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Case Report

# Medial migration of the intramedullary Gamma 3 nail – a case report☆

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ABSTRACT

Intertrochanteric femur fractures are very common in patients over 65 years old, and are often associated with osteoporosis. Proximal femoral nails are preferred because of their biomechanical advantages in the treatment of these fractures, especially if the fracture is unstable. However, many complications associated with intramedullary fracture fixation have been described. The medial migration of the intramedullary gamma nail is a rare complication. The authors report an uncommon but potentially fatal complication, medial and intrapelvic migration of the intramedullary Gamma 3 nails, recorded after one month of osteosynthesis. This article aims to alert the orthopedic community to this rare complication, which may present a high risk of morbidity and mortality.



## Migração medial do cravo cefálico de dispositivo cefalomedular Gamma 3 – Relato de caso

*Palavras-chave:*
Fraturas do quadril
Pinos ortopédicos
Parafusos ósseos

RESUMO

As fraturas intertrocantéricas do fêmur proximal são muito comuns em pacientes acima de 65 anos, por estarem muitas vezes associadas à osteoporose. A fixação do fêmur proximal com dispositivos cefalomedulares, pelas suas vantagens biomecânicas, constitui o tratamento preferencial, especialmente no tratamento das fraturas instáveis. Várias complicações associadas com a fixação cefalomedular tipo Gamma desse tipo de fraturas foram descritas na literatura, a migração medial do cravo cefálico é uma complicação excecionalmente singular. Os autores relatam uma complicação incomum mas potencialmente

☆ Study conducted at the Local Heath Unit of Alto Minho, Viana do Castelo, Portugal; and at the Plastic Surgery Service, Hospital de Gaia, Porto, Portugal.

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fatal, a migração medial intrapélvica do cravo cefálico do dispositivo intramedular Gamma 3, verificada após um mês da osteossíntese. Este trabalho aspira a despertar a comunidade ortopédica para essa rara complicação, a qual pode apresentar alto risco de morbilidade e mortalidade.



## Introduction

Intertrochanteric fractures of the proximal femur are very common in patients over 65 years, and are often associated with osteoporosis.[1–3]

These are extracapsular fractures, whose treatment generally consists of osteosynthesis with intramedullary (cephalomedullary nail with more evident indication in unstable fractures, but also indicated in stable fractures) or extramedullary implant (plate and sliding screw, in stable fractures).[4,5]

Cephalomedullary nailing of the proximal femur is the preferred treatment especially for unstable fractures nailing of the proximal femur, due to its biomechanical advantages.[6–9]

However, various complications associated with intramedullary fixation of this type of fracture have been described; cut-out of the cephalic screw is one of the most

