



Original Article

Terrible triad of the elbow: influence of radial head treatment^{☆,☆☆}



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ABSTRACT

Objective: to test the null hypothesis that patients with the terrible triad of the elbow (dislocation together with fractures of the radial head and coronoid process) who are treated with open reduction and internal fixation of the radial head have final results that are comparable with those of patients treated with arthroplasty or partial resection of the radial head.

Methods: twenty-six patients with the terrible triad of the elbow who were operated by a single surgeon were evaluated on average 23 months after the surgery (range: 16–36 months). There were 17 men and nine women of mean age 41 ± 13.4 years. The fractures of the radial head were treated by means of osteosynthesis (12 patients), arthroplasty (nine) or resection of a small fragment or no treatment (five). Fixation of the coronoid process/anterior capsule was performed in 21 patients. The lateral ligament complex (LLC) was repaired in all the patients, while the medial ligament complex (MLC) was repaired in three patients whose elbows remained unstable after treatment for the radial head and LLC, but without fixation of the coronoid process.

Results: the mean final range of flexion and extension was 112° . The mean pronation was 70° and supination, 6° . The mean DASH score (Disabilities of the Arm, Shoulder & Hand) was 12 and mean MEPI (Mayo Elbow Performance Index) was 87. According to the MEPI scores, 21 patients (80%) had good and excellent results. There was no statistically significant difference in the results between the patients who underwent fixation of the radial head and those who underwent arthroplasty or resection of a small fragment.

Conclusion: there was no difference between the patients treated with arthroplasty of the radial head and those treated with other techniques.

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Tríade terrível do cotovelo: a influência do tratamento da cabeça do rádio

R E S U M O

Palavras-chave:

Luxações

Articulação do cotovelo

Fraturas do rádio

Objetivo: testar a hipótese nula de que os pacientes com a tríade terrível do cotovelo (luxação associada a fraturas da cabeça do rádio e do processo coronoide) tratados com redução aberta e fixação interna da cabeça do rádio têm resultado final comparável aos pacientes tratados com artroplastia ou ressecção parcial da cabeça do rádio.

Métodos: foram avaliados, em média aos 23 meses (16 a 36) após a cirurgia, 26 pacientes com a tríade terrível do cotovelo operados por um único cirurgião. Eram 17 homens e nove mulheres, com média de idade de 41 anos ($\pm 13,4$). As fraturas da cabeça do rádio foram tratadas com osteossíntese (12 pacientes), ou artroplastia (nove), ou ressecção de um fragmento pequeno ou nenhum tratamento (cinco). Fixação do processo coronoide/cápsula anterior foi feita em 21 pacientes. O complexo ligamentar lateral (LCL) foi reparado em todos os pacientes, enquanto que o complexo ligamentar medial (LCM) foi reparado em três pacientes cujos cotovelos persistiam instáveis após o tratamento da cabeça do rádio e do LCL, mas sem fixação do processo coronoide.

Resultados: o arco final médio de flexão e extensão foi de 112° . A pronação média foi de 70° e a supinação, de 6° . O escore Dash (Disabilities of Arm, Shoulder & Hand) médio foi de 12 e o Mepi (Mayo Elbow Performance Index) médio foi de 87. De acordo com o Mepi, 21 pacientes (80%) tiveram bons e excelentes resultados. Não houve diferença estatisticamente significativa entre os resultados dos pacientes submetidos a fixação da cabeça do rádio e aqueles submetidos a artroplastia ou ressecção de um fragmento pequeno.

Conclusão: não há diferença entre os pacientes tratados com a artroplastia da cabeça do rádio daqueles tratados com outras técnicas.

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Introduction

Injuries that involve dislocation of the elbow in association with fracturing of the radial head and fracturing of the coronoid process are referred to as the terrible triad of the elbow.¹ Historically, these injuries have been difficult to deal with and the results from treatment have been unsatisfactory due to instability, arthrosis and/or stiffness of the elbow.^{2,3} The difficulty in treating this injury pattern has been ascribed to lack of knowledge regarding the anatomical factors involved in elbow stabilization and the appropriate surgical techniques. Pugh and McKee^{4,5} described a systematized approach for surgical treatment of the terrible triad of the elbow, which included osteosynthesis or arthroplasty of the radial head, repair of the coronoid when possible and/or repair of the joint capsule, and repair of the lateral ligament complex (LLC) of the elbow. They reported that 80% of their patients presented good or excellent results and also that the revision rate was 15–25%. Since then, several authors have presented good and excellent results (77–100%) from surgical treatment of the terrible triad of the elbow, in accordance with the protocol presented by Pugh et al.^{6–14}

This study had the objective of evaluating the clinical and radiographic results from patients with the terrible triad of the elbow who were operated in accordance with this protocol. Our hypothesis was that the patients who underwent arthroplasty of the radial head would have results that were comparable to those of the other patients.

Methods

Between March 2007 and December 2009, 32 patients with the terrible triad of the elbow were diagnosed and underwent surgical treatment performed by the same surgeon (LBJG) at Hospital Madre Teresa (HMT) and “Risoleta Tolentino Neves” University Hospital (HURT). Six patients were excluded: four who could not be found and two who did not adhere to the postoperative follow-up. Thus, 26 patients remained for evaluation (17 men and nine women), with a mean age of 41 years (± 13.4). Three were left-handed and 23 were right-handed. The injury mechanisms were falls from a height in 13 cases, motorcycle accidents in 10 cases and being run over, falling off a bicycle and being in a car accident in one case each. The elbows were operated, on average, nine days (± 5.93) after the initial trauma. The left side was affected in 17 patients (65%) and right side in seven (35%).

The fractures of the radial head were classified as type 4, in accordance with Mason’s classification as modified by Johnston.¹⁵ In six fractures, only one fragment was identified and, in four of these, there was an anterior fragment accounting for less than 20% of the joint surface, which was extremely comminuted, without the possibility of fixation. Five fractures had two fragments, seven fractures had three and eight fractures had more than three.

The fractures of the coronoid process were classified in accordance with O’Driscoll,¹⁶ who divided such fractures, as seen on a coronal slice from a computed tomography scan,

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