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Review Article

The effects of orthosis on thoracolumbar fracture healing: A review of the literature



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ABSTRACT

Background: Various methods have been used as a conservative treatment of stable thoracolumbar fracture. Presently, it is controversial, whether the use of spinal orthoses reduces pain and deformity associated with vertebral fracture or not. Therefore, the aim of this study was to determine the effects of orthoses on vertebral fractures healing in thoracolumbar area.

Materials and methods: A search was carried out on Medline, ISI web of knowledge, Google Scholar and Embasco. The keywords used included thoracolumbar fracture; brace, orthosis, and conservative treatment.

Results: Twenty-one papers were selected for final analysis. The quality of the most of the papers was poor, as most of them were retrospective studies with various follow-up periods. **Discussion:** Based on the results of these studies, it can be concluded that subjects with a fracture of thoracolumbar achieved a high ability to return to their jobs. The use of orthosis did not influence the kyphosis angulation in subjects with stable fracture in thoracolumbar spine. The effects of orthoses would be mostly immobilization, protection and remaining.

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1. Introduction

The prevalence of thoracolumbar fracture is high due to trauma (mostly traffic accident) and diseases.^{1–3} Various treatment methods have been used to manage thoracolumbar fracture.^{4–7} The main goals of treatment are to provide stability, to relieve pain, to restore function, and to reduce the deformities such as kyphosis or lordosis associated with spinal fracture.^{4–7} Various conservative treatments have been recommended including postural re-education, bed rest, body cast, and use of orthoses. Currently, bracing is a fundamental part of conservative treatment for thoracolumbar fracture even after surgery.⁶ Most common orthoses for vertebral

fracture include the 3-point hyper extension (Jewett style), Boston overlap orthosis (BO), and Taylor style.^{4,8}

Orthoses help to stabilize fractured vertebra, to relieve pain and to reduce intradiscal pressure.⁹ They also help to reduce the time of hospitalization for patients with vertebra fracture.⁹ They have also been reported to be a cost-effective intervention for this condition.⁹ However, it is controversial that using brace is an effective method to stabilize the vertebral column, reduce the deformities associated with the fracture and reduce pain (it has been shown that the goals of bracing are to prevent failure of osteosynthesis, to facilitate immobilization, and to ensure correct posture).^{10–12}

It has been shown that using spinal brace seems to reduce subjective symptoms during the mobilization phase, however,

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it did not have a significant influence on preventing kyphotic deformity.^{12,13} Similarly, Ohana et al. confirmed that there is no evidence to support the positive influence of brace on treatment of fracture in the lumbosacral region, therefore, this type of fracture should be treated with early ambulation and with no external support.¹⁰ In contrast, Celebi et al. in their study on 26 individuals, recognized with single burst type fracture, showed that the average pain score in patients with spinal fracture decreased follow the use of orthoses.¹⁴ Moreover, it was defined that early mobilizations in a total contact TLSO produce satisfactory functional results.

Although the goals of using an orthosis are to provide support, rest, immobilization, protection, correction and remainder,⁶ it is controversial whether the use of orthosis has the aforementioned benefits for thoracolumbar fractures or not. Therefore, the aim of this review was to determine the effect of using various orthoses in the treatment of vertebral fracture.

2. Materials and methods

An electronic search was performed via PubMed, ISI web of Knowledge, Google scholar, Medline, and Embase. The keywords used were orthosis, thoracolumbar fracture, conservative treatment, and brace. The search was carried out to include articles between 1960 and 2014. The inclusion criteria for selection of the papers include were articles published in English language and having at least one of the

aforementioned keywords. The first selection of the papers was done based on the title and abstract. The following exclusion criteria were used to select the final papers.

- (1) Focus on surgical intervention (if the paper focused on comparison between surgery and brace, the data of brace was selected).
- (2) Published between 1960 and 2014.
- (3) Patients have only vertebral fracture.

The brief description of each paper is provided in Tables 1a-1e. Some parameters including methods of evaluation, type of injury, number of subjects, age of subjects, follow-up period, type of orthosis, pain severity, amount of kyphosis deformity and reduction of vertebral height were considered.

3. Results

Based on the aforementioned key words, 1000 papers were found. The selected papers were evaluated with considering title and abstracts. Finally 21 papers have been selected for final analysis. As can be seen from the table the quality of most of the papers was poor. In most of the studies pain severity and evaluation procedure were not mentioned. Moreover, various procedures have been used to represent the severity of fracture and association deformities. Most of the studies were retrospective studies with varying follow-up periods.

Table 1a – The results of some studies done on effect of spinal orthosis on thoracolumbar fracture.

Researcher	Number	Age	Follow-up	Intervention	Procedure	Results
Dai et al. ¹⁶	16 burst fracture (T12-L2)	No information	3-7 years	Hyper extension body brace	Subjects wore a hyper extension body brace after postural reduction	Canal compromise: 8.5%. None of the subjects was neurologically worse at follow-up.
Denis et al. ¹⁷	36 (thoracolumbar fracture without neurologic deficit)	No information	42 month	Body cast	The subjects used body cast. Their abilities to return to their job and neurological complications were evaluated in this study.	75% able to return to work. Neurological complications were 17%.
Hitchon et al. ¹⁸	32 (thoracolumbar fracture)	No information	3-5 months	Thoracolumbar body cast	Frankel score to check neurological compliance. The ability to return to the previous job, and angulation of the vertebra were also evaluated in this study.	Incidence of pain was 42%. Ability to return to previous employment was 60%. Residual canal was 65 ± 18%. Frankel system improved by 0.2 ± 0.4. Angulation was 13.5 ± 8.5
Shen et al. ¹⁹	47 single level closed burst fracture at T11-L2	18-65	2 years	Hyper extension brace	The patients allowed doing various activities with the brace.	Ability to return to work: 56% Load share score: 4.1 Kyphotic angle worsen by 4 degrees. Low back pain outcome score: 65
Wood et al. ²⁰	23 single level burst fracture at thoracolumbar (T10-L2)	No information	44 month	Body cast	The alignment of the spine in sagittal and coronal planes was analyzed by use of radiograph and CT scan.	Kyphotic angle increase: 13% Canal compromise increase: 19% Complication = 2 Less disability

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