

Clinical Effect of Posterior Internal Fixation and Fusion in the Treatment of Thoracolumbar Fractures

Tianhui Liu, Jianmin Cui*

Shizhu People's Hospital, Chongqing 409100, China

Abstract: Objective: To evaluate the clinical effect of posterior internal fixation and fusion in the treatment of thoracolumbar fractures. **Methods:** 36 patients with thoracolumbar fractures from January 2018 to December 2020 were selected and divided into study group and control group according to the random number table model. The control group was treated with anterior internal fixation, while the study group was treated with posterior internal fixation and fusion. The indexes of the two groups were compared and analyzed. **Results:** Compared with the operation related indexes of the two groups, the study group had more advantages ($P < 0.05$); The postoperative kyphosis Cobb angle, height of anterior and posterior vertebral body, wedge index of the two groups were better than those before operation ($P < 0.05$), and there was no significant difference between the two groups ($P > 0.05$); There was no significant difference between the two groups ($P > 0.05$). **Conclusion:** The clinical effect of posterior internal fixation and fusion in the treatment of thoracolumbar fractures is significant, and the body damage is slight, which is worthy of comprehensive promotion.

Keywords: Thoracolumbar fracture of spine; The back road; Internal fixation and fusion

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***Corresponding author:** Jianmin Cui, 812741946@qq.com

The thoracolumbar spine has a special anatomical structure, which is vulnerable to fracture due to external violence factors, such as falling from height, traffic accidents and so on. Thoracolumbar fracture of spine can lead to decreased stability of spine, burst fracture of vertebral body, and induce acute or

delayed neurological deficit, which requires timely symptomatic treatment^[1-2]. In clinical treatment of thoracolumbar fractures, pedicle screw reduction and other intervention measures are often used. After treatment, the normal height of the injured vertebra can be restored, and the decompression between vertebral canals can be realized, and the normal physiological radian of the injured vertebra can be gradually restored. The long-term curative effect of this treatment scheme is poor, and it is easy to cause kyphosis and vertebral height loss^[3]. Posterior internal fixation and fusion is a new intervention for the clinical treatment of thoracolumbar fractures. This study summarized and evaluated the baseline clinical data of patients in our hospital, and evaluated and systematically analyzed the related problems of posterior internal fixation and fusion.

1 Material and methods

1.1 General information

36 patients with thoracolumbar spine fracture admitted from January 2018 to December 2020 were selected and divided into study group and control group according to random number table mode. All patients were diagnosed as thoracolumbar spine fracture by X-ray and symptom comprehensive evaluation analysis, and agreed to participate in this study. The basic clinical data of the two groups were statistically evaluated. In the study group, there were 10 males and 8 females, with an average age range of (38.85 ± 2.46) years old from 21 to 55 years old. The injury sites were 9 cases of L1, 5 cases of L2, 2 cases of T11 and 2 cases of T12. In the control group, there were 9 males and 9 females, with an average age range of (38.97 ± 2.51) years from 23 to 56 years

old. There were 8 cases of L1, 4 cases of L2, 3 cases of T11 and 3 cases of T12 in the injury sites. There was no significant difference in the baseline data ($P > 0.05$).

1.2 Methods

The patients in the control group were treated with anterior internal fixation and general anesthesia. The left approach was selected to fully expose the anterior and lateral areas of the vertebral body, and the posterior 2 / 3 fractures of the injured vertebral body and the upper and lower intervertebral discs were removed. Decompression was performed in front of the spinal canal, and the compressive material in front of the posterior longitudinal ligament was removed. Distraction reduction was performed to restore the physiological curvature and normal height of the spine. After the operation, the depth of the injured vertebrae was measured, and the ipsilateral iliac bone mass was selected for proper internal fixation.

