

## LETTER TO THE EDITOR

## Cause Analysis and Remedial Measures of Nonunion Factors for Operative Treatment of Lumbar Vertebrae Fractures in Wushu Athletes the air Pollution

Huiying Dai\*

School of Physical Education, Hubei University of Education, Wuhan 430205, China

\*Email: daihuiying02@163.com

The nonunion for Lumbar vertebrae fracture treated by surgery will affect not only the patient's quality of life, but also their daily training. This study aims to analyze the factors that cause the nonunion for operative treatment of Lumbar vertebrae fracture and put forward the active and effective remedial measures. Materials and methods: 1,250 cases of lumbar vertebral fractures of wushu athletes admitted to our hospital from May 2010 to May 2015 under environmental pollution were selected as the research objects. Among them, 656 patients were treated with manipulative reduction and external fixation, and the other 594 patients were treated with open reduction and internal fixation. After the operation, 80 cases of nonunion occurred, including 22 cases of common plate fixation, 24 cases of pure wire cerclage fixation, 18 cases of internal fixation with Kirschner wire and 16 cases of joint wire cerclage internal fixation with Kirschner wire respectively. Then the 80 cases of nonunion were applied with pelvic reconstruction plate fixation and autogenous cancellous bone graft fixation. After the operation, they should be fixed with abducent bracket for 6 weeks, examined through X-ray and observed for healing condition. Meanwhile, the reasons of nonunion in different patients should be concluded. Results: Follow-up examination were conducted for the patients for 3 consecutive years after the surgery, and results showed that all the 80 patients were fully healed in 15 -25 weeks after the operation, with union rate reaching 100%. Conclusion: The application of open reduction and internal fixation in the treatment of lumbar vertebrae fracture causes higher nonunion rate and involves multiple nonunion causes. Therefore, in-depth analysis of nonunion factors should be carried out and active and effective remedial measures should be implemented to improve curative effect, so that patients can get rehabilitation as soon as possible.

### I Introduction

Zhao congmei, Xie Qin. "Correlation Study on Women Aerobics Athletes' Physical Quality and Skilled Movement" on Issue 107, Pages: 3927-3932, Article No: e107436 Year: 2019, in the article, Being located between the relatively stable thoracic vertebra and lumbar vertebra with large range of motion, thoracolumbar spine as a stress fulcrum is more likely to be injured. Clinically, 70% of spinal fracture or spine dislocation occurs at thoracolumbar segment (mostly at the 12th thoracic vertebra or the 1st lumbar vertebra). In addition to bone structure injury, thoracolumbar vertebral fracture is usually accompanied with spinal cord injury, medullary cone, cauda equina injury, which can severely affect viscer anatomy and physiological changes, causing paraplegia or

even death, as shown in Fig.1 and 2 below.



**Figure 1. Image of lumbar fracture**



**Figure 2. Image of lumbar fracture**

Lumbar vertebrae fracture is clinically common. According to the relevant statistics, it is shown that the incidence of adult lumbar vertebrae fracture is around 5%, and mostly are middle lumbar fracture. Nonunion is a complication derived from the operative treatment of lumbar vertebrae fracture. The operation treatment is usually advocated to be applied to treat lumbar vertebrae fracture in adults. This study is to Cause Analysis and Remedial

Measures of Nonunion Factors for Operative Treatment of Lumbar Vertebrae Fractures in Wushu athletes the air pollution. The detailed reports are as follows (Li et al. 2019).

## II Material and Method

1,250 cases of lumbar vertebral fractures of wushu athletes admitted to our hospital from May 2010 to May 2015 under environmental pollution were selected as the research objects. Among them, there were 80 cases of nonunion with open reduction and unilateral injury, including 42 cases on left side and 38 cases on right side. In terms of fixation method, there were 22 cases with common plate fixation, 24 cases with pure wire cerclage fixation, 18 cases with internal fixation using Kirschner wire and 16 cases with joint wire cerclage internal fixation using Kirschner wire. There were 20 patients with 1/3 of outer lumbar vertebrae fracture, 18 patients with 1/3 of mid-outer lumbar vertebrae fracture, 16 patients with 1/3 of middle lumbar vertebrae fracture and 26 patients with 1/3 of inner lumbar vertebrae fracture. And there were 15 patients with comminuted fracture, 30 patients with oblique fracture, 35 patients with pure cross fracture. Of the 80 nonunion cases, there were 53 males and 27 females, aged within 18-32 years old, averaging at (24.5 + 0.6) years old. All the patients did not have the serious diseases, such as infection, hematopoietic system and dysfunction of liver and kidney, with good treatment compliance.

