

LETTER TO THE EDITOR

Efficacy of LISS Surgery on Complex Bone Fracture around the Knee based on Ecological Cognition

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Objective: To analyze the therapeutic efficacy of LISS surgery on complex bone fracture around the knee. A total of 180 patients definitely diagnosed as complex bone fracture around the knee were enrolled and divided into research group and control group, with 90 cases in each group. The patients of control group were subjected to traditional internal fixation, while those of research group underwent LISS surgery. The therapeutic efficacy was compared between both groups. The perioperative indicators of research group were significantly lower than that of control group ($p < 0.05$). The excellent and good rate of knee function of the research group (95.56%) was markedly higher than that of control group (77.78%) ($p < 0.05$). Compared with the control group, the VAS score and Lysholm knee function score of the research group had more advantages ($p < 0.05$). Application of LISS surgery on complex bone fracture around the knee could exert satisfactory efficacy and promote recovery, which is worthy of popularization.

I Introduction

Chieh-Jen Shieh, Guang-Sheng Wan, Wei Wang, Yuzhou Luo. Buslaev published "An Empirical Study on the Performance Evaluation of Introducing Artificial Intelligence Medical Service System into Medical Ecological Environment" on Issue: 107, Pages: 183-189, Article No: e107074, Year: 2019, in the article, under the advance of time, development of science and technology, and popularity of network, the combination of medical ecological environment and information & communication technology provides diverse medical care services for the public. An artificial intelligence medical service system might be the ideal tool to actualize local aging. According to the results, suggestions are proposed, expecting that medical staff could real-time grasp the physiological state and offer timely assistance to reduce medical costs, promote the quality of life of people in communities, and improve doctor-patient interactive relationship.

At present, there is a gradual increase in severe high-energy injuries, so the number of complex fractures around the knee is constantly rising. We used to adopt traditional surgical measures in the treatment of this disease, including dynamic condylar screws, T-shaped plates, dynamic anatomical plates and retrograde intramedullary nailing (Li 2017). Although the corresponding results can be obtained, postoperative plaster external fixation is adopted due to lack of good firmness, which has certain effect on the functional exercise in the early stage and delay the recovery of knee joint function (Yuan et al. 2016).

With indirect reduction and small incision minimally invasive techniques, LISS reduces the tissue damage and

periosteal destruction around the bone fracture, stabilize and fix the fracture as well as meet the needs of minimally invasive surgery and aesthetics demand (Guo et al. 2016). This technique could produce ideal reduction effect, promote bone healing and the recovery of knee function, relieve pain and reduce postoperative complications (Mocellin et al. 2016). With the continuous development of medical technology, the use of minimally invasive LISS internal fixation to treat complex fractures around the knee (as shown in Figure 1) has been widely practiced. And remarkable results were achieved. This study investigated and analyzed the effect of LISS surgery on complex fractures around the knee joint. The report is listed as follows.



Figure 1. Complex fractures around the knee

II Method

The therapeutic regimen of traditional internal fixation can be seen below. The patients in the control group underwent traditional internal fixation. That is: with the use of several fixed equipment like dynamic condyle screws, T-shaped steel plates and anatomical steel plates, incision was made on the lateral side of patella in patients with distal femoral fractures, while the incision was made on the lateral upper part of the proximal tibia in patients with proximal tibial fractures. The length of incision depends on the length of the fracture and the reduction, which is usually about 10 cm. The skin is cut open, separated layer by layer, and the joint and the fracture segment are fully exposed. Under direct view, anatomical reduction of the fracture is performed. Pay attention to the anatomical reduction of the articular surface, and then follow the type of fracture and apply the best internal fixation. Routine anti-infection treatment was performed for one week after surgery, and drainage tube was placed. If there is a postoperative fracture involving the articular surface, the fixation is not secure. Then 4 weeks of external fixation was performed with plaster, and the knee joint activities are conducted as early as possible (Liu 2014).

The therapeutic regimen of LISS surgery can be seen below. Patients in the research group were treated with LISS surgery. The internal fixation equipment used were the distal femur LISS (LISS-DF) and the proximal tibia LISS (LISS-PT). The LISS-DF fixation technique is as follows: continuous epidural anesthesia was performed, incision was made on the lateral side of patella, the skin and subcutaneous tissue were directly cut open till the extensor support band, and the patella was turned over to expose the articular surface. Then reduction of intra-

articular fractures performed. Under the monitor of the C-arm X-ray machine, the LISS-DF plate was inserted into the soft tissue window between the lateral femoral muscle and the femoral shaft to define the best position. The length of the fracture reduction was determined and the plate was rotated. Correctly place the guide pin (Yi and Liu 2016). When malformation was excluded, about 5 angle-stable locking screws were used to fix the fracture end that close to the articular surface, and 4-5 self-drilling screws were adopted to fix the other end of the fracture. Effective evaluation of fracture reduction and stability as well as full activity for the knee joint were performed to determine whether reliable fixation were obtained or not. The joint capsule was then closed, and the tendon bundle was closed. The skin and the subcutaneous tissue were routinely sutured.

