Journal of Clinical and Nursing Research 2018, 2(1): 23-27

Journal of Clinical and Nursing Research

Clinical Analysis of Minimally Invasive Single-segment Reduction and Internal Fixation in Patients with Thoracolumbar Fractures

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ARTICLE INFO

Article history:

Published online: 31st Jan, 2018

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Key words:

Thoracolumbar fractures

Dilated channels

Minimally invasive

Single segment reduction

Internal fixation

ABSTRACT

Objective: To study the clinical effect of minimally invasive single -segment reduction and internal fixation in patients with thoracolumbar fractures. **Methods:** From June 2013 to June 2014, 100 patients with thoracolumbar fractures were selected as the subjects and they were randomly divided into observation group (50 cases) and control group (50 cases). The patients in the observation group were treated with minimally invasive single-segment reduction and internal fixation. The patients in the control group were treated with short segmental fixation. The clinical effects of the two groups were compared. **Results:** There was no significant difference in the compression rate and Cobb angle between the two groups before and after operation (P> 0.05). For all patients who were followed up for the last time, the Cobb angle was significantly lower in the observation group than in the control group (P <0.05). The social function, affective function and physical pain score of the observation group were significantly better than the control group (P <0.05). The amount of bleeding in the observation group was (250.4 ± 41.0) ml, which was significantly lower than that in the control group (267.5 ± 32.8) ml. The time required for the operation was (90.2 ± 35.4) min, which was significantly lower than that of the control group (104.5 ± 22.6) min (P <0.05). After treatment, the prognosis was 70.00% and the excellent and good rate was 98.00%, which was significantly higher than that of the control group (46.00%) and 78.00% (P <0.05). **Conclusion:** Thoracolumbar fractures in patients with dilated channel minimally invasive single-segment reduction and internal fixation treatment can effectively repair the patient's vertebral height and Cobb angle and the degree of correction after surgery was significantly better, safer and worthy of clinical recommended use.

Introduction

Thoracolumbar fracture is the destruction to thoracolumbar vertebral bone continuity caused by external force [1-3]. This fracture is the most common phenomenon of spinal injury. In young and middle-aged patients, high-energy damage is the main cause of this phenomenon, such as car accidents, injuries and other injuries. Because of their own osteoporosis, factors leading to damage to the old patients are usually as low violence damage, such as slipping and falls and so on. Thoracolumbar fractures often are associated with neurological impairment, and because the injury factors are basically high-energy damage, they are also often associated with other organ damage, which has brought great difficulties and challenges for the treatment.

1 Information and methods

1.1 Clinical data

During the period from June 2013 to June 2014, 100 patients who underwent thoracolumbar fractures were enrolled in this study with 54 males and 46 females, aged 25-75 years, with an average age of (45.3 ± 3.2) years. They were randomly divided into observation group and control group. The observation group had 26 males and 24 females aged 27-75 years, with an average age of (45.3 ± 3.5) years. The control group had 28 males and 22 females aged 25-72 years, with an average age of (45.3 ± 3.0) years. According to imaging and clinical diagnosis, all patients were diagnosed with thoracolumbar fractures. There was no significant difference in sex, age and severity between the two groups (P> 0.05).

1.2 Research methods

In the control group, we selected the posterior longitudinal incision of the injured vertebrae, followed by incision of the skin, subcutaneous tissue and fascia, and cut off the paraspinal muscles on both sides of the spinous process. The patient's ligaments, vertebral parts of the vertebral lamina and the specific deformation of the joints were carefully examined. Determine the nail point at transverse roots and it incident revealed in lumbar spine and upper edge of the lamina and the facet joint revealed in thoracic vertebra. Use the C-arm X-ray machine for true lateral fluoroscopy guidance and process pedicle fixation, reduction and fixation for the injury and adjacent upper and lower normal vertebral body. Both groups of patients were removed from the internal fixation device after one year and 18 months after surgery. After surgery, patients should be bed rest and anti-infection and effective protection treatment of hormones and gastric mucosa shall be carried out and drainage tube shall be placed at the patient's wound. Pull out the drainage tube within 2-3 days and the patients shall be detected by X-ray. If the test results show that the internal fixation is good, the brace can be used to get out of bed slowly.

1.3 Efficacy evaluation

The patients were examined by imaging, and the amount of bleeding during operation and the operation time of the operation were measured. All patients underwent X-ray and CT before surgery, and the degree of pulverization was observed. The patients were measured before and after the operation, including the height of the leading edge of the vertebrae, the height of the apex of the vertebrae and the apex of the normal vertebral body and the Cobb angle of the sagittal plane. The height ratio of the leading edge of injured vertebral body was calculated, that is, the compression rate = the height of the leading edge of the vertebrae × 2 / (The height of leading edge of the normal vertebral body at head of the injured vertebrae +the height of leading edge of the normal vertebral body at tail of the injured vertebrae). Quality of life scale (SF-36) was used to assess patient life. The full score is 100.

