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Research Paper Review

Conservative management of patients with an osteoporotic vertebral fracture

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ABSTRACT

Osteoporotic vertebral compression fractures (VCFs) are an increasing public health problem. Recently, randomised controlled trials on the use of kyphoplasty and vertebroplasty in the treatment of these fractures have been published, but no definitive conclusions have been reached on the role of these interventions. The major problem encountered when trying to perform a meta-analysis of the available studies for the use of cementoplasty in patients with a VCF is that conservative management has not been standardised. Forms of conservative treatment commonly used in these patients include bed rest, analgesic medication, physiotherapy and bracing. In this review, we report the best evidence available on the conservative care of patients with osteoporotic VCFs and associated back pain, focusing on the role of the most commonly used spinal orthoses. Although orthoses are used for the management of these patients, to date, there has been only one randomised controlled trial published evaluating their value. Until the best conservative management for patients with VCFs is defined and standardised, no conclusions can be drawn on the superiority or otherwise of cementoplasty techniques over conservative management.

ANALYSIS

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Background Information

Osteoporotic vertebral compression fractures (VCFs) are common in the elderly population and are an increasing public health problem (1-3). About one third of patients with acute VCFs seek medical attention, and some are sure to present in manual medicine offices (1, 3, 4). In general, acute, painful VCFs should be managed with focus on symptom relief and avoidance of predictable complications/morbidities, such as back pain, spinal deformity, and impaired function (4). The presence of a VCF is a predictor of subsequent vertebral fractures and is associated with a higher mortality rate, as well as pulmonary-related mortality (2-4). Vertebroplasty and kyphoplasty are two percutaneous, minimally invasive techniques by which bone cement is inserted into the vertebral body in order to manage symptomatic vertebral compression fractures (1, 2, 4). However, studies examining the use of cementoplasty have been equivocal (1, 4). These results may be due to the lack of standardization of sham procedures (conservative plans of management). Until a safe and effective conservative management plan is standardized, all studies investigating cementoplasty vs. sham procedures will have this limitation.

The aim of this paper was to review the best evidence available on the conservative care for patients with osteoporotic VCFs and associated back pain, focusing on the role of the most commonly used spinal orthoses.

SUMMARY

Best Available Evidence for the Management of Vertebral Compression Fractures

- To date, the best management of acute painful vertebral compression fractures has not been defined, and few level I studies are available for review.
- Conservative care of an acute painful vertebral compression fracture should focus on pain relief and rehabilitation, and the assessment and management of underlying osteoporosis.

Medication

- Analgesia should begin with paracetamol or salicylates and non-steroidal anti-inflammatory drugs (NSAIDS). However the risk of gastrointestinal bleeding and renal insufficiency, as well as cardiovascular risks, should be taken into account
- The risk of non-union and NSAID exposure is not confirmed.
- Opioids should be prescribed for patients failing to obtain relief from first-line medications and activity programs, however narcotics have significant side effects.
- Muscle relaxants may help manage paravertebral muscle spasm, however the evidence supporting their use in patients with vertebral compression fractures is scant.
- Medication used for the treatment of osteoporosis (such as calcitonin, bisphosphonates, and parathyroid hormones), may provide pain relief in patients with an acute vertebral compression fracture.