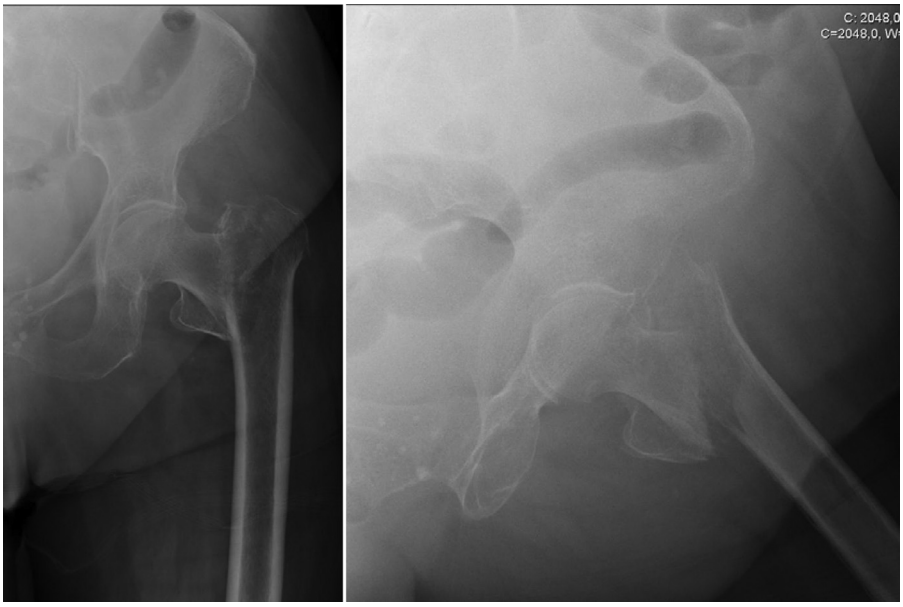

**Fig. 1 – Radiograph disclosing an intertrochanteric fracture.**

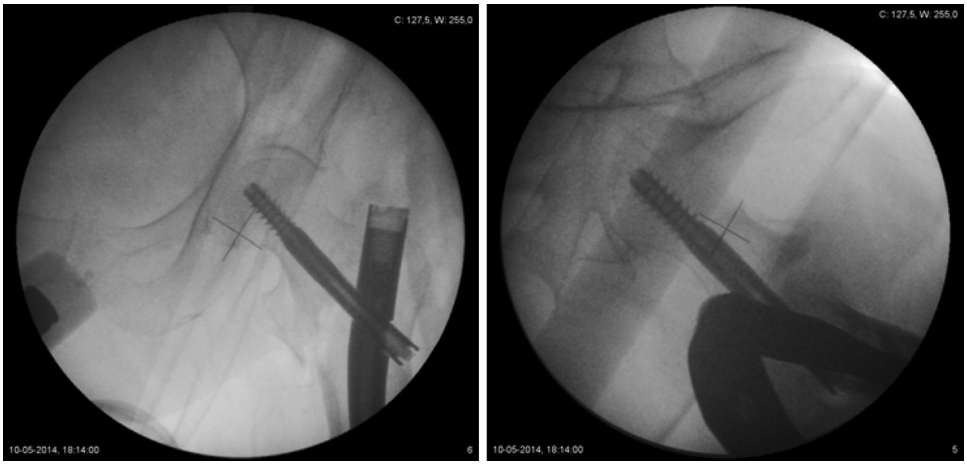

**Fig. 2 – The patient underwent closed reduction and osteosynthesis with cephallomedulary screw and nail Gamma3 Stryker 130°; intraoperative radiography of the hip, anteroposterior and lateral views.**

frequent complications (incidence ranging from 3% to 10%). In turn, medial migration of the cephalic screw in Gamma nails is an exceptionally unique complication.[10–14]

The authors report a very rare complication, medial migration of the cephalic screw of the Gamma3 intramedullary nail, recorded one month after osteosynthesis.

This study aimed to alert the orthopedic community to this rare complication of osteosynthesis, which may present a high risk of morbidity and mortality.

## Case report

A female patient, aged 92 years, partially dependent for activities of daily living, previously walking with crutches, was taken to the Emergency Department (ED) after a fall from own height with left hip injury. The medical history and physical examination indicated intense hip pain and functional disability. The patient had no apparent neurovascular injuries in the affected limb. Radiographs showed an AO 31-A2.2 intertrochanteric fracture (Fig. 1). Seven days after the initial trauma, under antiplatelet therapy, the patient underwent closed reduction on the traction table and internal fixation with the Gamma3 Stryker 130° cephalomedullary nail, with fluoroscopy control of the fracture reduction and proper positioning of the implant according to the surgical technique and placement of the locking screw without apparent intraoperative complications (Fig. 2). The patient was discharged from the hospital on the fourth postoperative day, with partial weight bearing on the affected limb. At the 36th postoperative day, she was taken to a primary healthcare center due to incapacitating pain and functional disability of the operated lower limb; the symptoms worsened gradually, without apparent traumatic events when the patient already beared full weight on the operated limb. She was once again referred to the ED; a hip radiograph demonstrated intrapelvic medial migration of the cephalic screw and loss of the fracture reduction (Fig. 3). The presence of internal organ injury was not observed through imaging using pelvic CT scan nor clinically. The patient underwent the extraction of the Gamma3 nail and second osteosynthesis with plate and sliding screw (Fig. 4), without intra- or postoperative complications. During the outpatient follow-up, cut-out of the cephalic screw was observed at six months postoperatively (Fig. 5). A new surgery was proposed, but was refused by the patient and her relatives; the patient was kept in outpatient monitoring. Eighteen months after the initial trauma, the patient had general condition worsening with limited mobility, moving in a wheelchair and without significant pain complaints. She still refused to undergo a new surgery.