The treatment plan of the study group was posterior internal fixation and fusion, and the anesthesia plan was general anesthesia. The doctor adjusted the patient's position to prone position, and raised the shoulder, upper chest, anterior iliac and other parts to keep the abdomen and lower chest suspended. The injured vertebra was selected as the center, and the posterior median incision was set to fully expose the upper and lower lamina, vertebral body, transverse process and facet joints. The transverse section angle was maintained at 5-15° and the sagittal angle was maintained at 0° by using anatomical positioning technology. The pedicle needle was used for detection, and drilling holes were set in the bone wall around the pedicle. C-arm fluoroscopy was used to observe the drilling position. Tapping was carried out after meeting the relevant requirements of surgery, and pedicle screw fixation was properly placed. If the patient is complicated with nerve root or spinal cord compression, complete laminectomy or hemilaminectomy should be performed according to the degree of spinal stenosis shown by preoperative imaging examination. Under C-arm fluoroscopy, the injured vertebrae were opened and reset to restore the

height of intervertebral disc and vertebral body. After the above operation, the ipsilateral iliac bone graft was performed, and the incision was closed after washing with normal saline. Postoperative routine anti infection treatment, and guide patients to complete rehabilitation training.

1.3 Evaluation criteria

The operation related indexes, including incision length, intraoperative blood loss, operation and hospital stay, were compared between the two groups. Preoperative and postoperative imaging examinations were performed, and the kyphosis Cobb angle, height of anterior and posterior vertebral body, wedge index were compared between the two groups.

Compared with the Asia classification of postoperative neurological function of the two groups, Grade A showed that there was no motor and sensory function in the nerve plane, which belonged to complete injury. In Grade B, there is no motor function and sensory function below the nerve plane, which is incomplete injury. Grade C showed motor function below the nerve level, and more than 50% of the key muscles had muscle strength lower than grade 3. In grade D, there was motor function below the nerve level, and more than 50% of the key muscles were stronger than grade 3. Grade E is completely normal.

1.4 Statistical methods

SPSS 23.0 software was used to calculate all kinds of data. In this study, the measurement data was ($\bar{x} \pm s$), the test method was t, the count data was (%), and the test method was χ^2 . If $P < 0.05$, there were differences between groups.

2 Result

2.1 Compare the operation related indexes of the two groups

Compared with the two groups of operation related indicators, the study group had more advantages ($P < 0.05$).

Table 1. Comparison of operation related indexes between the two groups ($\bar{x} \pm s$)

Group	Incision length (CM)	Intraoperative blood loss (ML)	Operation time (min)	Length of stay (d)
Study group (n = 18)	12.88±4.07	624.48±85.03	175.54±38.12	11.82±3.09
Control group (n = 18)	17.94±6.35	992.75±73.38	266.97±61.35	20.66±5.74
T value	2.846	13.911	5.370	5.753
P value	0.007	0.000	0.000	0.000

2.2 The preoperative and postoperative spinal orthopedic indexes of the two groups were compared

The postoperative kyphosis Cobb angle, height of

anterior and posterior vertebral body, wedge index of the two groups were better than those before operation ($P < 0.05$), and there was no significant difference between the two groups ($P > 0.05$).

Table 2. Comparison of preoperative and postoperative spinal orthopedic indexes ($\bar{x} \pm s$) between the two groups

Group		Kyphosis Cobb angle (°)	Anterior height of vertebral body (%)	Posterior edge height of vertebral body (%)	Wedge index
Study group (n = 18)	Before operation	28.91±4.05	36.28±9.74	82.77±6.47	56.22±3.13
	After operation	12.45±2.17*	85.13±9.62*	91.95±2.48*	80.69±9.15*
Control group (n = 18)	Before operation	28.96±4.12	36.44±9.53	82.42±6.75	56.18±4.02
	After operation	12.38±2.19*	84.96±9.75*	91.88±2.47*	80.77±8.34*

Note: Compared with preoperative, the difference was significant, * $P < 0.05$

2.3 Compare the Asia grading of neurological function between the two groups

Compared the Asia grading of neurological function between the two groups, there were 2 cases of grade C, 3 cases of grade D and 13 cases of Grade E in the study group, and 3 cases of grade C, 3 cases of grade D and 12 cases of Grade E in the control group. There was no significant difference between the two groups ($P > 0.05$).

