

## C A S E R E P O R T

## Subtrochanteric nonunion following fracture of an arthrodesed hip: a case report

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**Summary.** In recent years in the era of successful of total hip replacement, hip arthrodesis is rarely performed. The anatomy and biomechanics of an arthrodesed hip is altered, thus influencing the treatments strategies in case of fracture or nonunions. This case report describes the management and therapeutic solution for the treatment of subtrochanteric nonunion in a patient with hip arthrodesis. Satisfactory outcomes were finally obtained after a double surgical procedure. ([www.actabiomedica.it](http://www.actabiomedica.it))

**Key words:** hip, arthrodesis, fracture, nonunion.

### Introduction

Total hip replacement (THR) has become the treatment of choice for most hip pathologies and the indications for arthrodesis are few in selected cases (1,2). They include isolated arthritis of the hip in young patients engaged in manual work, or those with severe muscular deficits (3). Furthermore, this procedure is more often performed in the developing world, Furthermore, in young patients with septic arthritis. The most effective technique for obtaining a stable hip arthrodesis is a topic of debate. Several surgical procedures with varying rates of success have been described including the use of plates and screws, intramedullary nails and external fixators (4-9).

The increasing incidence regarding proximal femoral fractures in developed countries has been noticed. However, femoral fractures following hip arthrodesis are rare cases (1,10) that need special attention in their treatment strategy. This is related with the fact that conventional treatment options are difficult to apply as consequence of the concomitant altered anatomy and biomechanics. Therefore, nonunions in the arthrodesed hip may have an higher frequency, even if few reports about this topic are described in the literature (11-13).

In this case report Authors, we shall present a patient with a subtrochanteric nonunion following a fracture of the femur which occurred in a hip that had a previous arthrodesis.

### Case presentation

This study was conducted in accordance with the principles of Declaration of Helsinki. Patient signed informed consent about the treatment she was subjected and the processing of her personal data. M.C. a 71 years old female was admitted at the emergency department complaining of severe pain as a result of a torsional movement and a subsequent fall on his right hip, that underwent arthrodesis in the past.

Patient has a complex and not clear history. She was born with a hypometry of the lower right limb, and a homolateral hip dysplasia.

At the age of 9 she was submitted to arthrodesis. At the age of 19, she had surgery to lengthen his right femur. At the end of these treatments she was left with a hypometry of about 4 centimeters, but despite that she had a normal life.

Radiographs after trauma showed a subtrochanteric

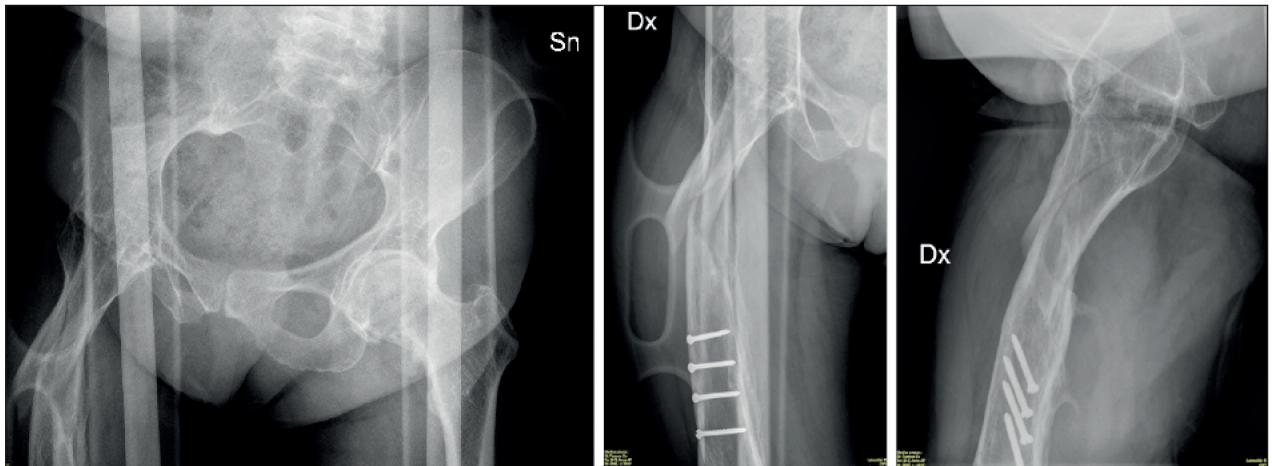
spiroid fracture of the right femur and the presence of screws in its distal fragment that derived from the previous intervention in a context of severe osteoporosis (figure 1).