All the patients were given with corresponding specific operative treatment, namely open reduction and normal steel plate internal fixation, open reduction and steel wire internal fixation and open reduction using Kirschner wires plus internal fixation treatment. After deeply observing and analyzing the nonunion factors, scientific and effective remedial measures were established. 80 nonunion patients were applied with reoperation with the method of pelvic reconstruction plate fixation and autogenous cancellous iliac bone grafting. After the operation, the patients were fixed with triangle pocket elbow and abductors respectively for 6 weeks in accordance with actual circumstances (Pang et al 2007).

## III Results

For all patients, the results of X-ray examination in 6 months showed that there occurred absorption at fracture region, osteoporosis and sclerosis in bone marrow cavity, without the occurrence of callus growth and fracture nonunion. Among them, there were 14 cases with unmatched shaping of fixed plate, and excessive periosteal stripping, which resulted in serious injury of soft tissue; there were 18 cases with repeated puncture of Kirschner wire during internal fixation, causing loosening, outside sliding or rotating of Kirschner wire after operation; there were 15 cases having bone sliding after operation due to unstable fixation; there were 17 cases having wire fracture after operation; there were 7 cases of which the wire loosened and slid into fracture line; there were 9 cases with loosened Kirschner wire after operation, which caused inflammation of needle tail after 5 weeks. After reoperation, all patients were followed up for 3 years and the Fracture Were fully healed, with 100% of healing rate, 15-25 weeks of healing time (averaging at (16.4 + 0.9) weeks).

## IV Discussion

The nonunion factors that lead to lumbar vertebrae fracture are analyzed from two aspects: the first is factors of fracture itself and the other is the iatrogenic factors.

For iatrogenic factors, they can be analyzed from the following aspects. For the patients with oblique fracture, the implementation of pure steel wire fixation lacks support effect of specific backbone in intramedullary nail. For patients with comminuted fracture, if the large bone cannot be properly treated, it will result in untight contact in broken end, and thus lead to free state of bone to affect its union. For ordinary steel plate internal fixation, it is

difficult to achieve anatomical shape to form stress shielding. During surgery, too wide periosteal stripping and serious damage around fracture end will also lead to damage in local blood circulation; Choosing a too thin Kirschner may lead to its weak flexural capacity, while if selecting thicker Kirschner wire, the length of penetration into medullary cavity is shorter and it may not penetrate the contralateral cortex, which will lead to worse effect of internal fixation (Yin et al. 2019). During the surgery, the repeated drilling will give rise to the expansion of needle path, which may easily cause needle loose and spondylolysis; Selecting inappropriate internal fixation is an important factor. There are a lot of methods on open reduction and internal fixation, such as pure internal fixation with Kirschner wire, Kirschner wire and steel wire internal fixation and lumbar hook plate internal fixation tension band wire fixation, coracolumbar ligament repair, wire fixation and AO fixation (Yang et al. 2015a). In addition, the functional training for patients should be appropriate and reasonable. In the functional training of fracture, scientific and progressive functional rehabilitation training should be carried out according to specific circumstances of different stages in fracture union (Yang et al. 2015b). Once the staged exercise cannot be conducted in accordance with the process of fracture union, it will cause the delayed union of fracture and even Occurs the condition of fracture nonunion.

According to relevant data survey, the nonunion rate of traditional internal for lumbar vertebrae fracture fixation is about 3.7%, which higher by 0.8% than the non-operative treatment Therefore, it is necessary to strictly control the indications for surgery, well solve the problem of internal fixation and reduce or avoid the occurrence of nonunion in lumbar vertebrae fracture (Liu et al. 2013).

In order to avoid the occurrence of nonunion phenomenon in lumbar vertebrae fracture, it is needed to keep the stability of fracture fixation part, to select a good fracture fixation Device, appropriate steel plate and Kirschner wire (Yang et al. 2015b). According to a large number of clinical practices, it is proved that proximal inner-fixation with Kirschner wire can achieve better effect. Moreover, patients need to pay attention to the fracture part during the event of activity to avoid loosening of fracture fixation device caused by inappropriate intensity or direction. Therefore, before the surgery, doctors should carry out a careful preoperative assessment, and conduct surgery in strict accordance to the normal operation standard, so as to prevent damage of the blood vessels and reduce the occurrence of unclear vision caused by bleeding during the operation.

Moreover, the application site and application situation of Kirschner wire should be strictly controlled. The application of Kirschner wire in middle and near lumbar vertebrae fracture can achieve sound therapeutic effect. Common fixing devices include tension band, plate screw and steel wire, etc. The fixing objects should be selected according to patients' actual fracture condition.

## V Conclusion

In conclusion, there are many causing nonunion of lumbar vertebrae fracture after operative treatment. Through in-depth analysis and research on various factors, it is very important to find optimal remedial measure. Through strict control of surgical indications, reasonable choice of internal fixation and avoidance of repetitive operation as much as possible, the incidence of nonunion can be effectively reduced.

## References

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