

Research Article

Progress in the Study of Manual Repositioning for Thoracolumbar Vertebral Body Fracture

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Abstract

Thoracolumbar vertebral fractures are the most common spinal fractures, and the traditional Chinese medicine of manual repositioning has a definite curative effect on thoracolumbar vertebral fractures, and can restore the vertebral body height to the greatest extent, release pain, reduce the rate of cement leakage and recurrent fractures. The author summarizes the progress of researches on thoracolumbar vertebral fractures by manual repositioning in order to provide reference for relevant clinical and scientific research.

Keywords: Manual repositioning; Thoracolumbar vertebral fracture

Thoracolumbar vertebral fractures are the most common spinal fracture, especially at the Thoracolumbar junction (T10-L2), where the transition from the less mobile thoracic spine and its associated ribs and sternum to the more mobile lumbar spine makes this an area of high biomechanical stress and more prone to compression fractures [1-2]. Thoracolumbar vertebral fractures due to car accidents and falls account for more than 90% of spinal fractures each year, and this percentage is increasing [3-5] gradually along with the increasing incidence of osteoporosis due to an aging population. Percutaneous Vertebro-Plasty (PVP) is one of the recognized treatments for thoracolumbar vertebral fractures, which is simple and inexpensive, but cannot restore vertebral height. The traditional manual reduction has a definite effect on spinal fractures, and can restore the height of the vertebral body to the greatest extent. Therefore, the combination of the two is often used in the treatment [6] of thoracolumbar vertebral fractures. The author now summarizes the progress of research on manual repositioning of thoracolumbar vertebral fractures in order to provide reference for relevant clinical and scientific research.

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Mechanism of Action of Manual Repositioning

Manual repositioning has proven efficacy in the treatment of lumbar vertebral fractures alone or in combination with other means. Although there is no unified standard for manual repositioning, the repositioning technique basically adopts the inverse injury mechanism of hyperextension repositioning. In the hyperextension state, the tension of the anterior longitudinal ligament of the vertebral body increases and the anterior middle column of the injured vertebral body is repositioned by longitudinal tension, which restores the height of the vertebral body, corrects the spinal deformity, and restores the physiological curvature [7-8] of the spine. After manual repositioning, the external pressure of the neighboring vertebrae on the injured vertebrae is reduced, and vertebral strengthening is performed under low pressure to inject bone cement, which can reduce the leakage rate of bone cement and also promote its pain-relieving effect [9,10]. Qin Daping et al., believes that compared with other treatments, the use of TCM over-extension repositioning with PKP method can reduce the magnitude of stress changes in the annulus fibrosus and intervertebral disc, which tends to a stable state and reduces the risk of distant height loss and re-fracture of the injured spine. In addition, manual repositioning can also improve bone metabolism level and bone density [11]. Luo Le et al., found that the treatment group could relieve their pain effectively, improve bone metabolism level and bone density, reduce TRACP-5b, BALP and β -CTX levels that promote bone and calcium resorption, and increase PINP levels that promote bone formation, after adding manual repositioning to conventional drug group to treat 50 cases of osteoporotic vertebral compression fractures.

Related Clinical Studies

At present, the application of manual repositioning in thoracolumbar vertebral fractures can be roughly divided into two types, one is traditional conservative treatment, i.e., simple manual repositioning or combined with other conservative treatments such as internal and external application of traditional Chinese medicine; the other is treatment by manual repositioning combined with surgical means such as PVP.

Application of manual repositioning in traditional conservative treatment

Clinically, for some relatively stable and simple vertebral fractures, treatment with simple manual repositioning can be considered [12]. Jiang Zhiyong et al., treated simple compression fractures of the thoracolumbar spine in prone position with over-extension traction plus manual repositioning, with a total efficiency of 98% and a total Beck index efficiency of 92.16%; [13] Zhang Yan et al., treated thoracolumbar fractures without neurological symptoms using over-extension traction repositioning, with an excellent rate of 92% [14]; Huang et al., showed that indirect decompression by manual repositioning for thoracolumbar burst fractures has good clinical efficacy [15]. He Zhanning et al., treated osteoporotic vertebral compression fractures using manual repositioning + adjustable spinal external fixator fixation in combination with Bone Mimic formula, and the pain VAS

score was higher in the treatment group than in the control group, and the Oswestry dysfunction index ODI score was lower than before treatment.