As several surgical options have been reported in literature, the choice of the proper surgical technique was not easy. Authors decided to perform open

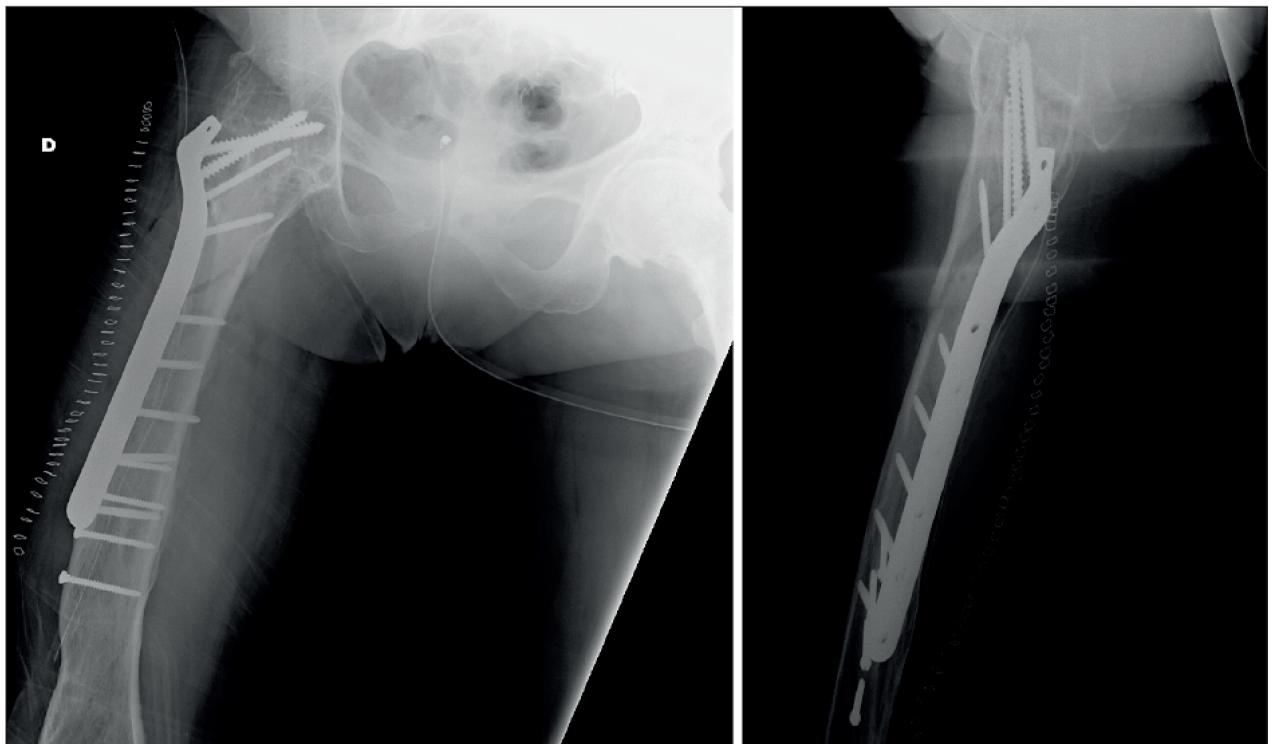
reduction and internal fixation (ORIF) with plate and screws (O'Nil plate 22,5 mm with 2 locking screws of 7 mm diameter, 2 locking screw of 4 mm diameter in the proximal fragment and 5 screws in the distal fragment; 1 of them is a standard screw) (figure 2).

Surgery was performed under general anesthesia.

After two months from surgery the patient was



**Figure 1.** Subtrochanteric right fracture in a previously arthrodesed hip



**Figure 2.** Postoperative x-rays

able to walk with crutches and control X-rays showed a slow bone healing process (figure 3).

After eight months M.C. was admitted again in the emergency ward complaining of severe pain as a result of another torsional movement and a subsequent fall. Radiographs showed a femoral nonunion and the breakage of the plate at the level of the previous fracture (figure 4).

The re-operation consisted in the removal of the broken plate and in a new fixation with a sliding hip screw associated with a cortical bone allograft and local injection of platelet rich plasma (PRP) (figure 5).

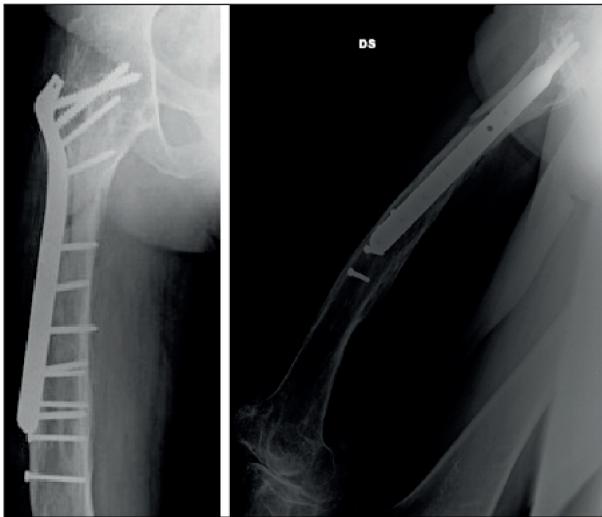
Patient had a non weight bearing period of 2 months. In the following weeks she gradually

recovered and at final check (8 months after surgery) pain was absent and nonunion consolidated (figure 6).

