



# Do thoraco-lumbar spinal injuries classification systems exhibit lower inter- and intra-observer agreement than other fractures classifications?



## A comparison using fractures of the trochanteric area of the proximal femur as contrast model

Julio Urrutia<sup>a,\*</sup>, Tomas Zamora<sup>a</sup>, Ianiv Klaber<sup>a</sup>, Maximiliano Carmona<sup>a</sup>, Joaquin Palma<sup>a</sup>, Mauricio Campos<sup>a</sup>, Ratko Yurac<sup>b</sup>

<sup>a</sup> Department of Orthopaedic Surgery, School of Medicine, Pontificia Universidad Catolica de Chile. Marcoleta 352, Santiago, Chile

<sup>b</sup> Department of Orthopaedic Surgery, Clinica Alemana de Santiago, Chile

### ARTICLE INFO

#### Article history:

Accepted 13 November 2015

#### Keywords:

Agreement study  
Fracture classification  
Spine fracture  
Thoraco-lumbar  
Hip fracture  
Trochanteric area fracture

### ABSTRACT

**Introduction:** It has been postulated that the complex patterns of spinal injuries have prevented adequate agreement using thoraco-lumbar spinal injuries (TLSI) classifications; however, limb fracture classifications have also shown variable agreements. This study compared agreement using two TLSI classifications with agreement using two classifications of fractures of the trochanteric area of the proximal femur (FTAPF).

**Material and methods:** Six evaluators classified the radiographs and computed tomography scans of 70 patients with acute TLSI using the Denis and the new AO Spine thoraco-lumbar injury classifications. Additionally, six evaluators classified the radiographs of 70 patients with FTAPF using the Tronzo and the AO schemes. Six weeks later, all cases were presented in a random sequence for repeat assessment. The Kappa coefficient ( $\kappa$ ) was used to determine agreement.

**Results:** Inter-observer agreement: For TLSI, using the AOSpine classification, the mean  $\kappa$  was 0.62 (0.57–0.66) considering fracture types, and 0.55 (0.52–0.57) considering sub-types; using the Denis classification,  $\kappa$  was 0.62 (0.59–0.65). For FTAPF, with the AO scheme, the mean  $\kappa$  was 0.58 (0.54–0.63) considering fracture types and 0.31 (0.28–0.33) considering sub-types; for the Tronzo classification,  $\kappa$  was 0.54 (0.50–0.57). Intra-observer agreement: For TLSI, using the AOSpine scheme, the mean  $\kappa$  was 0.77 (0.72–0.83) considering fracture types, and 0.71 (0.67–0.76) considering sub-types; for the Denis classification,  $\kappa$  was 0.76 (0.71–0.81). For FTAPF, with the AO scheme, the mean  $\kappa$  was 0.75 (0.69–0.81) considering fracture types and 0.45 (0.39–0.51) considering sub-types; for the Tronzo classification,  $\kappa$  was 0.64 (0.58–0.70).

**Conclusion:** Using the main types of AO classifications, inter- and intra-observer agreement of TLSI were comparable to agreement evaluating FTAPF; including sub-types, inter- and intra-observer agreement evaluating TLSI were significantly better than assessing FTAPF. Inter- and intra-observer agreements using the Denis classification were also significantly better than agreement using the Tronzo scheme.

© 2015 Elsevier Ltd. All rights reserved.

### Introduction

Classifications in orthopaedics have been used to improve communication among treating physicians, to aid in clinical

decision-making, anticipating complications and prognosis, and also as research tools. In order to achieve those objectives, classification schemes should be comprehensive, easy to apply, and reproducible among different observers and by the same observer in different occasions.

In orthopaedics, several fracture classifications systems per body segment have been described and are in current use, probably reflecting that none is universally accepted. In thoraco-lumbar spine injuries (TLSI) specifically, there have been several attempts

\* Corresponding author at: Department of Orthopaedic Surgery, School of Medicine Pontificia Universidad Catolica de Chile Marcoleta 352, Santiago, Chile. Tel.: +562 23543467; fax: +562 23546847.

E-mail address: [jurrutia@med.puc.cl](mailto:jurrutia@med.puc.cl) (J. Urrutia).

to achieve a well-accepted classification [1–4]; nevertheless, different studies assessing the reliability and reproducibility of TLSI classification systems have demonstrated insufficient inter- and intra-observer agreement [5–7]. It has been postulated that the complex fracture patterns and soft-tissue involvement in TLSI explain this difficulty obtaining an adequate agreement. On the other hand, a number of studies evaluating limb fracture classifications have also shown less than optimal inter- and intra-observer agreement [8–15], and several limb fractures are still classified using different schemes, without a uniformly used classification.

A modification of the AO Spine TL injury classification system was recently published [16]; this new AO Spine classification, which is based on computed tomography (CT) scan, demonstrated substantial inter-observer reliability and intra-observer reproducibility when it was evaluated by its authors, who are all world leaders in spine trauma [16,17], but it also demonstrated substantial agreement in an independent study including evaluators with different levels of expertise in spine trauma [18].

