

# Clinical Application of Minimally Invasive Surgery in Pain and Complications after Spinal Trauma

Tianhui Liu, Xiaoying Gao\*, Jianmin Cui

Shizhu County People's Hospital, Chongqing 409100, China

**Abstract: Objective:** To study and evaluate the incidence of pain and complications in patients with spinal trauma after minimally invasive treatment.

**Methods:** The research period was selected from January 2018 to December 2020, and 40 patients with spinal trauma were selected. According to the random number table scheme, they were divided into the study group and the control group. The treatment scheme of the control group was traditional surgery, and the treatment scheme of the study group was minimally invasive surgery. The indicators of the two groups were compared and analyzed. **Results:** Compared with the two groups of surgery and postoperative recovery related indicators, the study group had more advantages ( $P < 0.05$ ); Compared two groups of postoperative NRS score, VAS score and the incidence of complications, the study group had more advantages ( $P < 0.05$ ). **Conclusion:** Minimally invasive treatment of spinal trauma has significant clinical effect, which can effectively relieve postoperative pain and reduce the incidence of various complications.

**Keywords:** Minimally invasive treatment; Spinal trauma; Pain; Complication

**Publication date:** January, 2021

**Publication online:** 31 January, 2021

\***Corresponding author:** Jinku Zhang, 12741946@qq.com

Spinal trauma is a kind of bone surgery trauma with high clinical incidence rate. The cause of injury is related to external factors such as traffic accidents and high altitude falling. It can cause serious spinal cord injury, and if it fails to get symptomatic treatment in time, it can induce severe paraplegia and other critical

diseases. The quality of life of patients with severe disease is<sup>[1]</sup>. Open surgery is the routine scheme for the clinical treatment of spinal trauma, which has exact curative effect, large incision area, serious damage to the patient's body caused by intraoperative operation, and it is easy to induce postoperative pain, and can also lead to increased incidence of postoperative complications in the recovery period<sup>[2]</sup>. The clinical application of minimally invasive surgery in the treatment of spinal trauma in our hospital is lack of systematic research and analysis.

## 1 Material and methods

### 1.1 General information

The study period was from January 2018 to December 2020. 40 patients with spinal trauma were selected and divided into study group and control group according to the random number table scheme. All patients were diagnosed as spinal trauma by CT, X-ray and other imaging examinations, without cognitive and consciousness disorders, and agreed to participate in the study. The baseline clinical data of the two groups were summarized and analyzed. The gender ratio of the study group was 12:8, the age range was 25-67 years old, with an average of ( $46.05 \pm 2.88$ ) years old, and the time from trauma to treatment was 1-9 hours, with an average of ( $5.08 \pm 0.26$ ) hours. In the control group, the ratio of male to female was 13:7, the age range was 27-68 years old, with an average of ( $46.13 \pm 2.94$ ) years old, and the time from trauma to treatment was 1-10 hours, with an average of ( $5.26 \pm 0.38$ ) hours. There was no significant difference in the baseline data ( $P > 0.05$ ).

## 1.2 Methods

The patients in the control group were treated with traditional surgery, the doctor assisted the patients to adjust to prone position, and the anesthesia scheme was general anesthesia. C-arm fluoroscopy was used to observe the site of spinal trauma. The midline area of spinal trauma was selected, and appropriate surgical incision was set. Skin tissue and subcutaneous tissue were cut. Paravertebral muscles were properly stripped to fully expose the lateral area of facet joint. Blunt dissection and distraction of adjacent tissue around the joint to ensure a clear surgical field. After the operation, local tissue suture was performed.

The patients in the study group were treated with minimally invasive surgery, the doctor assisted the patients to adjust to prone position, and the anesthesia scheme was general anesthesia. After anesthesia induction, C-arm machine was used to locate the injured spine, and the incision site was set outside the pedicle of the injured vertebrae. Blunt dissection of multifidus and longissimus muscle in local trauma area, gradually stripping to the muscle and soft tissue area. The operation channel was set up to fully expose the head and tail mastoid process and isthmus of spine, and the pedicle probe was used to open the working channel. Pedicle screw was inserted into the injured area, and the injured area was fixed properly.

Percutaneous plastic rod was used to reset the injured area, and the injured area was sutured properly.

