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Clinical observation of minimally invasive percutaneous pedicle screw fixation for thoracolumbar fractures

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ABSTRACT. *Objective: To explore the therapeutic effect of minimally invasive percutaneous pedicle screw fixation (MIPPSF) on patients with lumbar thoracic vertebral fractures. Methods: The clinical data of 32 patients with lumbar thoracic vertebral fractures admitted to our hospital from February 2018 to October 2019 were retrospectively analyzed, and the MIPPSF was determined by comparing the pain level, correction and dysfunction before and after surgery. Actual efficacy. Results: After implementing MIPPSF, the VAS score of the patients was significantly lower than that before the operation, and there was a significant difference before and after the operation (P <0.05); the ODI score of the patients was significantly lower than that before the operation, and the difference before and after the operation was significant (P <0.05); The imaging operation indexes of the patients were significantly better than before the operation, and there was a significant difference before and after the operation (P <0.05). Conclusion: Implementing MIPPSF in patients with lumbar thoracic vertebral fractures can not only achieve better orthodontic results, but also have stronger safety performance and are more conducive to patients' postoperative recovery. However, the long-term efficacy of the operation needs to be determined after follow-up.*

KEYWORDS: *Minimally invasive percutaneous pedicle screw fixation, Thoracolumbar fractures, Vas, Odi*

2. Introduction

Thoracolumbar vertebral burst fractures are mostly caused by violent events. When the patient's spine is seriously damaged, the patient usually suffers from vertebral body stability, kyphosis, and nerve damage. From a therapeutic point of view, posterior cone fusion is the most common traditional surgical method. Although this method can reduce nerve pressure and improve the effect of segment fusion, the lack of minimally invasive characteristics is also likely to cause major bleeding and complications. To this end, the article will explore the therapeutic effect of a new minimally invasive surgery on patients with thoracolumbar fractures. The detailed report of the research results is as follows:

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3. Materials and Methods

3.1 Normal Information

This study collected clinical data of 32 patients with lumbar thoracic vertebral fractures. All 32 patients were admitted to our hospital from February 2018 to October 2019. None of them had neurological symptoms, and all were diagnosed with single-segment fractures. Among the 32 patients, 18 were male and 14 were female. Their ages ranged from 26 to 49 years, with an average age of (37.53 ± 4.86) years. The causes of fracture in 32 patients were as follows: 14 cases of falling from height; 9 cases of heavy injuries; 9 cases of car accident. Injury segment statistics are as follows: 6 cases in T11 segment, 9 cases in T12 segment, 10 cases in L1 segment, and 7 cases in L2 segment. The fracture classification results are as follows: 26 cases of compression fractures, 14 cases of burst fractures, and 2 cases of Chance fractures.

3.2 Surgical Methods

After general anesthesia, take the patient's prone position. To avoid pressure injury, place a pillow under the patient's chest and hips. First, use the C-arm to determine the neutral point of the patient's pedicle. After confirming that it is correct, use the positioning network to mark the point. After completing routine operations such as disinfecting the towels, make a surgical incision at the previously marked location, with a length of approximately 1.2 cm, for a total of 4 sites. Cut the patient's skin and deep fascia in sequence, and use the C-arm to guide, make the hollow hand vertebral needle come into contact with the needle entry point, and when the fluoroscopic effect is better, tap the needle tail to make the needle Pierce into the pedicle. Then remove the inner core of the needle, and then remove the needle tube after placing the guide wire. Use a 3-stage hollow sleeve to build a channel. After the construction is completed, remove the first two-stage catheter, leaving only the third pole for protection. Damage should be avoided when tapping. After tapping, the probe should be used to check the depth and the integrity of the wall of the nail path, and screw the long-tailed pedicle screw into it. After that, install the remaining screws, and measure the length of the connecting rod in vitro after all are completed. After knowing the actual length, combined with the position of the patient's vertebral body, begin to shape the connecting rod. After the shaping is completed, the connecting rod is guided through the tail of the two screws in turn under the guidance of the rod set, and the patient will be reset After the injured vertebrae were expanded, the auxiliary effect of the C-arm was used to observe the reduction results, and if the reduction results were satisfactory, the jacking wire was tightened.