3 Discussion

T10-L2 is the thoracolumbar segment. In this region, the turning point of thoracic vertebra is relatively fixed, and the range of motion of lumbar vertebra is relatively large. It belongs to the junction of two curvature of lumbar lordosis and thoracic kyphosis. The articular surface moves in this region, and it is easy to fracture under the action of external force. Thoracolumbar spine fracture can lead to spinal cord injury, loss of spinal load-bearing capacity, and can induce the loss of sensory and motor function of lower limbs, resulting in the inability of patients to take care of themselves. Therefore, it is necessary to take timely surgical intervention^[4].

Posterior internal fixation and fusion is a new scheme for the clinical treatment of thoracolumbar fractures. Through various operations, the kyphosis deformity can be corrected, the normal height of injured vertebra can be restored, and the structural injury in the posterior region can be effectively treated^[5]. Posterior internal fixation and fusion using pedicle screw internal fixation system, can achieve anatomical reduction, three-dimensional fixation, short segment fixation, fixation is firm and reliable, can effectively restore the sagittal plane and coronal

plane curvature of the injured vertebra, make the spine in a normal physiological bending state. In the operation of posterior internal fixation and fusion, pedicle screws are placed in the fractured vertebral body. Short segment pedicle screw internal fixation can reduce fracture and deformation, and it can achieve good reduction by distraction of the injured vertebral body with normal bone in the complete area of the endplate^[6].

Compared with the anterior internal fixation, the posterior internal fixation and fusion is easy to operate, without cutting the fracture site, which can reduce the amount of intraoperative blood loss, and the pedicle screw can achieve three-dimensional stable mode, and the stability of anti-rotation, anti-compression and anti-bending is significantly improved^[7]. Anterior internal fixation mode can achieve complete decompression in front of the spinal canal, intraoperative support bone graft mode can restore sagittal balance and vertebral height, and the use of spinal motion load line area for fixation can promote fracture healing. The operation of anterior internal fixation is complex and serious damage to the patient's body. Posterior internal fixation and fusion can achieve longitudinal distraction of the injured vertebral body and effectively restore the normal vertebral body The height, combined with the longitudinal ligament stretching operation mode, can initially reset the bone block into the spinal canal, can achieve good decompression effect. Posterior internal fixation and fusion can achieve simultaneous fixation of anterior column, middle column and posterior column, and realize three-dimensional fixation and orthopedics. Its mechanical properties are significantly better than that of anterior internal fixation.

Bone graft is an important part of posterior internal fixation and fusion. The stability of the posterior column after laminectomy is low. Therefore, bone graft and fusion should be performed in the area between the articular processes after decompression to prevent fracture of internal fixation, back pain and aggravation of deformity. In the operation of bone graft, the doctor should reasonably select autologous iliac bone or allogeneic bone according to the fracture situation of the patients, and standardize the operation of bone graft to improve the treatment effect^[8].

According to the conclusion and analysis of the data content in this study, the operation related indexes of the study group was better than those of the control group. Meanwhile, the postoperative kyphosis Cobb angle, the height of anterior and posterior vertebral body, wedge index of the two groups were better than those of the preoperative. There was no significant difference in Asia classification between the two groups. So it can be considered that anterior internal fixation and posterior internal fixation and fusion are effective schemes for the treatment of thoracolumbar fractures, and posterior internal fixation is better, and it is helpful to improve the safety of treatment.

In conclusion, the clinical effect of posterior internal fixation and fusion in the treatment of thoracolumbar fractures is significant, and the body damage is slight, which is worthy of comprehensive promotion.

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