



ORIGINAL ARTICLE

Concordance in the radiological diagnosis of thoracolumbar spine fractures[☆]



M. Hirschfeld^{a,*}, M. Rodríguez^a, A.M. Cerván^a, J.A. Ortega^a, F. Rivas-Ruiz^b, E. Guerado^a

^a Departamento de Traumatología y Cirugía Ortopédica, Hospital Universitario Costa del Sol, Universidad de Málaga, Marbella, Málaga, Spain

^b Unidad de Investigación, Agencia Sanitaria Costa del Sol, Red de Investigación en Servicios de Salud y Enfermedades Crónicas REDISSEC, Marbella, Málaga, Spain

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KEYWORDS

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Abstract

Introduction: Thoracolumbar spine fractures are frequent and severe. Early diagnosis and appropriate treatment to obtain good clinical results is essential, with many classifications being proposed for this purpose.

Objective: To determine the external validity of radiographic and computed tomography (CT) measurements for the most used classifications, and decide on the type of treatment required. The working hypothesis is the existence of external validity of radiographic measurements.

Material and method: A sample of patients with thoracolumbar fracture was selected. Three spine specialists and a resident performed measurements on anteroposterior and lateral radiographic images as well as coronal, sagittal and axial CT slices. Fractures were classified as stable or unstable, evaluating the degree of intra- and interobserver agreement based on a standard observer. Sagittal index of Farcy, lateral wedging, Beck Index, traumatic regional angulation and channel occupancy were studied.

Results: All indicators studied, except the lateral wedging, showed a high degree of concordance.

Conclusions: Instability determinants studied with radiographs and CT, which had obtained statistical significance, are reliable and accurate for the classification of thoracolumbar fractures and, therefore, to indicate an appropriate treatment.

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* Corresponding author.

E-mail address: miguelhirschfeld@gmail.com (M. Hirschfeld).

PALABRAS CLAVE

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Concordancia en el diagnóstico radiológico de las fracturas del raquis toracolumbar**Resumen**

Introducción: Las fracturas del raquis toracolumbar son muy frecuentes y graves, siendo imprescindible su diagnóstico precoz y tratamiento adecuado para obtener buenos resultados clínicos. Para este propósito se han descrito numerosas clasificaciones e índices.

Objetivo: Estudiar la validez externa de las mediciones radiográficas y de la tomografía computarizada (TC) para las clasificaciones más usadas y decidir el tipo de tratamiento que precisan. La hipótesis operativa consiste en la existencia de validez externa de las mediciones radiográficas.

Material y método: Se seleccionó una muestra de pacientes con fractura toracolumbar. Tres especialistas de raquis y un médico residente realizaron mediciones sobre imágenes radiográficas anteroposterior y lateral, así como sobre cortes coronales, sagitales y axiales de TC, clasificándose las fracturas como estables o inestables, evaluándose el grado de concordancia intra e interobservador, basados en un observador estándar. Se estudiaron las variables índice sagital de Farcy, acuñamiento lateral, índice de Beck, angulación regional traumática y ocupación del canal.

Resultados: Todos los indicadores estudiados, excepto el acuñamiento lateral, presentaron un alto grado de concordancia.

Conclusiones: Los determinantes de inestabilidad estudiados en radiografías simples y TC que han obtenido significación estadística son fiables y precisos para caracterizar las fracturas toracolumbares y, por tanto, para indicar un tratamiento adecuado.

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Introduction

Spine fractures are frequent and present high morbidity, with an incidence of 64 cases, 4 with spinal cord injuries, per 100,000 inhabitants per year. Overall mortality is from 4–5%¹ with a higher prevalence in males between 15 and 25 years of age, due to traffic accidents.² Thoracolumbar fractures (TL) are the most common.

Accurate, early diagnosis is necessary in order to administer appropriate treatment. To meet this objective there are several variables and severity classifications for thoracic and TL fractures based on radiological imaging,^{3–7} although, to our knowledge as authors, there are no concordance studies to enable determination of their external validity.

The aim of our study is to determine the external validity of the most frequently described variables of conventional X-ray and computed technology (CT) measurements with an operational hypothesis of a high degree of intra- and inter-observer concordance.

Material and method**Data**

A retrospective study was performed, the main variable of which was a diagnosis of spine fracture according to clinical criteria of trauma history and pain and the radiological criteria which is explained later on. Variables studied include gender, age, fracture level and type of treatment received (conservative or surgical).

A patient sample of 147 patients was obtained with the use of a prospective database on the HP Doctor v.2.22 (Hewlett Packard) software application between 2009 and

2012, from which 79 patients were selected whose fracture level was localized in the TL segment (T11–L2). Data handling was covered by the personal Data Protection Act.⁸

Design

One of the researchers made an evaluation study which included the anteroposterior and lateral X-rays as well as coronal, sagittal and axial CT imaging sections for each patient in the sample. The observers were 3 specialists from the spine unit of our hospital, and one 4th year orthopaedic and trauma resident surgeon. All of them worked in our hospital. Two measurements were taken, 6 months apart, from these images using the Centricity (GE Healthcare) programme measuring tool, of the instability markers described below (quantitative variables). The observers defined each fracture as stable or unstable (dichotomous qualitative variable), according to the results of these measurements. The intra- and interobserver correlation was thus evaluated respectively. The measurements made by the observer with the greatest experience were taken as the benchmark measurements, with the intention of comparing the qualitative “instability” variable with that made by the other observers with respect to this standard, thus determining the level of validity of the diagnostic testing.

Instability markers**Sagittal index of Farcy³**

This is measured in the sagittal plane and determines the wedging level in this plane. It is an angle comprised of 2 lines resulting from projections of the lower discs of the

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