

## LETTER TO THE EDITOR

## Under the Influence of Ecological Environment Short-term Efficacy of Minimally Invasive Internal Fixation System in the Treatment of Complicated Fracture around Knee of Taekwondo Athletes

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Methods: A total of 180 Taekwondo athletes definitely diagnosed with complicated fracture around knee in our hospital were enrolled as study objects and divided into study group and reference group, each group with 90 cases. Where, the reference group received traditional internal fixation treatment, while the study group underwent minimally invasive internal fixation system treatment. Treatment effects of the two groups were observed and compared. Results: Comparison of surgical indexes between the two groups, namely operation time, blood loss, incision length and healing time, reveals obvious advantages in the results of study group,  $p < 0.05$ ; comparison of excellent rate of treatment between the two groups reveals significantly higher rate of the study group (95.56%) than the reference group (83.33%),  $p < 0.05$ ; in addition, observation and comparison of postoperative Harris score and HSS score after half a year and one year show superior score of the study group to the reference group,  $p < 0.05$ . Conclusion: For the Taekwondo athletes with complicated fracture around knee, minimally invasive internal fixation system treatment mode can significantly improve the treatment effect with good safety and reliability, which is worthy of popularization and application.

### I Introduction

Xiaolei Peng, Qingwu Zhang published "Influence Factors and Improvement Suggestions of Chinese Wushu Communication in Chinese Martial Arts" on Issue: 107, Pages: 2755-2760, Article No: e107331, Year: 2019, in the article, the paper comprehensive utilizes comparative analysis approach and variation method, learns Chinese martial arts communication current status through analyzing previous world martial arts championships competing situations and Chinese martial arts communication influence factors. Make analysis from previous martial arts championships competing countries amount and athletes amount these two aspects, through comparing the two-intensity relative number, and then get the conclusion. It establishes reliability model-based martial arts communication influence factors model, makes reliability evaluation on Chinese martial arts communication influential static results.

Knee joint is the most complex and largest joint in the body with the strongest leverage bearing (Capkin et al.

2019). In the case of a complicated fracture at the distal femur and proximal tibia, the articular surface can be involved with many bone fragments shown, causing great pain to the patient (Liu et al 2015).

Taekwondo athletes, whose job is quite special, usually have a high training intensity, so prone to complicated fracture around knee and belonging to high-risk group of this disease. It is difficult for traditional treatment methods on complicated fracture around knee to achieve effective and reliable fixation, also the functional exercise time will be delayed, and infection is easy, triggering knee ankylosis, internal fixation failure and nonunion etc. (Reiner and Robert 2018). It is crucial to take a minimally invasive procedure that not only restores anatomic form of articular surface, but also achieves reliable and effective internal fixation. This study is to observe and analyze the short-term efficacy of minimally invasive internal fixation system in the treatment of complicated fracture around knee in Taekwondo athletes (Zhang et al. 2017). The main purpose is to explore a safer and more reliable treatment method that brings the best treatment efficacy on patients with complicated fracture around knee as soon as possible. The report contents are as follows.

## II Perspective

The study was performed in 180 patients diagnosed with complicated fracture around knee from January 2015 to June 2017. All patients, who were Taekwondo athletes, enjoyed the right to know the study and signed the formal informed consent form developed by the hospital. The patients were randomly divided into study group and reference group, each with 90 cases. There were 56 males and 34 females in the study group, with an average age of  $(29.9\pm 3.2)$  years. There were 60 males and 30 females in the reference group, with an average age of  $(28.8\pm 3.5)$  years. Comparison of the two groups' data has comparability,  $p>0.05$ .

Patients in the study group underwent minimally invasive internal fixation system treatment. The patient maintained correct and comfortable supine position and received epidural anesthesia. With incision above the proximal tibia, skin of each layer was gradually cut, with articular surface spliced. The fragment was internally fixed with lag screw or Kirschner wire. The steering handle was inserted into the proximal tibia minimally invasive internal fixation system plate or distal femoral minimally invasive internal fixation system. The soft tissue window was inserted between tibialis anterior and humeral shaft, or between lateral femoral muscle and femoral shaft. Rigorous monitoring was carried out under C-arm X-ray machine, and the Kirschner wire was temporarily fixed at far and near ends of the steel plate. The articular surface fracture end was fixed with about 5 angled locking screws, and the other end was fixed with about 5 single-cortex self-tapping, self-drilling screws. After the completion, determine whether the broken end was in a firm state. The incision site should be strictly cleaned, and negative pressure drainage was conventionally placed. After the surgery, antibiotics injection was performed, and rehabilitation training activities of lower limb function could be carried out two days after surgery.

The surgical indexes of the two groups were observed and compared, including operation time, intraoperative blood loss, incision length and healing time. Meanwhile, the patients were followed up for one year, with their joint recovery status recorded (Zhou et al. 2017). The evaluation was undertaken using Harris score and HSS score records. In addition, the patients' excellent rate of treatment was assessed by knee joint clinical evaluation system, including the four criteria of excellent, good, acceptable and poor (Li 2017). The excellent standard is 91-100 points; good standard is 75-90 points; acceptable standard is 50-74 points; and poor standard is 50 points or less.