1.4 Statistical methods

Adopt SPSS20.0 statistical software to analyze. Count data comparison was examined by x2 and measurement data was expressed with （$\bar{x}$ ±s） and examined by t. P <0.05 for the difference was statistically significant.

2 Results

2.1 Comparison of imaging findings between the two groups of patients

There was no significant difference in the compression rate and Cobb angle between the two groups before and after the operation (P> 0.05). For the last follow-up of all patients, the compression rate of the observation group was significantly higher than that of the control group and Cobb angle was significantly lower than the control group (P <0.05). See Table 1 below:

Table 1 Comparison of imaging findings between the two groups of patients (cm, $\bar{x}$ ±s)

Group	Case	Compression ratio（%）			Cobb angle（°）		
		Before Treatment	After Treatment	Last Follow-up	Before Treatment	After Treatment	Last Follow-up
Observation Group	50	58.8±13.9	87.6±10.3	85.7±11.8	19.4±5.9	6.2±5.2	7.7±5.2
Control Group	50	57.7±15.4	86.4±9.4	80.6±10.4	20.7±6.7	5.8±7.8	11.2±7.5
t	-	0.375	0.609	2.293	1.030	0.302	2.712
P	-	0.709	0.544	0.024	0.306	0.764	0.008

2.2 Comparison of life quality scores of the two groups

The social function, emotional function and physical pain score of the observation group were significantly better than the control group.（$P<0.05$）See Table 2 below:

Table 2 Comparison of life quality of the two groups (cm, $\bar{x}$ ±s)

Group	Case	Time	Social function	Emotional function	Physical pain
Observation Group	50	Before Treatment（1）	64.4±5.0	64.8±4.8	50.3±3.9
		After Treatment（2）	87.5±5.8	89.5±6.2	90.3±2.6
Control Group	50	Before Treatment（3）	65.5±4.7	64.2±5.2	51.4±3.2
		After Treatment（4）	71.3±4.7	70.3±7.5	75.6±3.8
（2）VS（1）	-	t	21.330	22.275	60.343
		P	0.000	0.000	0.000
（4）VS（3）	-	t	6.170	4.726	34.445
		P	0.000	0.000	0.000
（4）VS（2）	-	t	15.345	13.952	22.575
		P	0.000	0.000	0.000

2.3 The comparison of the amount of bleeding during surgery and the time required for surgery of the two groups of patients

The amount of bleeding during operation of observation group was (250.4 ± 41.0) ml and the time required for operation was (90.2 ± 35.4) min, which were significantly lower than those（267.5±32.8）ml,（104.5±22.6）min（$P<0.05$） in the control group. See Table 3 below:

Table 3 The comparison of the amount of bleeding during surgery and the time required for surgery of the two

groups of patients (cm, $\bar{x}$ ±s)

Group	Case	Amount of bleeding during surgery（ml）	Time required for surgery(min)
Observation Group	50	250.4±41.0	90.2±35.4
Control Group	50	267.5±32.8	104.5±22.6
t	-	2.303	2.408
P	-	0.023	0.018

2.4 Comparison of the effect of two different methods after treatment

After treatment, the excellent effect rate of observation group account for 70.00% and the excellent and good rate was 98.00%, which were significantly higher than those (46% and 78.00%) in the control group. See Table 4 below:

Table 4 Comparison of the effect of two different methods after treatment (cm, %)

Group	Case	Excellent	Good	Dad	Excellent and good rate
Observation Group	50	35（70.00）	14（28.00）	1（2.00）	49（98.00）
Control Group	50	23（46.00）	16（32.00）	11（22.00）	39（78.00）
X2	-	5.911	0.190	9.470	9.470
P	-	0.015	0.663	0.002	0.002

3 Discussion

Thoracolumbar fractures often occur in the case of spinal injury. For the unstable fractures at thoracolumbar, the clinical operation of the spine can be effective and stable [7-8]. In addition, the patient can also be in the spinal canal to lift the oppression and this approach has been clinically recognized by more scholars. Now the most commonly used clinical approach is across the injured vertebral short segments fixation. Clinical follow-up of treated patients found that this procedure for patients with thoracolumbar fractures has good effect in a relatively short period of time and patients' satisfaction is high. But there are nails broking, rods broking and loss of degree of correction, and can even lead to deformities after treatment for a long time. In this study, we found that there was no significant difference in compression rate and Cobb angle between the two groups before and after the treatment (P> 0.05) after comparing imaging findings of the two groups before and after treatment. After all patients were followed up for the last time, it can be found that the Cobb angle was significantly lower in the observation group than in the control group (P <0.05).This suggests that observation has a better therapeutic effect in treatment. In the medical profession, there is a great deal of controversy about how to prevent postoperative loss of correction. After the spine fractures, despite the height of the vertebral body can be restored after distracting the resuscitation of the vertebral body, the skeletal scaffold structure within the vertebral body can't be recovered together. In addition, due to the damage of upper and lower intervertebral disc of fracture vertebral body, it destruct the unity of the former column. Therefore, some people think that when carrying out restoration and internal fixation to patients with thoracolumbar fractures, the reconstruction of bone grafts within the vertebral body and the more effective fusion operation of bone graft are of great significance for the prevention of loss of correction degree. However, some people think that this method can't avoid the poor fixation and the height of the vertebral body loss.

