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Original Article

Outcomes evaluation of locking plate osteosynthesis in displaced fractures of the proximal humerus

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ABSTRACT

Objective: To evaluate functional outcomes, radiographic findings and complications of proximal humeral fractures treated with locking plates and to determine prognostic factors for successful clinical outcomes.

Methods: Forty patients undergoing internal fixation of fractures of the proximal humerus with the Philos® plate were included in the study. The surgeries were performed between 2004 and 2011 and the patients underwent radiographic and clinical evaluation, by Constant–Murley and Dash score. Outcomes were analyzed by use of multivariate regression with several different variables.

Results: Patients were on average of 61.8 ± 16.28 years, and most were female (70%). The Constant–Murley score was 72.03 ± 14.01 and Dash score was 24.96 ± 19.99. The postoperative radiographs showed a head-shaft angle of 135.43° ± 11.82. Regression analysis showed that the patient's age and the Hertel classification influenced the Constant–Murley scale ($p = 0.0049$ and 0.012, respectively). Other prognostic criteria such as Neer and AO classification, head-shaft angle, the presence of metaphyseal comminution and extension of the humeral metaphyseal fragment showed no effect on prognosis. Complications occurred in four patients (10%).

Conclusion: The fixation with the Philos® plate provided good clinical and radiographic results in fractures of the proximal humerus, with a low complication rate. Patient's age and Hertel classification were defined as prognostic factors that led to worse functional outcomes.

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Avaliação do resultado do tratamento cirúrgico das fraturas desviadas do terço proximal do úmero com placa pré-moldada com parafusos bloqueados

Palavras-chave:
Fraturas do úmero
Fixação interna de fraturas
Resultado de tratamento

RESUMO

Objetivo: Avaliar os resultados clínicos e radiográficos e as complicações das fraturas do terço proximal do úmero tratadas com a placa Philos® e correlacionar esses resultados com critérios prognósticos.

Métodos: Foram estudados 40 pacientes submetidos a osteossíntese de fraturas do terço proximal do úmero com a placa Philos®. As cirurgias foram feitas entre 2004 e 2011 e os pacientes foram submetidos a avaliação funcional (escalas de Constant–Murley e Dash [Disability of Arm-Shoulder-Hand]) e radiográfica. Os resultados funcionais foram correlacionados com variáveis clínicas e radiográficas por meio de regressão múltipla.

Resultados: Os pacientes apresentavam em média 61,8 ± 16,28 anos e a maioria era do sexo feminino (70%). Observamos pontuação de 72,03 ± 14,01 pela escala de Constant–Murley e 24,96 ± 19,99 pela de Dash. A radiografia pós-operatória evidenciou um ângulo cabeça-diáfise de 135,43° ± 11,82. A análise por regressão demonstrou que a idade do paciente e a classificação de Hertel exercem influência direta na escala de Constant–Murley (p = 0,0049 e 0,012, respectivamente). Outros critérios prognósticos, como a classificação de Neer e AO, o ângulo cabeça-diáfise, a presença de cominuição metafisária e a extensão do fragmento metafisário não demonstraram influência no prognóstico em nossa amostra. Complicações ocorreram em quatro pacientes (10%).

Conclusão: A osteossíntese com a placa Philos® proporcionou, em nossa amostra, bons resultados clínicos e radiográficos, com baixo índice de complicações. A idade do paciente e a classificação de Hertel foram demonstradas como fatores preditores do resultado funcional.

Introduction

Fractures of the proximal third of the humerus account for around 4–5% of all fractures and are the second commonest types in the upper limbs.[1] Their incidence increases with age and women are affected up to twice as often as men. Just as with other fractures relating to osteoporosis, the incidence of fractures of the proximal third of the humerus presents an increasing trend.[1] In elderly patients, the proximal third of the humerus is commonly osteoporotic, which makes it difficult to fix and stabilize using traditional plates and screws.[2,3] Several techniques have been described for treating these fractures, including fixation with a plate and screws, laminar plate, intramedullary nail, percutaneous pins or tension band, or using partial arthroplasty.[4–6] Premolded plates with locking screws are considered to be the main implants for increasing the mechanical stability of these fractures.[5] Several clinical studies have shown good results in relation to shoulder function and consolidation with this type of implant.[7–9] Clinical and intraoperative variables have been described as prognostic criteria for these fractures, including: age, fracture classification, adequacy of reduction and plate positioning.[10–13]

The complication rate from using these synthesis materials is high and may result both from the fracture pattern[14,15] and from the surgical technique.[7] In a recent systematic review, Sproul et al.[7] demonstrated a complication rate of 49% among 514 patients, with a reoperation rate of 14%.

The aim of this study was to evaluate the clinical and radiographic results and complications from fractures of the proximal third of the humerus treated with the Philos® plate and correlate these results with prognostic criteria.

Methods

Between 2004 and 2011, 86 patients underwent operations to treat displaced fractures of the proximal third of the humerus, which were fixed using a fixed-angle premolded plate and proximal screws made by Philos® (Synthes®). The operations were performed by five different surgeons with experience in surgical treatment for these fractures. These patients were invited to make a return visit between August 2011 and July 2012, and 40 of them came for reassessment (40 shoulders). The other patients did not come because of death, change of telephone number or refusal to participate in the investigation. The displacement parameters for indicating surgery were based on the Neer criteria, with displacement greater than 45° or 1 cm between the fragments (or 0.5 cm for the displacement of the tubercles). Patients over the age of 18 years with fractures presenting fewer than 30 days of evolution were included. Patients who did not come for the reassessment, those with clinical follow-up of less than 6 months, fractures affecting only the greater or lesser tubercle, pathological fractures, dislocated fractures and cases with previous infection in the shoulder affected were not included in the analysis.