Original Article

The epidemiology of thoracolumbar trauma: A meta-analysis

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A B S T R A C T

Purpose: To describe the epidemiology of thoracolumbar fractures and associated injuries in blunt trauma patients.
Methods: A systematic review and metaanalysis was performed based on a MEDLINE database search using MeSH terms for studies matching our inclusion criteria. The search yielded 21 full-length articles, each sub-grouped according to content. Data extraction and multiple analyses were performed on descriptive data.
Results: The rate of thoracolumbar fracture in blunt trauma patients was 6.90% (±3.77, 95% CI). The rate of spinal cord injury was 26.56% (±10.70), and non-contiguous cervical spine fracture occurred in 10.49% (±4.17). Associated injury was as follows: abdominal trauma 7.63% (±9.74), thoracic trauma 22.64% (±13.94), pelvic trauma 9.39% (±6.45), extremity trauma 18.26% (±5.95), and head trauma 12.96% (±2.01). Studies that included cervical spine fracture with thoracolumbar fracture had the following rates of associated trauma: 3.78% (±5.94) abdominal trauma, 21.65% (±16.79) thoracic trauma, 3.62% (±1.07) pelvic trauma, 18.36% (±4.94) extremity trauma, and 15.45% (±11.70) head trauma. A subgroup of flexion distraction injuries showed an associated intra-abdominal injury rate of 38.70% (±13.30). The most common vertebra injured was L1 at a rate of 34.40% (±15.90). T7 was the most common non-junctional vertebra injured at 3.90% (±1.09). Burst/AO type A3 fractures were the most common morphology 39.50% (±16.30) followed by 33.60% (±15.10) compression/AO type A1, 14.20% (±8.08) fracture dislocation/AO type C, and 6.96% (±3.50) flexion distraction/AO type B. The most common etiology for a thoracolumbar fracture was motor vehicle collision 36.70% (±5.35), followed by high-energy fall 31.70% (±6.70).
Conclusions: Here we report the incidence of thoracolumbar fracture in blunt trauma and the spectrum of associated injuries. To our knowledge, this paper provides the first epidemiological road map for blunt trauma thoracolumbar injuries.

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1. Introduction

Blunt trauma is a leading cause of death in industrialized nations.[1] Although fractures of the spine occur only in small proportion of blunt trauma patients, they often have serious consequences on the medical, social and financial status of the patient.[1,2] While the overall prevalence and causation of spinal injuries varies according to region and level of urbanization, the Unites States has the highest prevalence of spinal injury globally.[3] Composite epidemiological data is needed to guide emergency management, treatment, and policy development regarding spinal trauma. Currently no such comprehensive guide exists.

The purpose of this study was to conduct a systematic review of the literature regarding the epidemiology of thoracolumbar trauma and to perform a meta-analysis on available data. The goals were to summarize the rate of thoracolumbar trauma in blunt trauma patients and to compile the rates of etiology, location, fracture type, and associated injuries into a single source for treating physicians. This will allow quick reference to epidemiological rates of thoracolumbar trauma and associated injuries.

2. Materials and methods

2.1. Inclusion and exclusion criteria

We used the Cochrane collaboration guidelines[4] to help develop our methods and reported our results according to the PRISMA checklist.[5]

Inclusion criteria: English language articles published from 1980 onward were evaluated for inclusion. The study had to contain patients who sustained a spinal fracture as a result of blunt trauma (specifically the T1-L5 thoracolumbar region or C1-L5 global spine).

Exclusion criteria: Studies were excluded if the primary focus was: biomechanical, a case report of an individual or several incidents, the cervical spine, complications of surgery, osteoporotic or insufficiency fractures, a military based population, a pediatric population, specific interventions or treatments, other specific patient populations such as diabetics or ankylosing spondylitis patients, pathological fractures, radiographic parameter studies not containing epidemiological data, review articles, or papers not relevant to thoracolumbar trauma (Fig. 1). Elderly and pediatric patients were not specifically excluded from this paper; merely studies which were focused only on osteoporotic fractures in the elderly or only evaluated a pediatric population.