Manual repositioning combined with surgical treatment

At present, surgery is the recognized effective treatment for thoracolumbar vertebral fractures, and in China, it is mostly used in combination with manual repositioning to compensate for the shortcomings of insufficient repositioning of the vertebral body height, such as PVP surgery. Studies have shown that manual reduction of PCVP in the treatment of OVCF can not only achieve the effect of conventional PKP reduction of injured vertebrae and improve kyphosis, but also reduce the number of intraoperative fluoroscopy, shorten the operation time and reduce the cost of treatment [16-18]. Wang et al., showed that the use of three-step repositioning with pedicle screw internal fixation could achieve satisfactory repositioning of thoracolumbar burst fractures, reconstruction of vertebral body height, restoration of spinal biomechanical function, and reduction of bleeding [19]. Li et al., concluded that TpBA vertebroplasty for osteoporotic compression fractures has good results in its clinical early and middle stages in terms of symptom improvement and anatomical repositioning.

The Progress of the Research of Intelligent Innovation of Manual Repositioning

Although a considerable number of clinical studies have demonstrated the efficacy of manual repositioning in the treatment of thoracolumbar vertebral fractures, there are many manual repositioning operations without uniformity, which affects the widespread use of manual repositioning in the treatment of thoracolumbar vertebral fractures internationally, so some researchers hope to develop a simpler, easier and more reliable manual repositioning treatment [20]. Zhao Gang et al., conducted a clinical study by inputting data from the manual repositioning fracture model into their self-developed automated mechanical traction device, and showed that simulation-optimized manual repositioning combined with PVP has shorter operation time and fluoroscopy time, less hospitalization cost, better bone cement dispersion, and no significant difference in short-term pain relief, but long-term pain relief, better functional recovery, and lower incidence of adjacent vertebral re-fracture than PKP. In addition, 3D printing technology has also been applied to the treatment of thoracolumbar vertebrae [21]. Zhou Jinhua et al., used 3D printing of CT three-dimensional structures to assist percutaneous vertebroplasty combined with postural repositioning to treat osteoporotic vertebral fractures, and the results were excellent; Chen Hua [22] used 3D printing to design an external fixation support for the treatment of simple thoracolumbar fractures, which consolidated the efficacy of the manual repositioning and helped patients to get down early after the repositioning to avoid complications [23]. He Zhaning et al., used an adjustable spinal external fixator for the treatment of osteoporotic vertebral compression fractures with considerable efficacy, which can be adjusted according to the needs of the disease and has great potential for clinical development.

Conclusion and Outlook

Manual repositioning, whether used alone or in combination with other methods for the treatment of thoracolumbar vertebral fractures, has definite efficacy and should be used and promoted clinically, and will be promoted with the emphasis on Chinese medicine culture in the country and the world. However, there are many schools of

traditional manual repositioning and different operations, which are not conducive to the promotion and application of this exact and effective treatment method. Thus, it is necessary to work on the intelligent, innovative, simple and reliable research on manual repositioning. At present, there are some researches in this area, but they are not deep and perfect. The author believes that with the coming of the era of intelligence, the innovative research of manual repositioning should follow the trend of the times and combine with modern advanced technology such as 3D technology and intelligent data machine for innovative research. At the same time, it is also possible to combine the manual repositioning treatment with other fields of research, such as according to the relevant imaging analysis [6,23] and intelligent classification of thoracic and lumbar fracture machines [24], starting from the first-hand imaging of the patient's admission presenting the patient's fracture typing, recommended treatment, required manipulation and position, strength, operation and other information analysis, intelligently to the clinician to assist clinical diagnosis and treatment, and also creating corresponding external fixation support for the patient based on this information. It can also create the corresponding external fixation support for the patient based on this information.

As a bright branch of Chinese medicine, many clinical studies have proved the efficacy of manual repositioning. The author hopes that all peers will use it and promote it, and hopes that through our unremitting efforts, manual repositioning and even Chinese medicine will be widely used all over the world to alleviate the disease for patients.

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