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Cochrane in CORR®: Surgical Versus Non-surgical Treatment for Thoracolumbar Burst Fractures Without Neurological Deficit

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Importance of the Topic

Thoracolumbar burst fractures account for approximately 45% of all major thoracolumbar traumatic injuries [9]. They most commonly occur secondary to an axial

compression mechanism and are characterized by failure of the anterior and middle spinal columns. Clinical features of thoracolumbar burst fractures include acute back pain and possible damage to the nerve roots or spinal cord, but more than 50% of these

injuries may present without neurological deficit [9]. Characteristic radiographic findings include anterior wedging of the vertebral body, increased interpedicular distance, and narrowing of the spinal canal due to retropulsed bone.

The management of thoracolumbar burst fractures in patients without neurological deficits remains controversial [3]. Surgical stabilization and possible decompression may result in earlier mobilization, reduced time to hospital discharge, and faster return to work [9], but it may also expose patients to more-frequent early complications, an increased risk for subsequent revision surgery, and greater overall healthcare costs [9]. Nonoperative management including symptomatic pain control, early mobilization, and perhaps a brace may be

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Cochrane in CORR

an acceptable alternative in properly selected patients [1]. This Cochrane systematic review compared surgical versus non-surgical treatment for thoracolumbar burst fractures in patients without neurological deficits.

Upon Closer Inspection

The authors performed a systematic review and meta-analysis of two randomized or quasi-randomized controlled trials ($n = 87$) comparing surgical with nonsurgical treatment [1]. Quasi-randomized trials use non-random methods of allocation such as alternation to assign participants to the comparison group. They raise the possibility of selection bias because treatment allocation can be predicted before potential patients are enrolled [5]. Functional outcomes were reported according to the Roland and Morris Disability Questionnaire (RDQ), a well-validated, patient-reported outcome measure for back pain [6]. However, the RDQ does not address psychological or social dysfunction and is most useful when the disability level is only low to moderate [6].

Substantial clinical heterogeneity and a general lack of randomized trials limited the ability of the authors to provide valid treatment recommendations. Siebenga et al. compared surgical treatment with short-segment posterior only stabilization followed by a Jewett hyperextension orthosis [8], whereas Wood et al. [13] used posterior or anterior fusion and instrumentation. This meta-analysis was not able to address other controversial management issues such as the level and classification of thoracolumbar fractures, the optimal timing of surgery in spinal trauma, surgical approach, or the role of bone graft in addition to fusion.

Take-home Messages

There are not enough studies in this population to answer the question of whether surgical or nonsurgical treatment is better. In another meta-analysis with two additional trials not included in the present study, Gnenthiran et al. [3] found no differences in pain, function, or return to work rates, with higher complications and costs associated with

surgery. One of the trials was excluded from the Cochrane review because an intention-to-treat analysis was not reported, and the other because it was a nonrandomized prospective cohort study [4, 7].

Inherent barriers to randomized controlled trials in surgery include challenges with patient enrollment, randomization, blinding, and strong patient preferences [2]. Trial innovations in recent years, however, have made conducting randomized controlled trials in surgical patients more practical [2]. The Spine Patient Outcomes Research Trial is one such example, in which a preference trial was used to investigate operative versus nonoperative treatment for various spinal conditions [10–12]. Patients were given a choice of either randomization or enrolment in an observational arm. Although high crossover rates compromised the intention-to-treat analysis, these studies are celebrated as the highest quality of evidence in the absence of Level 1 studies. Efforts focusing on innovative methodological techniques may improve our ability to overcome some of the challenges inherent in surgical randomized controlled trials.

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Appendix

Surgical versus non-surgical treatment for thoracolumbar burst fractures without neurological deficit (Review)

Abudou M, Chen X, Kong X, Wu T



This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2013, Issue 6

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Surgical versus non-surgical treatment for thoracolumbar burst fractures without neurological deficit (Review)
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[Intervention Review]

Surgical versus non-surgical treatment for thoracolumbar burst fractures without neurological deficit

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ABSTRACT

Background

Spinal burst fractures result from the failure of both the anterior and the middle columns of the spine under axial compression loads. Conservative management is through bed rest and immobilisation once the acute symptoms have settled. Surgical treatment involves either anterior or posterior stabilisation of the fracture, sometimes with decompression involving the removal of bone fragments that have intruded into the vertebral canal. This is an update of a review first published in 2006.

