested from the left anterior iliac crest [Figure 2].

Postoperative radiographic evaluation [Figure 3] was satisfactory, showing restoration of a cervico-diaphyseal angle close to 130°, adequate filling of the fracture site with the autograft, and a centered position of the cervical screw on the anteroposterior view [Figure 4]. Furthermore, on the AP view, the cervical screw was located between the middle and upper thirds of the femoral neck due to the trajectory of the previous screw.

Figure 1: Preoperative radiograph

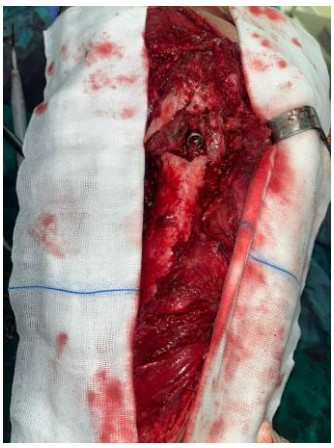

Figure 2: Intraoperative clinical image

Figure 3: Postoperative anteroposterior radiograph

Figure 4: Intraoperative lateral fluoroscopic view

DISCUSSION

Trochanteric fractures are less likely to progress to nonunion than intracapsular femoral neck fractures, with a reported incidence ranging from 1% to 2%.[2] This lower rate of nonunion is mainly explained by the abundant vascular supply of the trochanteric region, which provides a favorable biological environment for fracture healing and callus formation.[2,3] In addition, the metaphyseal nature of these fractures contributes to a greater osteogenic potential and generally satisfactory consolidation rates following stable fixation.

Regarding the diagnosis of nonunion in this region, implant failure remains the most common mode of presentation. Mechanical failure usually reflects an unfavorable biomechanical environment for fracture healing, particularly residual varus malalignment after the initial reduction and fixation. [4] Varus deformity increases shear stresses across the fracture site, leading to excessive mechanical strain, progressive instability, and ultimately failure of osteosynthesis. This mechanism was consistent with the presentation observed in our patient.

CONCLUSION

Primary nonunion of intertrochanteric fractures is a rare but challenging condition to manage, particularly in young patients. The risk of persistent nonunion remains high when optimal biological and mechanical conditions are not restored. Among the mechanical factors, residual varus deformity following the initial osteosynthesis represents one of the main predictors of fixation failure and impaired fracture healing. Indeed, varus malalignment increases compressive and shear forces across the fracture site, resulting in instability and progressive mechanical overload of the implant.

Therefore, revision surgery must aim to restore proper alignment and provide stable fixation while recreating a favorable biological environment for bone healing. Correction of the residual varus deformity is essential and may be associated with bone grafting, depending on the degree of bone loss and local biological conditions, in order to promote secondary fracture union and improve functional outcomes.

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