III Results

As shown in Table 1, the perioperative indicators of research group were significantly better than that of control group ($p < 0.05$).

Table 1. Comparison of each surgical indicator between both groups ($\bar{x} \pm s$)

Groups	Surgical Time (h)	Incision Length (cm)	Intraoperative Blood loss (mL)	Healing Time of Bone Fracture (month)
Research group (n=90)	1.40±0.93	5.32±0.12	243.36±94.25	2.1±1.3
Control group (n=90)	2.98±0.84	12.85±1.47	632.21±86.05	10.8±3.2
t	10.28	9.36	22.36	15.73
p	<0.05	<0.05	<0.05	<0.05

As shown in Table 2, the patients of research group had more advantages in life quality over those of control group ($p < 0.05$).

Table 2. Comparison of the life quality indicators between both groups ($\bar{x} \pm s$)

Groups	Mental function	Social function	Body function	Emotional life	Total score
Research group (n=90)	79.80±6.45	80.19±9.04	80.25±7.23	78.05±8.38	80.25±7.03
Control group (n=90)	64.33±7.03	70.26±8.26	65.98±9.26	62.46±9.50	65.48±8.31
t	10.29	8.93	11.22	9.03	8.59
P	<0.05	<0.05	<0.05	<0.05	<0.05

The images of a patient before and after treatment were shown in Figure 2 and Figure 3.



Figure 2. The image before treatment



Figure 3. The image after treatment(postoperative X-ray showed satisfactory result of fracture reduction)

IV Discussion

LISS surgery is a novel therapeutic approach to treat complex fractures around the knee, especially for those difficult to treat with conventional measures. This surgical concept and technique are significantly different from the traditional surgery, which positively change the reduction technique and fixation concept (Saydam et al. 2018). That means more value is attached to the indirect reduction technique. When it comes to articular surface reduction, combination of fracture window technology and fluoroscopy machine would effectively reduce the joint damage. Moreover, due to the emphasis on biological fixation, the articular surface should be dissected but there is no need for anatomical reduction at the junction of the metaphysis and the diaphysis. Meanwhile, the reduction of the metaphysis does not require incision, but the traction and retractor are used to restore the force line, length and rotation of the limb. When the bit line is strictly defined, the LISS fixation is implemented.

The advantages of LISS fixation system in the treatment of complex fractures around the knee include: the distal locking device provides better fixation and distal fracture reduction, which is suitable for fractures in some patients with osteoporosis and those small distal fragments; the device can be placed through the skin and under the muscles, with no needs to extend the scope of soft tissue incision and periosteal dissection, thereby reducing the incidence of soft tissue damage and infection. Moreover, with the techniques of indirect reduction and minimally invasive incision, it reduces the damage of the surrounding tissues and periosteum of the fracture, protects the blood supply of the fracture and its biological environment, satisfies the needs of stabilization and fixation, meets the needs of minimally invasive surgery, and conforms to the pursuit of aesthetics.

The perioperative indicators of research group including surgical time, incision length, intraoperative blood loss, and the healing time of bone fracture were significantly lower than that of control group ($p < 0.05$). The excellent and good rate of knee function of the research group (95.56%) was markedly higher than that of control group (77.78%) ($p < 0.05$). Compared with the control group, the VAS score and Lysholm knee function score of the research group had more advantages ($p < 0.05$). Moreover, the patients of research group had more advantages in life quality over those of control group ($p < 0.05$). The above findings are in line with relevant researches, indicating the effectiveness of LISS surgery on complex bone fracture around the knee.

V Conclusion

In summary, severely comminuted fracture fragments of the distal femur or proximal tibia usually involve the joint surface. And the effective and reliable fixation effect is difficult to obtain by cancellous bone of the

metaphysis, which makes the clinical treatment more difficult. Moreover, the traditional treatment sometimes requires removal of the fracture end, which further aggravates the loss of blood supply in the broken end, delays the healing of bone fracture, and even causes broken nails and broken steel plates. Therefore, it is very important to implement minimally invasive procedure that not only anatomically restores the articular surface well, but also yields effective and reliable internal fixation. The following Aspects Requires attention in LISS internal fixation: detailed imaging examination before surgery to ensure successful reduction; gentle indirect reduction technique to reduce blood vessel damage and vascular and nerve accessory damage; in patients with articular fracture, the knee joint capsule should be cut open and the reduction should be performed under direct view. Moreover, Kirschner wire is used for clinical fixation. In addition, the sample size of this study is small, a larger sample research is required in the future to fully support the results.

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