## III Personal View

According to the statistics in Table 1 below, by observing and comparing the surgical treatments in the aspects of operation time, intraoperative blood loss, incision length, healing time, the study group shows significant

advantage over the reference group,  $p < 0.05$ , statistically significant.

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

Group	Number of cases	Operation time (h)	Blood loss (ml)	Incision length (cm)	Healing time (month)
Study group	90	1.2±0.9	217.90±11.25	5.5±1.3	2.6±2.1
Reference group	90	3.6±1.2	568.93±10.29	12.9±1.5	12.3±1.8
t		10.28	11.25	16.76	12.38
p		<0.05	<0.05	<0.05	<0.05

The two groups were followed up for one year. The study group has higher excellent rate of treatment than the reference group,  $p < 0.05$ , statistically significant, as shown in Table 2 below. The comparison of 1 patient's CT film before and after treatment is shown in Figure 1 and Figure 2.

**Table 2. Comparison of treatment effects between the two groups [n (%)]**

Group	Excellent	Good	Acceptable	Poor	Excellent rate
Study group (n=90)	56	30	3	1	86 (95.56)
Reference group (n=90)	30	45	10	5	75 (83.33)
X <sup>2</sup>					10.20
p					<0.05



**Fig 1. A patient's preoperative CT film**



**Fig 2. A patient’s postoperative CT film**

As shown in Table 3 below, by observing the patient’s Harris score and HSS score, the results show that the study group is superior to the reference group in both indexes,  $p < 0.05$ , statistically significant.

**Table 3. Comparison of Harris score and HSS score between the two groups ( $\bar{x} \pm s$ )**

Group	Time	Harris score	HSS score
<b>Study group (n=90)</b>	Half a year after surgery	76.50±9.80	92.14±10.52
	One year after surgery	82.35±7.94	95.68±8.06
<b>Reference group (n=90)</b>	Half a year after surgery	62.38±6.80	81.25±9.66
	One year after surgery	66.80±6.72	83.46±10.57

Both distal femur and proximal tibia are cancellous bone covered with a thin layer of cartilage to form part of the joint. Once subjected to high-intensity violent damage, it is prone to form severe comminuted fracture. Meanwhile, the articular surface is also vulnerable to damage. In the case of osteoporosis, internal fixation is less reliable and effective. The implementation of traditional internal fixation surgery for complicated fracture around knee can endanger bone blood supply. Meanwhile, this operation leaves large incision, with massive postoperative and intraoperative blood loss, thus lowering treatment efficacy (Kachaporn and Win 2017).

Minimally invasive internal fixation system has been widely adopted for the treatment of fracture around knee, showing numerous advantages. First, articular surface can be exposed under direct vision, so that it restores normal anatomic form with incision length reduced. Second, broken ends of the fracture will not be exposed, so that blood can be supplied to the broken end. Third, interference with periosteum will be maximally reduced. Meanwhile, bone surface is not oppressed, which promotes periosteum perfusion. Fourth, the steel plate applied during surgery is pure titanium with low elastic modulus, which can well weaken the stress shielding effect, and then boost recovery of osteoporotic bone. Fifth, the minimally invasive internal fixation system is bridge-fixed with more reliable fixation, which can prevent the steel plate from directly contacting the bone interface and lower the pressure on bone interface from the steel plate.

The results of this study show that by comparing the surgical indexes of the two groups, namely operation time, blood loss, incision length and healing time, the study group has obvious advantages compared with the reference group,  $p < 0.05$ ; by comparing excellent rate of treatment between the two groups, the results show that the study group (95.56%) is significantly superior to the reference group (83.33%),  $p < 0.05$ ; in addition, by

observing and comparing postoperative Harris score and HSS score after half a year and one year between the two groups, the results show that the study group score is superior to the reference group,  $p < 0.05$ , which is consistent with relevant research results (Wei 2017).

#### IV Conclusion

In summary, implementation of minimally invasive internal fixation system treatment mode for Taekwondo athletes with complicated fracture around knee can significantly improve treatment efficacy with good safety and reliability, which is worthy of popularization and application. Moreover, treatment of complicated fracture around knee with minimally invasive internal fixation system can promote early healing of patients' joints, showing the advantages of small trauma, fastness, reliability and low infection rate. However, the issue demanding attention is that this surgical procedure has strict operational technical standards, and every orthopedist engaged in this surgery must undergo rigorous training, fully understand its structural principles, and proficiently master the technique. The study has limitations. For example, the enrolled sample size is small, which should be expanded later. There is no prospective comparative study. This paper, a retrospective study, lacks prospective study data. Meanwhile, the follow-up time should be increased, so that long-term treatment efficacy of the treatment regimen can be obtained and more valuable reference can be provided for clinical treatment.

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