To the best of our knowledge, no previous study has compared inter- and intra-observer agreement assessing spinal injuries classifications with limb fractures classifications by an equivalent panel of evaluators. In this study, we compared the inter-observer reliability and intra-observer reproducibility of two TLSI classifications with two limb fracture classification schemes of comparable complexity. As a contrast model, we used fractures of the trochanteric area of the proximal femur (FTAPF), including peritrochanteric and inter-trochanteric fractures, since they are among the most frequent limb fractures that orthopaedic surgeons classify and treat. We compared the inter-observer and intra-observer agreement of the new AO Spine TLSI classification system and the Denis classification [1,16] with the AO and the Tronzo classifications of FTAPF [19,20].

## Materials and methods

Institutional review board approval was obtained to perform this study. From a large database of patients treated at a single institution, we retrospectively collected and analysed 70 cases

with acute, traumatic TLSI, and 70 cases with acute FTAPF. One spine surgeon and another hip surgeon selected the cases from the database.

It was required that patients had complete clinical data and available imaging studies to be included in this study. Exclusion criteria for TLSI were patients with non-traumatic fractures, including pathological bone fractures (e.g.: fractures associated to spinal tumors and infections) and osteoporotic fractures. For FTAPF, we excluded patients with pathological fractures only.

Each evaluator received one digital versatile disc (DVD) containing pertinent information necessary to classify the cases. It contained a clinical vignette including the histories and the results of the physical examinations of the patients, and the complete imaging studies available. Six physicians representing two different levels of training in spine trauma evaluated the spinal injuries: three fellowship-trained spine surgeons with experience in spinal fractures treatment and three orthopaedic surgery residents. Antero-posterior and lateral radiographs, and computerised tomography scans (axial images and sagittal reconstructions) of the 70 patients were assessed by the six evaluators.

Likewise, six physicians representing two different levels of training in hip surgery evaluated the FTAPF: three fellowship-trained hip surgeons, and three orthopaedic surgery residents (the same three residents who assessed the spine injuries). Antero-posterior and lateral radiographs of the 70 patients were assessed by the six evaluators.

The evaluators were unaware of the patients' identification, the original classification used in their clinical care, and the treatment they received.

All TLSI were graded according to the morphological grading of the new AO classification (Fig. 1) as A, B or C type injury; in cases with type A or type B injuries, an analysis for A or B subgroups was also performed. For type B and type C injuries, concurrent type A or B injuries at the same level were not included in the analysis.

The images were also graded using the four main types of the Denis classification (flexion-compression; burst; seat-belt and fracture-dislocation, Fig. 2); the reason not to include the subtypes of Denis classifications was to make it comparable to the Tronzo classification of FTAPF, which has only five types (with no

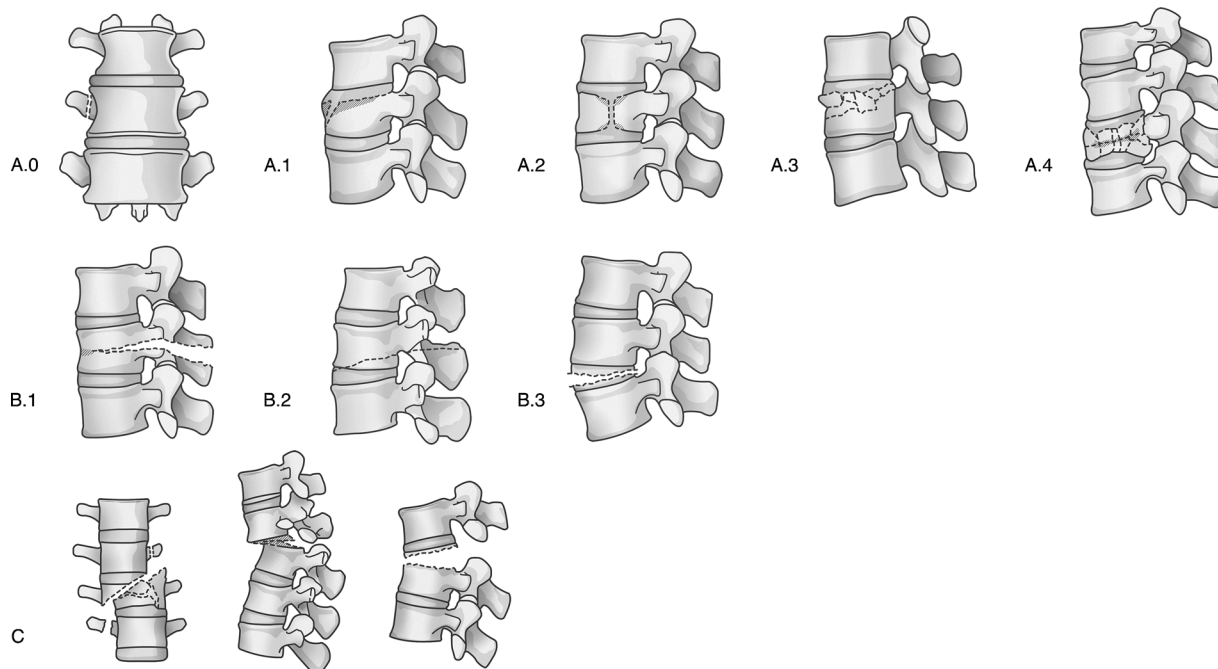


Fig. 1. The new AO spine thoraco-lumbar spine injury classification system.

Download English Version:

<https://daneshyari.com/en/article/3238946>

Download Persian Version:

<https://daneshyari.com/article/3238946>

[Daneshyari.com](https://daneshyari.com)