2.2. Literature search and study selection

In November 2014 a comprehensive literature search was performed through the electronic database of MEDLINE (1980–2014) using medical subject headings (MeSH) terms and Boolean operators outlined in Table 1. Search limits were: (1) study date 1980–2014, (2) human species, (3) abstracts were available, (4) study was reported in English. Studies were assessed initially based on title by 3 independent reviewers. From the yield of this search, two reviewers analyzed abstracts to determine which papers to investigate and include for paper review based on title, abstract, and keywords of the references retrieved from the electronic literature search. To further ensure that no appropriate studies were missed a manual cross-reference search of citations of each included article was performed. The two independent reviewers then evaluated the eligibility of each article. All disagreements were discussed in a consensus meeting. A third party reviewer resolved disagreements, which were not resolved
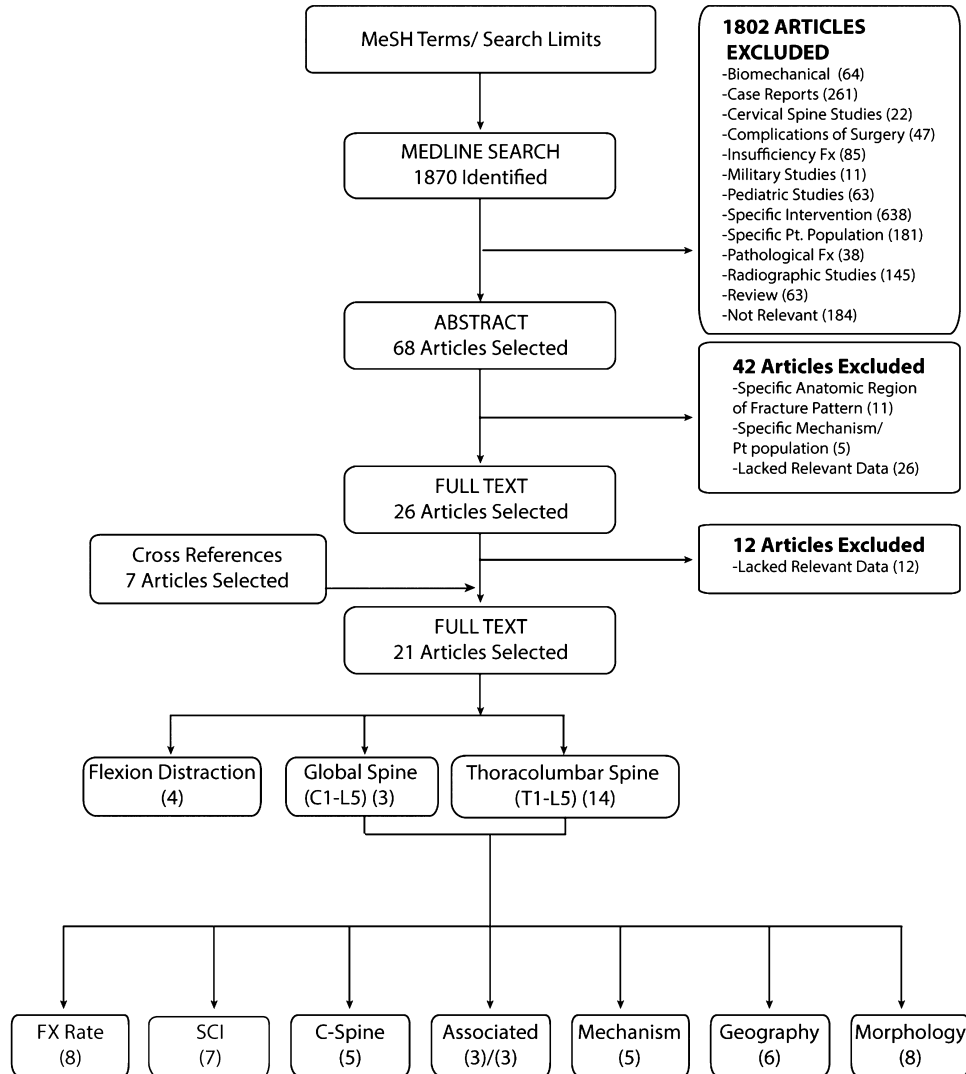
Fig. 1. Search algorithm used to select articles for analysis. Search terms initially yielded 1870 articles, 68 of which were selected for analysis of abstract based on inclusion and exclusion criteria. Another 42 articles were removed because they were too specific in their focus or lacked relevant data. This yielded 26 articles for full text analysis. Another 7 articles were included from manual cross-referencing. From these, 12 articles lacked relevant epidemiological data and were excluded to leave 21 relevant articles that were eventually selected for analysis of the full text. Some articles were utilized twice for different analyses. Abbreviations: Fx: fracture, SCI: spinal cord injury.