## 1.3 Evaluation criteria

The related indexes of operation and postoperative recovery were compared between the two groups, including intraoperative blood loss, ambulation time, operation and hospital stay.

The NRS score and VAS score of the two groups before and after operation were statistically analyzed. The score range was 0-10 points, and the score was directly proportional to the degree of pain.

The incidence of postoperative complications such as incision infection, traumatic paraplegia and dyskinesia were analyzed.

## 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  $\chi^2$ . If  $P < 0.05$ , there were differences between groups.

## 2 Results

### 2.1 Compare the two groups of operation and postoperative recovery related indicators

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

**Table 2.** Comparison of related indexes of operation and postoperative recovery between the two groups ( $\bar{x} \pm s$ )

Group	Intraoperative blood loss (ML)	Ambulation time (H)	Operation time (min)	Length of stay (d)
Study group ( $n = 20$ )	122.75±25.88	36.68±9.25	118.85±7.66	8.38±2.05
Control group ( $n = 20$ )	289.46±35.17	57.01±12.49	169.68±8.45	15.49±4.55
<i>T</i> value	17.073	5.849	19.931	6.371
<i>P</i> value	0.000	0.000	0.000	0.000

### 2.2 The NRS score and VAS score of the two groups before and after operation were compared

There was no significant difference in NRS score and

VAS score between the two groups before operation ( $P > 0.05$ ), but the study group had more advantages after operation ( $P < 0.05$ ).

**Table 2.** NRS score and VAS score ( $\bar{x} \pm s$ ) before and after operation were compared between the two groups

Group	NRS score		VAS score	
	Before operation	After operation	Before operation	After operation
Study group ( $n = 20$ )	5.63±0.88	1.82±0.48	5.92±0.98	1.25±0.33
Control group ( $n = 20$ )	5.69±0.75	4.03±0.77	5.97±0.95	4.19±0.36
<i>T</i> value	0.232	10.892	0.163	26.933
<i>P</i> value	0.817	0.000	0.870	0.000

### 2.3 The incidence of complications was compared between the two groups

Compared with the incidence of complications in the two groups, the study group had more advantages ( $P < 0.05$ ).

**Table 3.** Compared the incidence of complications between the two groups (*n* /%)

Group	Incision infection	Traumatic paraplegia	Dyskinesia	Incidence of complications
Study group ( <i>n</i> = 20)	1	0	1	2 (10.0)
Control group ( <i>n</i> = 20)	4	1	3	8 (40.0)
$\chi^2$ value				4.800
<i>P</i> value				0.028

### 3 Discussion

Spinal trauma mainly refers to spinal bone, joint and ligament injury, some patients with posterior high spinal nerve and spinal cord injury, the cause of injury is directly or indirectly related to external violence<sup>[3]</sup>. The incidence of physical injury and paralysis was high. There are many methods for clinical treatment of spinal trauma, and doctors need to make a comprehensive analysis of the patient's injury, and then determine a reasonable and effective treatment and intervention plan<sup>[4]</sup>. Spinal trauma patients such as fracture dislocation or spinal displacement lead to nerve root spinal cord injury, and compression nerve root, resulting in reduced spinal stability, unable to effectively bear body weight, such patients need to complete decompression and reduction through surgery, so as to restore the symptoms of spinal shape, and remove the compression nerve root and spinal cord bone, improve spinal stability<sup>[5]</sup>.

Traditional open surgery is a new scheme for the clinical treatment of spinal injury, which has exact clinical effect and relatively simple intraoperative use<sup>[6]</sup>. Open surgery incision area is large, intraoperative operation is easy to lead to trauma, spinal peripheral tissue injury, and postoperative recovery is slow, it is easy to induce all kinds of adverse reactions, affecting the recovery effect of spinal function. Minimally invasive surgery belongs to a new clinical treatment of spinal trauma. Compared with the traditional open method, this method uses C-arm machine to assist fluoroscopy observation, and uses small incision combined with working channel to complete the reduction of the trauma area, which can avoid the damage to the healthy tissues around the spine during the operation, and the small incision mode can reduce the contact area between the tissues around the spine and the air, and significantly reduce the incidence of complications. Low incidence of postoperative complications<sup>[7]</sup>. At the same time, the small incision injury mode can relieve the postoperative incision pain, is conducive to early ambulation, can effectively shorten the

overall recovery time of patients, and help to improve the prognosis.