Objectives

To compare the outcomes of surgical with non-surgical treatment for thoracolumbar burst fractures without neurological deficit.

Search methods

We searched the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register (October 2012), the Cochrane Central Register of Controlled Trials (CENTRAL) (*The Cochrane Library* 2012, Issue 8), MEDLINE (1946 to October 2012), EMBASE (1980 to October 2012) and the Chinese Biomedical Literature Database (1978 to October 2012). We also searched trial registers and reference lists of articles.

Selection criteria

Randomised or quasi-randomised controlled trials comparing surgical with non-surgical treatment of thoracolumbar burst fractures without neurological deficit.

Data collection and analysis

Two review authors independently assessed risk of bias and extracted data independently. Only limited pooling of data was done.

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Main results

We included two trials that compared surgical with non-surgical treatment for patients with thoracolumbar burst fractures without neurological deficit. These recruited a total of 87 participants and reported outcomes for 79 participants at follow-up of two years or more. Both trials were judged at unclear risk of selection bias and at high risk of performance and detection biases, resulting from lack of blinding.

The two trials reported contrasting results for pain and function-related outcomes at final follow-up, and numbers returning to work. One trial found less pain (mean difference (MD) -15.09 mm, 95% CI -27.81 to -2.37; 100 mm visual analogue scale), and better function based on the Roland and Morris disability questionnaire results (MD -5.87, 95% CI -10.10 to -1.64; 24 points = maximum disability) in the surgical group. Based on the same outcome measures, the other trial found the surgical group had more pain (MD 13.60 mm, 95% CI -0.31 to 27.51) and worse function (MD 4.31, 95% CI 0.54 to 8.08). Neither trial reported a statistically significant difference in return to work. There were greater numbers of participants with complications in the surgical group of both trials (21/41 versus 6/38; RR 2.85, 95% CI 0.83 to 9.75; 2 trials), and only participants of this group had subsequent surgery, involving implant removal either for complications or as a matter of course. One trial reported that surgery was over four times more costly than non-surgical treatment.

Authors' conclusions

The contradictory evidence provided by two small and potentially biased randomised controlled trials is insufficient to conclude whether surgical or non-surgical treatment yields superior pain and functional outcomes for people with thoracolumbar burst fractures without neurological deficit. It is likely, however, that surgery is associated with more early complications and the need for subsequent surgery, as well as greater initial healthcare costs.

PLAIN LANGUAGE SUMMARY

Surgical versus non-surgical treatment for thoracolumbar burst fractures without neurological deficit

The thoracolumbar region of the spine is composed of the thoracic (middle back) and lumbar (lower back) spine. One type of spinal injury is the burst fracture where a vertebra (one of several bones making up the spine) is fractured (broken) such that it loses height on both its back and front sides. This sort of fracture occurs most frequently in the bones situated at the junction of the thoracic and lumbar spine. These injuries are usually the result of a high-velocity accident such as a motor vehicle crash. These are serious injuries, particularly when the spinal cord is also damaged as this may result in the partial or complete loss of sensory and motor function in the legs, and bladder or bowel dysfunction. This review only included people whose nerve tissue was not damaged, although later damage could not be ruled out. People are treated in hospital either conservatively by being placed in a lying position that reduces strain on that part of the spine followed by fitting a cast or brace so that they can move around, or surgically by stabilising the affected part of the spine using various implants and procedures.

We included data from two trials, which included 87 participants. The trials compared surgical with non-surgical treatment for these fractures in the thoracolumbar region of the spine. Both trials had limitations in their methods that could reduce the reliability of their results. They reported contrasting results for patient pain and function at a minimum of two years after treatment. One study found patients had less pain and better function after surgery compared with patients who did not have surgery. The other trial found the opposite. Both trials found there were more early complications in the surgical group and only participants of this group had subsequent additional surgery. This involved the removal of the implant either to resolve a complication or routinely. One trial reported that surgery was over four times more costly than non-surgical treatment.

Our review concluded that the weak evidence from these two trials was insufficient to say whether surgery or non-surgical treatment was better for these fractures. However, surgery is likely to be associated with more early complications and the need for subsequent surgery, as well as greater initial healthcare costs.

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