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Original Article

Evaluation of the reproducibility of the Tronzo classification for intertrochanteric fractures of the femur☆,☆☆

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ABSTRACT

Objective: To evaluate the inter-observer reproducibility of the Tronzo classification for transtrochanteric fractures using the kappa concordance coefficient (κ).
Methods: Twenty radiographic images in anteroposterior view on hips with transtrochanteric fractures of the femur were used. These were classified by 12 observers using the Tronzo method. The images were presented in sequence and a questionnaire containing all the options of the Tronzo classification was filled out, along with a simplified classification using Tronzo divisions into two groups (stable and unstable). The data were analyzed by means of the kappa concordance test.
Results: The following kappa indices were found: for images with stable fractures (Tronzo 1 and 2), 0.11; for images with unstable fractures (Tronzo 3, 3 variant, 4 and 5), 0.52; and for the complete classification, 0.44 (moderate concordance). In turn, the simplified classification did not increase the concordance rates.
Conclusion: The Tronzo classification is unsuitable for clinical practice. We suggest that another system should be used or created for this type of fracture.

Avaliação da reprodutibilidade da classificação de Tronzo para fraturas intertrocantéricas do fêmur

Palavras-chave:
Fraturas do fêmur/classificação
Fraturas do fêmur/radiografias
Reprodutibilidade dos testes

RESUMO

Objetivo: Avaliar a reprodutibilidade, interobservadores, da classificação de Tronzo para fraturas transtrocantéricas com o uso do coeficiente de concordância *kappa* (κ).
Métodos: Foram usadas 20 imagens de radiografias do quadril na incidência antero-posterior com fraturas transtrocantéricas do fêmur, classificadas, segundo Tronzo, por

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12 observadores. As imagens foram apresentadas em sequência e foi preenchido um questionário com todas as opções da classificação de Tronzo, além da classificação simplificada, com a divisão de Tronzo em dois grupos (estáveis e instáveis). Os dados foram analisados por meio do teste de concordância de *kappa*.

Resultados: Foram encontrados os seguintes índices de *kappa*: para imagens com fraturas estáveis (Tronzo 1 e 2), 0,11; para imagens com fraturas instáveis (Tronzo 3, 3 variante, 4 e 5), 0,52; e para a classificação completa, 0,44 (concordância moderada). Por sua vez, a classificação simplificada não aumentou os índices de concordância.

Conclusão: A classificação de Tronzo não é adequada para a prática clínica. Sugerimos o uso ou a criação de outro sistema para esse tipo de fratura.

Introduction

Transtrochanteric fractures of the femur occur in the region between the greater and lesser trochanters of the proximal femur and are exclusively extracapsular.[1] In Brazil, in a survey conducted by the Ministry of Health through the National Health System (SUS), it was found that 90% of the funding destined for orthopedic diseases was consumed by nine diseases, which included transtrochanteric fractures.[2]

Their consequences for society are alarming. Around one-third of the patients die during the first year after the injury, approximately 50% become incapable of walking unaided or going up stairs and 20% start to need continual home care.[3]

Several systems have been used to classify transtrochanteric fractures and thus guide their treatment. The commonest of these are the Tronzo,[4] Evans[5,6] and AO classifications.[5–7]

The Tronzo classification is widely used in Brazilian orthopedics and traumatology services.

Exact documentation of the fracture depends on the capacity for radiographic evaluation and classification. Its reproducibility depends on the surgeon's skill in interpreting a classification system. The position of the fractured limb, the radiographic technique and the surgeons' levels of experience are factors that contribute toward the reproducibility of a classification system.[8]

Ideally, a classification system should be easy to apply, reliable and helpful in making treatment decisions, and consequently should influence the final result. An ideal system should not have interobserver discrepancies.[9]

Therefore, the aim of this study was to assess the interobserver reproducibility of the Tronzo classification for transtrochanteric fractures of the femur using the kappa coefficient of concordance (κ).

Materials and methods

A cross-sectional observational study was conducted, in which 20 radiographic images of hips with transtrochanteric fractures of the femur, in anteroposterior view, were used. All the patients were over the age of 65 years and had suffered low-energy trauma. The following were used as exclusion criteria for the images: pathological fractures caused by bone tumors, previous surgery in the region of the proximal femur and images of transtrochanteric fractures from patients under the age of 65 years.

The radiographs were classified in accordance with Tronzo, by 12 observers: four specialists who were members of the society for orthopedic trauma surgery, four third-year residents and four first-year residents of an orthopedics and traumatology service. All of these observers were given prior explanations regarding the Tronzo classification, with graphic images on spreadsheets.

The radiographs of the fractures were presented in the form of slides in the Power Point® software, in sequence, individually numbered from one to twenty, and each image was analyzed for a maximum of 45 s. During the presentation, a questionnaire was filled out to gather data on all the options of the Tronzo classification (Anexo 1).

The series of radiographs were analyzed by means of the complete Tronzo classification (six types). Subsequently, this classification was subdivided for analysis into two simple subtypes: stable fractures (Tronzo I and II) and unstable fractures (Tronzo III, III variant, IV and V).

In 1974, Tronzo subdivided these fractures into five types. Types I and II were stable; type I was described as an incomplete transtrochanteric fracture, while type II could present fracturing of the lesser trochanter, but without posteromedial comminution. Types III and IV presented posteromedial comminution; in type III, the diaphysis was brought to a medial position and proximal calcar was fitted to it. When fracturing of the greater trochanter was also present, the situation was classified as III variant (Fig. 1). In type IV, the diaphysis was brought to a lateral position, the fracture line was more vertical and the comminution was generally greater. Type V had an inverted line, from lateral to medial and from distal to proximal, which made the fracture unstable (Fig. 2). In presenting his classification, Tronzo described the osteosynthesis techniques proposed for the various types of fracture.[1,4]

The data gathered were analyzed statistically using the kappa concordance test. The software used comprised SPSS V16, Minitab 15 and Excel Office 2007.

Results

Taking all of the observers into account, we found the following kappa indices: for images with stable fractures, 0.11;