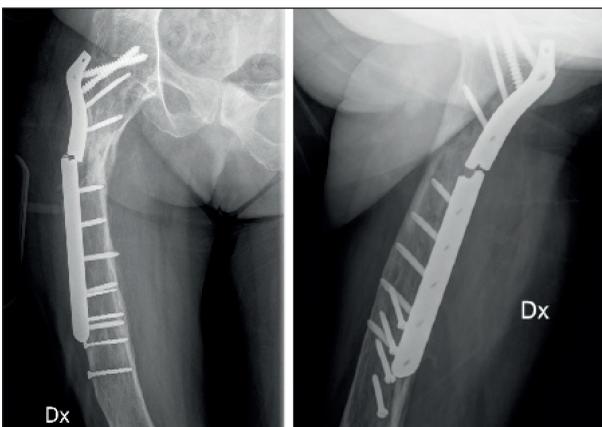
Nowadays, she has returned to her daily activities with a quality of life equal to the preinjury condition.

## Discussion

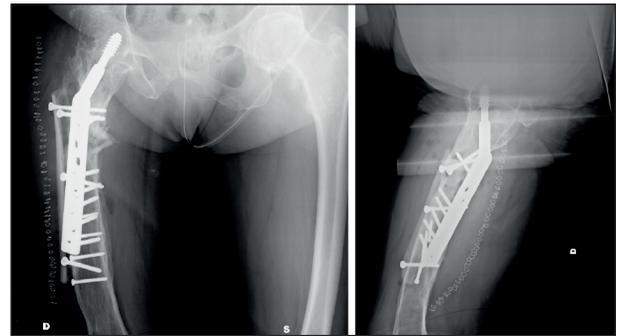
Fractures of the proximal femur are very common in the elderly population and treatment is usually surgical and performed as soon as possible. The particularity of a fracture around a preexisted coxofemoral arthrodesis derives from the fact that this type of lesion is rare, the experience of orthopaedic surgeon is low, and the literature is insufficient regarding this topic. Arthrodesis modifies the anatomy, biomechanics and biology of the femur and lower limb (14-16). Also, it can cause ipsilateral knee and lumbosacral spinal problems as well as atrophy of muscles around hip and



**Figure 3.** Radiographs 2 months after surgery



**Figure 4.** Plate's rupture 8 months after initial osteosynthesis with atrophic nonunion



**Figure 5.** X-rays following sliding hip screw fixation and cortical bone grafting and PRP injection.



**Figure 6.** X-rays 8 months after second osteosynthesis with consolidation of the nonunion

thigh. A "locked joint" determinates an altered distribution of forces and weight to the next joints, which have more easily early osteoarthritis, axial deviations and fractures (13).

The problem with deciding the correct surgical treatment and implants depends on all these factors.

In literature there are a lot of work recommending surgical treatment in order to avoid complications due to the long bed rest period (17-19).

Intramedullary nailing (IMN) and ORIF are the two possibilities of surgical treatment.

In this case report the first surgery was an ORIF. The conversion in total hip arthroplasty could be a strategy but the fracture was too much distal (20) and IMN was excluded because of technical difficulties related to patient positioning, fracture reduction and altered femoral anatomy (M.C. underwent both an arthrodesis and femoral elongation surgery) (21).

Authors managed to achieve a good reduction and sufficient stability. The patient resumed the load after two months from surgery. Clinical and X-ray follow-up showed a fracture that was healing slowly, but nonunion with plate's rupture developed 8 months after fixation. Different hypotheses could explain this failure. One explanation can be found in the altered bone characteristics of the patient (elderly with a severe osteoporosis). Another may lie in the altered biomechanics of the lower limb. In normal conditions surgical treatment would probably have led to the healing of the fracture, but in patients who have undergone arthrodesis, the way in which the load forces are distributed is very different from the normal condition (10,14,15). Finally, the type of fracture may have favored the development of this complication. Subtrochanteric patterns are associated with a variable incidence of nonunions (rates of 4-13% for extramedullary devices and up to 10% in intramedullary fixation). The main causes of failed consolidation can be associated to the interruption of the medial cortex of the femur, to comminution of the fracture and consequent loss of bone substance, to an imperfect reduction, to an incorrect surgical treatment or to a particular biomechanical conditions of the hip, as present after arthrodesis (13,22,23). Subtrochanteric nonunions are difficult to treat and the previous surgeries carried out worsens the local situation. Intramedullary and extramedullary

devices also proved to be succesful in these cases (13).

In this specific case the presence of a broken plate and an atrophic nonunion indicated a new internal fixation associated with a cortical bone graft. Authors believe that the use of cortical grafts are essential in order to obtain healing as they guarantee a better biomachanic situation. Furthermore, they are sure that cortical grafts together with PRP determine a biological stimulus as demonstrated by progressive strut osteointegration and bone formation (24-28).

## Conclusion

Subtrochanteric femoral nonunions in arthrodesed hip need special attention. Their treatment is difficult and controversial. Torsional stresses from the trunk and lower extremity require rigid fixation to minimize the risk of failure and is recommended a structural and biological supply in order to favor bone healing.

**Conflict of interest:** Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

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