Now, clinically it is trying to use the pedicle of the vertebral body and intervertebral bone graft, etc., to prevent the occurrence of correction loss. This type of treatment is technically critical to the physician and is too traumatic to the patient. The use of dilated channel minimally invasive single-segment reduction of internal fixation is in the cleft muscle and the longest muscle gap to operate with no human destruction of the inherent structure of the spine and retain the original post-stable structure in the greatest degree, which not only can carry out single-segment fixation for patients, but also can use Quardarnt channel for decompression or bone fusion to effectively reduce the height of the vertebral body after the patient's surgery and the loss of the Cobb angle. This study found that the social function, emotional function and physical pain score of the observation group were significantly better than the control group after comparing the score of life quality after treatment. The results showed that the amount of bleeding and the time required for surgery were lower in the observation group during surgery. This suggests that the safety of the observation group is relatively better. The reason may be: The minimally invasive single-segment reduction and internal fixation treatment of the expanded channel has the advantages of small trauma and less damage, and can retain the original stable structure of the patient to the greatest extent. Minimally invasive fixation makes the spine in the three directions have reached the best stability. In Summary, thoracolumbar fractures of the dilator channel minimally invasive single-segment reduction and internal fixation and traditional posterior median incision fixed with a single segment can effectively repair patient's vertebral height and Cobb angle. The minimally invasive single-segment reduction and internal fixation of the dilated channel is significantly better and safer for preventing postoperative loss of correction degree and it worthy of clinical recommended use.

References

[1] Sun Deshun, Wang Xiaohe, Wang Xiaoyan, etc. Effects of Self-made Bone Fumai Decoction on Early Expression of Interleukin-2, Fibrinogen and Pain in Patients with Thoracolumbar Fracture [J]. Traditional Chinese bone-setting, 2014,26（8）：8-11.

[2] Wu Bing, Wu Tianliang, Shen Liang, etc. Treatment of osteoporotic thoracolumbar fractures with percutaneous balloon dilatation and posterior kyphoplasty[J]. Journal of Zhejiang University of Traditional Chinese Medicine, 2014, 38（5）：592-594, 597.

[3] Zhuang Yunqiang, Ying Ying. Treatment of thoracolumbar fractures with single - pedicle screw fixation with Quadrant assisted [J]. Zhejiang Medical, 2014,36（11）：955-957.

[4] Tong Yumei, Feng Min, Xiao Xiuli, etc. Effect of evidence - based nursing intervention on reducing postoperative pressure ulcer and urinary tract infection in patients with thoracolumbar fractures, Chinese Journal of Nosocomiology[J]., 2014,15（1）：3834-3835,3838.

[5] Lun Xuegang, Li XiaoMin, Zhang Xinhua, etc. Treatment of thoracolumbar vertebral fracture with short segmental vertebroplasty[J]. Chinese Journal of Clinical Medicine (Electronic Edition), 2014,9（1）：1642-1646.

[6] Tang Hongwei, Liang Yu. Advances in internal fixation of minimally invasive interbody fusion with lumbar intervertebral foramen [J]. Chinese Journal of Spine and Spinal Cord, 2014,5（1）：462-465

[7] Liu Shumao, Guan Boqing, Li Shugang, etc. Improvement and clinical application of vertebral reduction in thoracolumbar fracture [J]. Chinese Journal of Bone and Joint Surgery, 2014,2（1）：113-116.

[8] Xun Guijun, Ma Xinlong, Zhang Tao, etc. Comparison of the mechanical properties of the posterior segmental fixation of the thoracolumbar fracture and the fixation of the conventional short segment [J]. Medical Biomechanics, 2014,29（2）：126-130.

[9] Bridwell Lawrence G, Lenke Samuel K, Cho Joshua M,at all. Proximal junctional kyphosis in primary adult deformity surgery: evaluation of 20 degrees as a critical angle.[J]. Neurosurgery, 2013, 72(6): 899-906

[10] Xu Baoshan, Ma Xinlong, Hu Yongcheng, etc. Treatment of complicated lumbar spinal stenosis by intervertebral fusion with bilateral decompression and unilateral open window [J]. Chinese Journal of Orthopedics, 2016, 36（12）：753-760.