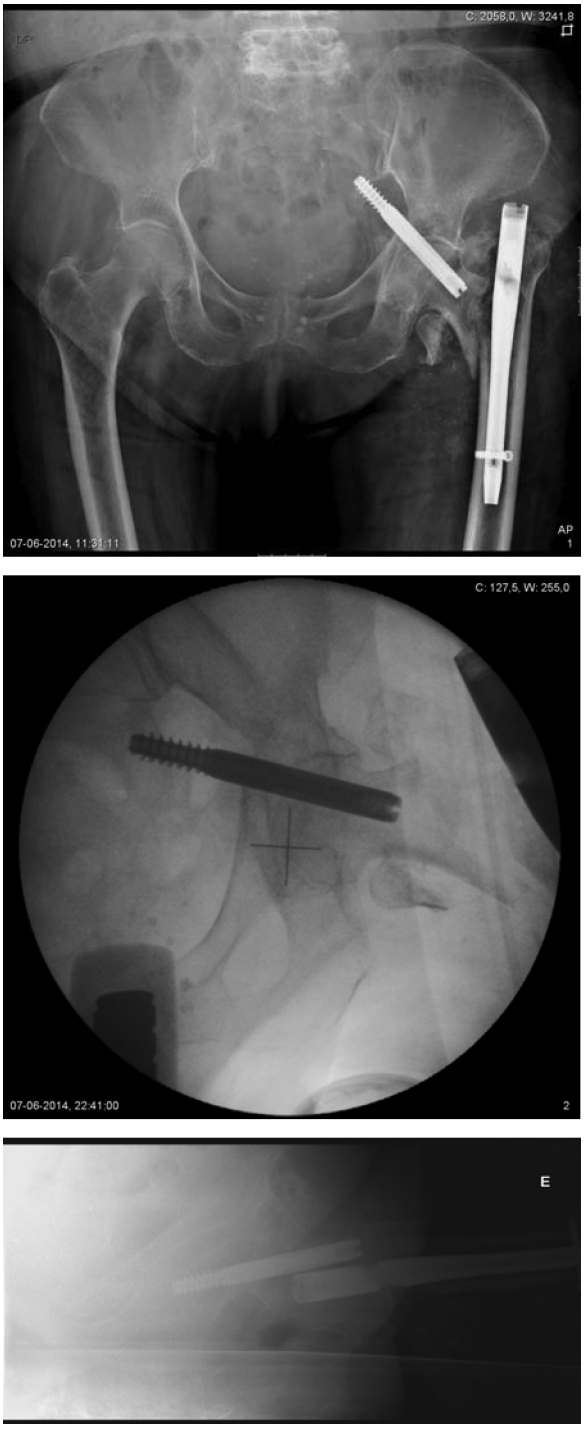


**Fig. 3 – Hip radiograph showing intrapelvic medial migration of the cephalic screw and loss of fracture reduction.**

## Discussion

Cephalomedullary nailing is widely used in the fixation of proximal femur fractures presenting numerous benefits, namely high mechanical stability with shorter operative time, smaller incision, early weight bearing, and good clinical and radiological results. However, several complications have been associated with this procedure; varus reduction loss and cut-out are the most common. Conversely, medial migration of the cephalic screws in Gamma nails is an exceptionally unusual complication, as there have been only nine cases reported in the literature.[6–18] The exact etiology of this condition remains unknown due to its uniqueness.