Bracing

- Bracing is important in the conservative care of vertebral compression fractures in selected patients. The primary goal of bracing is to stabilize the spine and limit progression of deformity. *Bracing allows a reduction in bed rest and facilitates earlier mobilization – both important goals in managing elderly patients.*
- The use of bracing is largely based on opinion.
- To ensure patient compliance, an ideal brace should be light-weight, easy to put on, comfortable, and should not restrict respiration.
- For thoracic fractures, several thoracolumbar orthoses are available:
    1. Jewett Orthosis: This brace is widely used and is the standard when hyperextension of the spine is necessary. It is excellent for maintaining the spine in sagittal hyperextension, limiting flexion and extension, however it is not able to reduce movement in the coronal and transverse planes. It uses a three point pressure system with two anterior pads (pressure over the sternum and pubic symphysis) and one posterior pad to produce opposing pressure in the midthoracic region.
    2. Cruciform Anterior Spinal Hyperextension (CASH) orthosis: This brace also holds the spine in hyperextension. It uses two anterior pads (sternal and pubic pads), attached to a metal, cross-shaped bar, and one posterior pad to produce a force (which is opposed by anterior pads) and a strap around the thoracolumbar region.
    3. Taylor Brace: This brace holds the spine in hyperextension as well. It is comprised of two posterior paraspinal bars attached inferiorly to a pelvic band and stabilized by an interscapular band, axillary straps attached posteriorly to an interscapular band and an anterior corset connected to the paraspinal bars.
    4. Knight-Taylor Brace: This brace holds the spine in hyperextension. It is effective in limiting lateral bending, fairly effective in limiting flexion-extension, and ineffective in restricting axial rotation. It uses a corset-type front with lateral and posterior bands and shoulder straps. The anterior corset is fastened to the lateral bars and the posterior portion of the brace includes a cross band below the inferior angle of the scapula and a pelvic band fitted at the sacrococcygeal junction
- For lower lumbar fractures, a rigid lumbosacral orthosis is used: Chairback Brace: This brace restricts axial rotation. It is short and rigid with two posterior uprights that have thoracic and pelvic bands
- *The best brace to manage a severe vertebral compression fracture is a custom moulded thoracolumbar orthosis, fitted in hyperextension.*
- Studies investigating the effect of bracing on myoelectrical activity have found mixed results, however electrical signals are often found to be increased when wearing an orthosis.
- On the whole, the efficacy of a conservative spinal orthosis for the management of patients with a vertebral compression fracture is based on evidence from studies in patients with non-osteoporotic vertebral burst fractures.

Exercise

- After a short period of bed rest patients should being mobilization with a rehabilitation and exercise program
- The goals of rehabilitation are the prevention of falls, reduction of the kyphosis, enhancing axial muscle strength and providing correct spine alignment.
- One study demonstrated that a spinal extensor strengthening program and a dynamic proprioceptive program increased bone density and reduced the risk of vertebral compression fractures.
- Back extensor exercises improve muscle strength, providing a better dynamic-static posture and reduction of the kyphotic deformity.
- Correction of the kyphosis also results in pain relief, increased mobility and an improvement in the quality of life.
- Several studies have demonstrated an improvement in quality of life in patients with vertebral compression fractures following a long term exercise program.
- *Previous data have suggested that physiotherapy, including manual techniques and exercises, have an important role in patients with vertebral compression fractures because it provides pain relief and improvement of physical function.*

CLINICAL APPLICATION & CONCLUSIONS

Current knowledge regarding the best conservative management of patients with an osteoporotic vertebral compression fracture is inadequate. Although spinal orthoses are widely used in managing these patients, there is very little evidence to support this practice. Physiotherapy, including manual techniques and exercises provide pain relief and improve physical function in patients with vertebral compression fractures. Indications for cementoplasty remain controversial. No conclusions can be made regarding the superiority of cementoplasty techniques over conservative treatment in the management of patients with vertebral compression fractures of the spine.

While there is a lack of evidence for the best conservative management of patients with vertebral compression fractures, manual therapy and exercises to strengthen back extensor muscles (in addition to medication and/or bracing) play an important role in pain relief and improvement of physical function.

STUDY METHODS

- Materials presented in this paper were based on a systematic review of the literature using a PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) checklist and algorithm.
- A search of PubMed, Medline, CINAHL, Cochran, Embase and Google Scholar databases with combinations of the keywords ‘osteoporosis’, ‘kyphoplasty’, vertebroplasty’, cementoplasty’, ‘vertebral compression fractures’, ‘orthosis’, ‘brace’, ‘bracing’, ‘conservative management’, and ‘rehabilitation’ covering the period between 1966 and 2011 was made.
- A total of 13 studies were finally reviewed.

STUDY STRENGTHS/WEAKNESSES

The authors presented a concise summary of the current literature on conservative management of acute vertebral compression fractures, with a focus on spinal orthoses. The authors noted a general paucity of studies investigating conservative care of acute vertebral compression fractures, and specifically identified several areas that require additional study:

- The effect of NSAID exposure on bone healing
- The effect of muscle relaxants on muscle spasm following a vertebral compression fracture
- The effect of osteoporosis medications on pain symptoms from vertebral compression fracture
- The effect of parathyroid hormone on pain symptoms from vertebral compression fracture
- The effect of bracing on myoelectrical activity of trunk muscles
- The effect of bracing in the treatment of osteoporotic vertebral compression fractures
- The effect of bracing in the treatment of vertebral compression fractures

Additional Reference

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