Summary and analysis of the relevant data in this study, the study group of patients with intraoperative blood loss, ambulation time, operation and hospitalization time and other intraoperative and postoperative recovery related indicators are better than the control group, it can be considered that minimally invasive treatment can effectively shorten the operation time, minimally invasive operation mode of patients with less intraoperative blood loss, can significantly reduce the body pain caused by operation, reduce the impact on the surrounding environment. The injury of healthy tissue can improve the safety of operation and shorten the recovery time. The postoperative NRS score and VAS score of the study group were better than those of the control group. It can be considered that minimally invasive treatment using small incision to complete the operation can effectively relieve postoperative pain and promote early postoperative ambulation. The incidence of postoperative complications such as incision infection, dyskinesia and traumatic paraplegia in the study group was lower than that in the control group. It can be considered that minimally invasive treatment using small incision to complete the operation has slight interference to the internal environment of the machine, and can significantly reduce the incidence of various complications.

Compared with the traditional open surgery, the operation of minimally invasive surgery is relatively complex, and the requirements for doctors' operation technology and clinical experience are higher. During the operation, it is necessary to ensure a high degree of concentration and master the relevant operation process of minimally invasive surgery, so as to ensure the curative effect and safety of the operation<sup>[7]</sup>. Doctors need to strengthen the study and research of minimally invasive surgery technology, long-distance cautious and meticulous work attitude, to ensure the safe and smooth completion of the operation to the greatest extent. At the same time, the human spine peripheral nerve is dense, the operation should

strictly follow the basic principles of minimally invasive surgery, accurate and complete damage area stripping and fixation treatment, avoid damage to the surrounding healthy nerve tissue, in order to reduce the injury. In addition, doctors need to accurately grasp the scope of application of minimally invasive surgery. If the patient's injury is complex and severe, traditional open surgery is recommended<sup>[8]</sup>.

In conclusion, the clinical effect of minimally invasive surgery in patients with spinal trauma is significant, which can effectively relieve postoperative pain and reduce the incidence of various complications. The surgical efficacy and safety are better than the traditional open surgery, which is worthy of comprehensive promotion. At the same time, this study lasted for a short time, affected by many factors, lack of horizontal comparative analysis of the same type of data content, the number of patients is less, and the process is not perfect. The specific effect of minimally invasive treatment still needs to be continuously studied and analyzed.

## References

- [1] Guo CQ, Tong WH, Liu H. Analysis of the clinical effect of sextant percutaneous minimally invasive spinal fixation in the treatment of traumatic thoracolumbar fractures [J]. Contemporary medicine, 2020, 26 (6): 144-145
- [2] Zhang Q. Observation on the clinical efficacy and the incidence of complications of minimally invasive spinal trauma surgery [J]. Medical Aesthetics and Cosmetology, 2020,29 (3): 57
- [3] Li PJ, Li J. effect of posterior V-osteotomy on Cobb angle and recurrence rate of patients with traumatic kyphosis [J]. Capital food and medicine, 2020,27 (12): 49
- [4] Mou XS. Analysis of operation effect, blood loss, hospitalization time and complications of minimally invasive surgery for spinal trauma [J]. Medical Aesthetics and Cosmetology, 2020,29 (12): 55
- [5] Han ZB. Comparative analysis of clinical efficacy and safety of small incision surgery and traditional open surgery in the treatment of spinal trauma [J]. Chinese and foreign medical, 2020, 39 (14): 71-73
- [6] He R, Zeng Y, Li Q, et al. Effects of minimally invasive surgery on perioperative indexes, spinal function and postoperative complications of patients with spinal trauma [J]. Journal of Guizhou Medical University, 2020, 45 (7): 844-848
- [7] Han XD. Analysis and exploration of the clinical effect of minimally invasive spinal internal fixation for patients with spinal trauma[J]. World's latest medical information Abstracts (continuous electronic journal), 2020, 20 (38): 55-56
- [8] Luo F. Comparative analysis of minimally invasive surgery and traditional open surgery in the treatment of spinal trauma [J]. Chinese community physicians, 2020, 36 (21): 50-52.