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Original article

Is there a difference in the positioning of sliding screws between stable and unstable extracapsular fractures?☆

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ABSTRACT

Objective: To analyze the tip–apex distance (TAD), cervicodiaphyseal angle and Garden angle in stable and unstable extracapsular fractures of the femur treated with a plate and sliding screw.

Method: Hip radiographs in anteroposterior (AP) and lateral view on 117 patients were evaluated. The fractures were classified as stable or unstable, using the AO classification, and the reduction achieved was assessed in accordance with the following criteria: TAD > 3 cm; Garden alignment index (AP) < 160°; and AP cervicodiaphyseal varus angle < 125°. When two or more criteria were present, the quality of the osteosynthesis was classified as "not ideal".

Results: The patients with unstable fractures presented AP cervicodiaphyseal angles that were significantly greater ($p = 0.05$) than in those with stable fractures. The patients with unstable fractures presented lateral cervicodiaphyseal angles that were significantly smaller ($p = 0.05$) than in those with stable fractures. There were no significant differences in the remainder of the criteria evaluated.

Conclusion: This study did not find any significant differences in the measurements evaluated, except in relation to the cervicodiaphyseal angle. Satisfactory reduction was achieved both for the stable and for the unstable fractures, when we used a plate and sliding screw to treat proximal extracapsular fractures of the femur.

☆ Work developed at the Prof. Dr. Donato D'Ângelo Orthopedics and Traumatology Service, Hospital Santa Teresa, and at the Petrópolis School of Medicine, Petrópolis, RJ, Brazil.

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Existe diferença no posicionamento do parafuso deslizante entre as fraturas extracapsulares estáveis e instáveis?

Palavras-chave:
Fraturas do fêmur
Fraturas do quadril
Parafusos ósseos

RESUMO

Objetivo: Analisar a distância ponta-ápice (DPA), o ângulo cervicodiafisário e o ângulo de Garden em fraturas extracapsulares instáveis e estáveis do fêmur tratadas com placa e parafuso deslizante.

Método: Foram avaliadas radiografias do quadril nas incidências em anteroposterior (AP) e perfil de 117 pacientes. As fraturas foram classificadas como estáveis e instáveis, pela classificação AO, e a redução obtida foi avaliada de acordo com os critérios de distância ponta-ápice (DPA > 3 cm), índice de alinhamento de Garden (AP) < 160° e ângulo cervicodiafisário (AP) em varo < 125°. Quando dois ou mais critérios estavam presentes, a qualidade da osteossíntese foi classificada como «não ideal».

Resultados: Os pacientes com fratura instável apresentaram CD AP (p = 0,05) significativamente maior do que os estáveis. Os pacientes com fratura instável apresentaram o CD Perfil (p = 0,05) significativamente menor do que os com fratura estável. Não houve diferença significativa entre o restante dos critérios avaliados.

Conclusão: Este estudo não encontrou diferença significativa entre as medidas avaliadas, exceto o ângulo cervicodiafisário. Foi conseguida uma redução satisfatória, tanto nas fraturas estáveis como nas instáveis, quando usamos placa e parafuso deslizante nas fraturas proximais extracapsulares do fêmur.

Introduction

Plates and sliding screws are currently the implants most often used for fixation of intertrochanteric fractures of the femur.[1] This is because of an intrinsic characteristic of their design, which makes it possible to collapse the fracture with controlled impaction into a stable position, while maintaining a constant cervicodiaphyseal angle, without penetration of the femoral head.[2–4] The plate and sliding screw join the limb together without making cuts, so as to resist penetration and the threaded screw increases the fixation in the proximal fragment. The great advantage of this is that the screw can be inserted deeply without any danger that the joint might become perforated later on, although the placement needs to be precise in order to avoid failures.[5]

The most common cause of failure of fixation of extracapsular fractures that are treated with plates and sliding screws relates to situations in which the screw in the femoral head cuts out. The incidence of this situation ranges from 5.3% to 16.8%.[1,2,6–8] It occurs when the cervicodiaphyseal angle collapses in varus and the threaded screw extrudes superiorly through the femoral head.[2,3] Baumgaertner et al.[2] introduced the concept of the tip–apex distance (TAD) as a strong prognostic factor for this complication.

TAD was defined by Baumgaertner et al.[2] as the sum of the distance in millimeters, on radiographs in anteroposterior (AP) and lateral views, from the tip of the threaded screw to the apex of the femoral head, with appropriate correction for magnification.[2,6,9] It has been demonstrated that TAD greater than 2.5 cm is associated with increased risk of implant failure[2,6,9] with greater occurrence of cut-out.[1–3,6,9,10] Some studies have suggested that values lower than 2 cm ought to be the ideal.[1]

The aim of the present study was to analyze TAD, cervicodiaphyseal angle and Garden angle in stable and unstable extracapsular fractures treated with a plate and sliding screw.

Materials and methods

Between May 1998 and July 2011, 408 patients with unstable and stable extracapsular fractures of the femur underwent surgical treatment by means of reduction and fixation using a plate and sliding screw at Hospital Santa Teresa, Petrópolis, state of Rio de Janeiro. Among these, 291 patients were excluded because they presented radiographs with incorrect views or did not present one of the views needed for analysis on the TAD measurements; or because they were under 60 years of age; or because they presented pathological fractures and treatment with cephalomedullary nails. All the patients were operated on a traction table.

The technical quality of the osteosynthesis was analyzed by means of observation and using radiographs produced during the immediate postoperative period. According to Baumgaertner et al.[2,6] TAD was described as the sum of the distance in millimeters, on radiographs in anteroposterior (AP) and lateral views, from the tip of the threaded screw to the apex of the femoral head, with correction for magnification. The cervicodiaphyseal angle was measured after osteosynthesis as a line that passed through the femoral neck and femoral diaphysis. The diastasis after the reduction and osteosynthesis was also measured. The Garden alignment index,[11] which analyzes the direction of the trabeculae,