



Original Article

Ultrasound evaluation of the rotator cuff after osteosynthesis of proximal humeral fractures with locking intramedullary nail[☆]



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ABSTRACT

Objective: To evaluate supraspinatus tendon integrity with ultrasound (US) in patients submitted to proximal humeral fracture (PHF) fixation with a locking intramedullary nail.

Methods: Thirty-one patients with PHF treated with curvilinear locking intramedullary nail, aged between 50 and 85 years, were assessed by US at six months postoperatively and clinically at six and 12 months postoperatively. The primary aim was supraspinatus tendon integrity, evaluated by US at six months postoperatively. Secondary aims included the Constant-Murley, DASH score, and visual analog pain scores, as well as complications and reoperation rates.

Results: Full-thickness rotator cuff ruptures were observed in four patients (13%), supraspinatus ruptures in three cases (10%), and subscapularis ruptures in one case (3%). Partial ruptures were diagnosed in 10 cases (32%). The results using the Constant-Murley score at 12 months were 71.3 ± 15.2 points for the entire series, with 73.2 ± 16.1 points for patients without rotator cuff ruptures and 68.7 ± 14.1 points for those with partial or complete ruptures, without a statistically significant difference ($p = 0.336$). Complications, exclusively for rotator cuff ruptures, were observed in nine patients (29%).

Conclusion: A high rate of rotator cuff ruptures was demonstrated, with partial ruptures in 32% of cases and full-thickness ruptures in 13%. However, clinical results are satisfactory, and are not influenced by the presence of rotator cuff ruptures.

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Avaliação ultrassonográfica do manguito rotador após a osteossíntese de fraturas da extremidade proximal do úmero com haste intramedular bloqueada

R E S U M O

Palavras-chave:

Fraturas do ombro
Fixação intramedular de fraturas
Manguito rotador
Ultrassonografia

Objetivo: Avaliar a integridade do tendão do supraespal por meio da ultrassonografia (US) em pacientes submetidos à fixação de fraturas da extremidade proximal do úmero (FEP) com haste intramedular bloqueada.

Métodos: Foram avaliados por exame de ultrassonografia aos seis meses de pós-operatório e clinicamente aos seis e 12 meses de pós-operatório 31 pacientes com FEP entre 50 e 85 anos, tratados com haste intramedular bloqueada inclinada. O objetivo primário foi avaliar a integridade do tendão supraespal e os secundários incluíam descrever os demais achados da ultrassonografia, as escalas de Constant-Murley, EVA e Dash e a taxa de complicações e comparar os resultados clínicos dos pacientes com e sem rotura do manguito rotador.

Resultados: Roturas transfixantes do manguito rotador foram observadas em quatro pacientes (13%), com rotura do supraespal em três casos (10%) e do subescapular em um caso (3%). Roturas parciais foram diagnosticadas em dez casos (32%). Os resultados pela escala de Constant-Murley aos 12 meses foram de $71,3 \pm 15,2$ pontos para toda a amostra, de $73,2 \pm 16,1$ pontos para os pacientes sem rotura do manguito rotador e de $68,7 \pm 14,1$ pontos para aqueles com rotura parcial ou completa ($p = 0,336$). Complicações, exclusive a rotura do manguito rotador, foram observadas em nove pacientes (29%).

Conclusão: Observou-se uma alta taxa de alterações nos tendões do manguito rotador, com roturas parciais em 32% dos casos e transfixantes em 13%. No entanto, os resultados clínicos são satisfatórios, não influenciados pela presença de rotura do manguito rotador.

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Introduction

Fractures of the proximal humerus (PHF) are the third most common fracture in the elderly.¹ Despite the current controversy over the advantages of surgical treatment,^{2,3} deviated fractures are commonly treated with fixation or arthroplasty, with a 25% increase in surgical indications in five years.⁴

Locked intramedullary nails have been used for PHF since before the development of locked plates⁵; however, they have not achieved the same popularity, with the main reasons being related to the potential risks of rupture of the rotator cuff, and because they do not help in the reduction of fractures.^{6,7} However, there are biomechanical advantages⁸⁻¹⁰ for the use of nails, and they can be used through minimally invasive approaches, with less potential damage to soft tissues.¹¹

Clinical results are similar among patients undergoing osteosynthesis with locking plates or nails.^{6,7,12-15} However, there is disagreement as to which one generates a higher rate of complications.^{6,14,16} The risk of rupture or changes in the rotator cuff after intramedullary nails has been scarcely studied,^{7,13,17,18} and no article mentions a standardized and detailed evaluation of the rotator cuff.

The primary aim of the study was to evaluate the integrity of the supraspinatus tendon by means of ultrasonography (US) in patients submitted to the fixation of PHF with a locking intramedullary nail. The secondary aim was to correlate the presence of rupture of the rotator cuff with the Constant-Murley, DASH and VAS scores, and to compare the

clinical results of patients with and without rotator cuff rupture.

Methods

Study design

A prospective study involving 31 patients with fractures deviated from the proximal humeral extremity, underwent surgical treatment with locking intramedullary nail through a minimally invasive anterolateral approach. The patients were part of a previous randomized study¹⁹ and were operated between March 2011 and December 2014 at the same Center. The operations were performed by the same surgeon, with the same model of implant. The protocol was approved by the Ethics Committee of our medical facility.

Participants

Inclusion criteria were ages between 50 and 85 years, PHF with deviation ≥ 1 cm or ≥ 45 degrees of angulation between the head and the humeral shaft, with or without major tubercle involvement. Fractures of the minor tubercle, regardless of deviation, and fracture-dislocations were not included. Patients with neurological injuries, associated fractures in the affected limb, pathological fractures, and previous surgery of the affected shoulder or previously diagnosed full thickness rupture of one of the rotator cuff tendons were also not

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