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3.3 Postoperative Treatment

After implementing MIPPSF, patients need to maintain two weeks of bed rest. There are two bed postures: one, lying on the ground; two, lying on the side. If the patient shows neurological symptoms before surgery, appropriate neurotrophic drugs can be used postoperatively. In addition, patients can also be injected with low molecular weight heparin. After two weeks of bed rest, the patient can perform functional recovery training under the guidance of the rehabilitation teacher, and can use the brace as an aid when getting out of bed.,

3.4 Observation Index

One, Statistical analysis of the patient's surgical indicators; two, Comparative analysis of the patient's imaging surgical indicators before and after surgery; 3. Comparative analysis of the patient's pain level and dysfunction before and after surgery, ODI scale is used for dysfunction test.

3.5 Statistical Method

The software used for data statistics and analysis is SPSS 20.0. The data obtained in this study are all measurement data, which can be expressed as the average ± standard deviation, and the t test is used for data comparison. The software output $P < 0.05$, which means that the difference in data before and after the operation is very significant.

4. Results

4.1 Surgical Observation Index

The surgical procedures of the 32 patients were relatively smooth. The average operation time was (51.35 ± 13.86) minutes, the average bleeding volume was (20.48 ± 7.45) ml, and the average incision length was (1.2 ± 0.2) cm.

4.2 Improve the Authenticity of Financial Information

See Table 1 for specific data.

Table 1 Comparative Analysis of Preoperative and Postoperative Imaging Index

index	Before surgery	after surgery
Height of anterior edge of vertebral body (%)	60.4±13.6	91.7±11.3
Cobb angle in sagittal	18.4±4.8	3.3±1.3

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position (degrees)		
Sagittal index (degrees)	18.5±4.8	12.5±5.3

4.3 Comparative Analysis of Pain Level and Degree of Dysfunction Before and after Operation

See Table 2 for specific data.

Table 2 Comparative Analysis of Pain Level and Degree of Dysfunction Before and after Operation

index	Before surgery	1 month after operation	6 months after operation
VAS(分)	5.1±0.6	1.5±0.4	1.1±0.3
ODI(%)	59.2±7.8	29.4±8.2	13.7±7.5

5. Discussion

For patients with thoracolumbar vertebral fractures, MIPPSF treatment is not necessary, because there is no need to dissect the patient's paravertebral muscles extensively, so the resulting wound is small and it is not easy to cause massive bleeding. Secondly, the operation will not damage the integrity and continuity of muscles and ligaments, and provides a strong guarantee for the stability of the posterior column. Therefore, the recovery after the operation is relatively easy and simple, and basically no complications will occur.

In this study, after MIPPSF was performed, the height of the anterior vertebral body of the patient was significantly restored, and the sagittal index and Cobb angle of the sagittal position were significantly reduced. From these perspectives, the surgical effect has achieved its intended purpose. In addition, the patient's pain level and degree of dysfunction have also been significantly improved, which not only ensures the smooth development of the treatment, but also promotes the functional recovery of the patient. The above results are consistent with previous research conclusions.

The results of this study show that, compared with traditional open surgery, MIPPSF has the following advantages: First, the incision formed is small, which is conducive to recovery; Second, it can be deep into the lesion segment to carry out work, the visual field is good during the operation, and the operation It is relatively simple; three, it will not destroy the stability of the posterior column, it will not damage the paravertebral soft tissue, and it will not interfere with the normal function of the spinal nerve, and it can avoid bleeding caused by improper operation; The opener is used to propagate the injured vertebrae of the patient and carry out reduction, which is beneficial to achieve the orthodontic effect. Fifth, the fixation is

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firm and will not cause serious complications after the operation, which is convenient for the patient to quickly accept psychologically.

In summary, the implementation of MIPPSF in patients with lumbar thoracic vertebral fractures can not only achieve better orthodontic results, but also have stronger safety performance and are more conducive to patients' postoperative recovery. However, the long-term efficacy of the operation needs to be determined after follow-up.

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