Iatrogenic damage of the femoral head during reaming, screw placement in improper position on the femoral head,

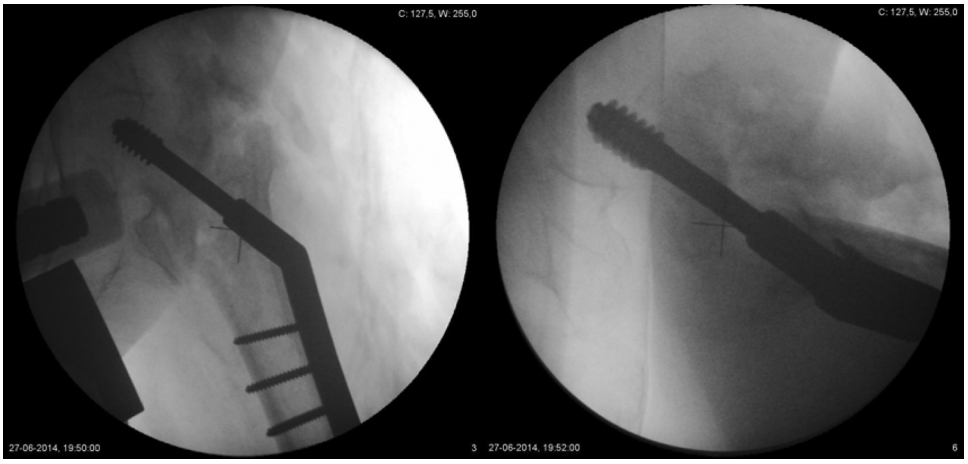


**Fig. 4 – The patient underwent extraction of the Gamma3 nail and revision osteosynthesis with plate and sliding screw.**

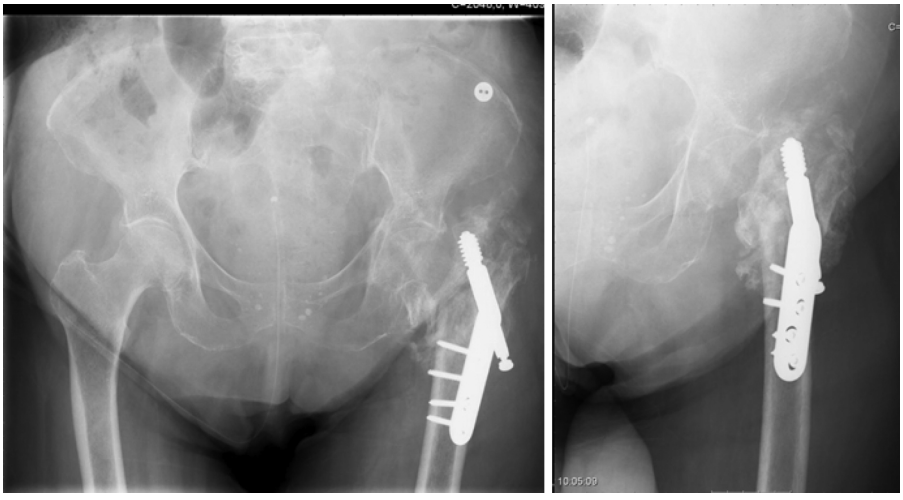

**Fig. 5 – During the outpatient follow-up, cut-out of the head screw was observed.**

early loading, subjecting the implant to excessive torsional forces, direct trauma that produces a defect in the screw-nail slot interface, the misplacement of the set screw in the proximal nail extremity, and the choice of a too short or too long cephalic screw have been associated with this unusual complication.[15–18]

In the present case, all the steps of the surgical technique were properly executed, and the reduction and osteosynthesis were appropriate; therefore, the cause(s) of the medial migration of the screw is(are) unknown. Early loading, subjecting the implant to excessive torsional forces, or direct trauma not disclosed by the patient may have contributed to osteosynthesis failure.

In this case, a second fixation device with screw in a femoral head and neck already weakened by osteoporosis in a 92-year-old patient and by prior surgery requiring local approach for the extraction of the proximal screw was shown to not have been a good option. At the time, the authors could have chosen to perform fixation with methylmethacrylate cement, to increase the mechanical strength of the cephalic fixation, such as the proximal femoral antirotation nail.[19,20]

The orthopedic surgeon must be aware of the occurrence of this complication and its associated risks, notably intrapelvic penetration and associated visceral injury.

## Conflicts of interest

The authors declare no conflicts of interest.

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