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Original article

Statistical analysis on the concordance of the radiological evaluation of fractures of the distal radius subjected to traction☆

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ABSTRACT

Objective: The objective of this study was to evaluate the current classifications for fractures of the distal extremity of the radius, since the classifications made using traditional radiographs in anteroposterior and lateral views have been questioned regarding their reproducibility. In the literature, it has been suggested that other options are needed, such as use of preoperative radiographs on fractures of the distal radius subjected to traction, with stratification by the evaluators. The aim was to demonstrate which classification systems present better statistical reliability.

Results: In the Universal classification, the results from the third-year resident group (R3) and from the group of more experienced evaluators (Staff) presented excellent correlation, with a statistically significant *p*-value ($p < 0.05$). Neither of the groups presented a statistically significant result through the Frykman classification. In the AO classification, there were high correlations in the R3 and Staff groups (respectively 0.950 and 0.800), with *p*-values lower than 0.05 (respectively <0.001 and 0.003).

Conclusion: It can be concluded that radiographs performed under traction showed good concordance in the Staff group and in the R3 group, and that this is a good tactic for radiographic evaluations of fractures of the distal extremity of the radius.

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Análise estatística da concordância na avaliação radiológica das fraturas de rádio distal submetidas a tração

Palavras-chave:
Fraturas do rádio
Radiografia
Tração

RESUMO

Objetivo: Avaliar as classificações atuais da fratura da extremidade distal do rádio, pois as classificações feitas em radiografias tradicionais nas incidências anteroposterior e perfil têm sido questionadas quanto a sua reprodutibilidade e é sugerida pela literatura a necessidade de outras opções, com o uso das radiografias pré-operatórias submetidas a tração de fraturas de rádio distal, estratificados pelos avaliadores, com vistas a demonstrar quais classificações apresentam melhor confiabilidade estatística.

Resultados: Na classificação Universal os resultados dos grupos de R3 e Staff apresentaram uma ótima correlação, com um p-valor estatisticamente significativo ($p < 0,05$). Quando avaliada a classificação de Frykman, nenhum grupo apresentou um resultado estatisticamente significativo. Na classificação AO, nos grupos R3 e Staff, a correlação foi alta (respectivamente 0,950 e 0,800) com um p-valor abaixo de 0,05 (respectivamente < 0,001 e 0,003).

Conclusão: A tração para feitura das radiografias se mostrou com uma boa concordância principalmente nos grupos avaliadores de maior experiência (Staff) e no residente de 3° ano e é uma boa tática na avaliação radiográfica da fratura da extremidade distal do rádio.

Introduction

Fractures of the distal extremity of the radius are very frequent injuries nowadays and this, along with technological advances, has led to much debate among orthopedists with regard to improvement of their treatment.[1]

The different approaches and outcomes have stimulated authors to seek classification systems that would guide diagnosis and treatment.[2] Classifications for the distal extremity of the radius have the aims of ranking the injuries, enabling better knowledge and serving as facilitators in the decision-making process, either for conservative treatment or for surgical treatment, and with regard to the latter, determining which technique would be best. A wide variety of methods for treating the distal extremity of the radius exists,[3] going from conservative to surgical treatment, using different techniques (fixation using Kirschner wires; ligamentotaxis using an external fixator with or without associated Kirschner wires; open reduction using rigid internal fixation; and absolute stabilization by means of osteosynthesis using a plate and screws with or without grafting). Use of imaging technology for classifications within orthopedics has been analyzed by researchers,[4] in relation to radiography,[5,6] computed tomography or magnetic resonance imaging.[7] The reproducibility of fracture evaluations through using classification systems is extremely important for reliability. Use of such systems is an important stage in quantifying the severity of the injury and this demonstrates the safety of using certain classifications.[8–11] Inter and intraobserver consistency is a prerequisite for efficient use of any classification system.

Classifications that are made using traditional radiographs in posteroanterior and lateral views have been questioned regarding their reproducibility. IN the literature, it has been suggested that there is a need for other options, such as computed tomography.[9] However, among the limitations of computed tomography is its greater cost and higher radiation dose in relation to radiography. Radiography performed under traction is among the other options of lower cost and greater practicality, and this may increase the reliability of analyses on joint fractures.[12]

The objective of this study was to evaluate the current classification systems for fractures of the distal radius by means of preoperative radiographs produced under traction, with stratification by the evaluators, with a view to demonstrating which classification systems present the best statistical reliability.

Methodology

A retrospective observational study was conducted in our institution based on 30 radiographs on patients who had been admitted to the orthopedics and traumatology service and who underwent surgical procedures to treat fractures of the distal extremity of the radius.

The authors declare that this study was in accordance with the Declaration of Helsinki.

Radiographs on these patients were produced preoperatively, at the time of admission, and these were performed under traction in order to evaluate the fracture, as part of the established routine within our service. Two radiographs were produced on each patient: in anteroposterior and lateral views.

After this, the images were evaluated. The evaluators were grouped according to their year of residency or position as a member of the hospital staff.