
CASE REPORT

FIXATION FAILURE AFTER PROXIMAL HUMERAL FRACTURE OSTEOSYNTHESIS ON OSTEOPOROTIC BONE

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SUMMARY

Osteoporosis leads to low bone mass and microarchitectural deterioration of bone structure. The thinning of the cortical shell combined with less and thinner trabeculae leads to inferior mechanical properties. It is well known that untreated osteoporosis significantly increases the risk for another fracture and furthermore, aggravates fracture fixation. We present the case of a 73 year old woman with proximal humeral fracture on osteoporotic bone who underwent fracture fixation with locked intramedullary nails and later fixation failure with secondary screw migration. The patient had secondary osteoporosis due to corticosteroid (Medrol) and antimetabolite and antifolate drug (Methotrexate) for rheumatoid polyarthritis. Radiographs were analyzed for fracture classification, evaluation of fracture reduction, implant positioning and later fixation failure. Six months after fracture fixation with locked intramedullary nails the patient presented shoulder pain and movement impairment in abduction. Follow-up radiographs showed proximal screw migration due to local poor bone stock. Surgery with removal of the migrated screw was performed with the complete recovery of the patient. At the six weeks follow-up the patient presented with pain free shoulder and full range of motion restored.

Key words: osteoporosis, fractures, fracture fixation, implant stability, fixation failure

RÉSUMÉ

Fixation de fracture après l'ostéosynthèse d'une fracture humérale proximale sur l'ostéoporotique

L'ostéoporose entraîne l'apparition d'une faible masse osseuse et la détérioration microarchitecturale de la structure osseuse. L'amincissement de la corticale osseuse combinée à des trabécules moins nombreux et plus minces conduit à des propriétés mécaniques diminuées. Il est bien connu que l'ostéoporose non traitée augmente significativement le risque d'une autre fracture et, en plus, aggrave la fixation de la fracture. Nous présentons le cas d'une femme de 73 ans présentant une fracture humérale proximale sur os ostéoporotique qui a subi une fixation de fracture avec des clous intramédullaires verrouillés et une défaillance ultérieure de fixation avec une migration de vis secondaire. La patiente avait une ostéoporose secondaire due à l'administration d'un corticostéroïde (Médrol) et aussi d'un antimétabolite et antifolate (méthotrexate) pour une polyarthrite rhumatoïde. Les radiographies ont été analysées pour la classification de la fracture, l'évaluation de la réduction de la fracture, le positionnement de l'implant et pour l'échec ultérieur de fixation. Six mois après la fixation de la fracture avec des clous intramédullaires verrouillés, la patiente présentait une douleur à l'épaule et une altération des mouvements d'abduction. Des radiographies de suivi ont montré une migration de la vis proximale en raison d'une masse osseuse locale diminuée. Une intervention chirurgicale avec retrait de la vis migrée a été effectuée avec la récupération complète de la patiente. Au suivi de six semaines, la patiente s'est présentée sans douleurs et avec une gamme complète de mouvements restaurée au niveau de l'épaule.

Mots clés: ostéoporose, fractures, fixation des fractures, stabilité des implants, échec de fixation

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INTRODUCTION

Osteoporosis is a systemic disease and a major health problem characterized by low bone mass and microarchitectural deterioration of bone structure, resulting in bone fragility and increased susceptibility to bone fracture (1).

Untreated osteoporosis aggravates fracture fixation, demonstrated in a number of biomechanical experiments that assessed various implant configurations at different bone locations and loading modes.

The Locking Intramedullary Nails system offers a number of advantages in fracture fixation combining intramedullary stability through the use of locking screws with traditional fixation techniques. This makes the implant particularly suitable for use in poor bone stock and complex joint fractures, especially in the epimetaphyseal area. However, the system is complex, requiring careful attention to biomechanical principles, and a number of potential pitfalls need to be considered (2, 3).

CASE PRESENTATION

A 73 year old woman presented with right shoulder pain and upper arm impairment after a fall due to known heart disease. Anamnesis revealed that the patient has secondary osteoporosis due to corticosteroid (Medrol) and antimetabolite and antifolate drug (Methotrexate) for rheumatoid polyarthritis.

At examination the patient presented shoulder tenderness, diffuse swelling and asymmetry of the upper arms contour.

A proximal humeral fracture was suspected and was confirmed by radiographs (fig. 1).

Surgical fracture fixation with locked intramedullary nails was performed with good outcome (fig. 2).

Six months after fracture fixation with locked intramedullary nails the patient presented shoulder pain and movement impairment in abduction. Follow-up radiographs showed fixation failure with secondary proximal screw migration due to local poor bone stock (fig. 3).

Surgery with removal of the migrated screw was performed with the complete recovery of the patient. At the six weeks follow-up the patient presented with pain free shoulder and full range of motion restored.

DISCUSSION

The relationship between fracture healing and osteoporosis is complex and its impact on the stability of orthopedic implants has not been fully understood. Untreated osteoporosis aggravates fracture fixation, demonstrated in a number of biomechanical experiments that assessed various implant configurations at different bone locations and loading modes (1, 4, 5).

Case reports as well as clinical experience suggest that fractures in osteoporotic patients are at higher risk of implant complication due to the fact that osteoporosis

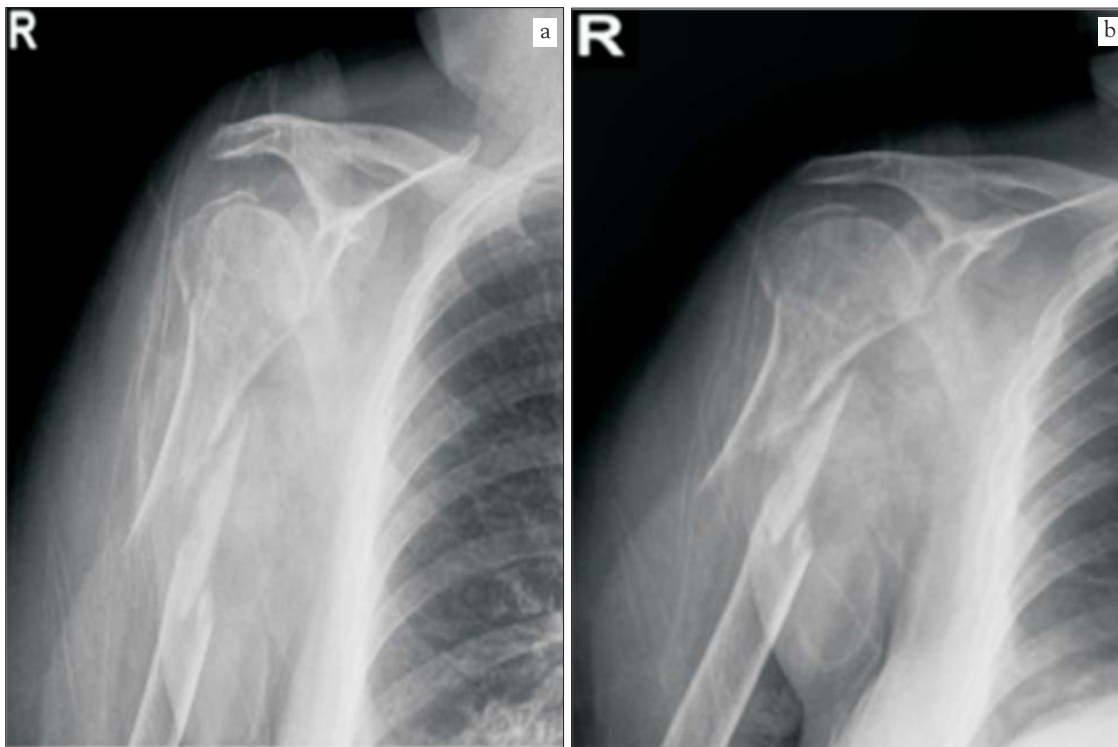


Figure 1 - Epimetadiaphyseal proximal humeral comminuted fracture



Figure 2 - Open reduction and internal fixation with intramedullary nail



Figure 3 – Proximal screw migration

promotes fragmentation and implant displacement after osteosynthesis (2, 6, 7).

In the case presented the fixation failure with proximal migrated screw was probably due to poor bone stock as the patient did not follow the recommendations given after the surgery to start the antiosteoporosis therapy.

Therefore it is very important for the patients to start the antiosteoporosis therapy early, especially, when they are known with illnesses that are treated with drugs that can promote osteoporosis.

The screening for osteoporosis is of much value in these cases and should be brought to knowledge as it can prevent complications and improve the quality of life of these patients.

CONCLUSIONS

A limited number of cases of fracture fixation failure has been reported in the literature and only a few describe the implications of osteoporosis on fracture fixation. The management of these fractures is difficult due to the poor bone stock involved and the problems that may occur with inadequate fixation and strength of implants used to stabilize the fracture until callus is formed.

This case-report underlines the osteoporosis effects on

the fracture osteosynthesis. Complications like screw migration can be avoided with early osteoporosis treatment and better fixation techniques.

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