

LETTER TO THE EDITOR

Arthroscopy-assisted Ecological Medical Treatment in the Treatment of Tibial Plateau fracture in Football Players

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To observe and analyze the therapeutic efficacy of arthroscopy-assisted Ecological medical treatment in the treatment of tibial plateau fracture in football players. A total of 160 football players with tibial plateau fracture treated at our hospital were enrolled. These patients were divided into control group and research group. The patients of the control group underwent traditional surgery while those of the research group were subjected to arthroscopy-assisted Ecological medical treatment. And the therapeutic efficacy was compared. Application of arthroscopy-assisted Ecological medical treatment in the treatment of tibial plateau fracture in football players could significantly improve the total therapeutic efficacy as well as reduce hospital stay and promote recovery.

I Introduction

Xiantao Huang, Keqing Sheng, Yue Hu published “Key Factors Influencing Ecological Operation Risk of Football Sports” on Issue 107, Pages: 3715-3720, Article No: e107414, Year: 2019, in the article, Eco-football sports is one of the favorite subjects of many people, and it is also the best way for young students to vent their physical strength. The football sports ecological movement is full of risks. In view of the major student sports accidents in the country, risk management is bound to become an important issue in school sports management. Therefore, how to reduce the casualties caused by accidental injuries in sports ecological activities is really a subject worthy of my research. In this study, the relevant practitioners of the football sports eco-industry in Hubei Province were selected to conduct the questionnaire survey. In this study, a total of 420 questionnaires were distributed as research samples, and 325 valid questionnaires were collected, with a recovery rate of 77%. The results of the study: In the second level of assessment, the most important facet is “site equipment”, followed by “management strategy” and “other factors”. Among the 14 evaluation indicators, the top five indicators that are most important are: maintenance and repair, protection measures, replacement, natural environment, and risk. Moreover, based on the results, suggestions are proposed, and it is expected that the accidents can be reduced for the football sports ecological activities in China, so that the sports ecological activities can be carried out in a safe and innocent environment.

In knee trauma, tibial plateau fractures are commonly seen. With the impact of an internal/external violent attack on the knee joint, or a compression violence caused by a fall can result in fracture of tibialcondyle. As a

typical intra-articular fracture, the treatment and prognosis of tibial plateau fracture are closely related to knee function. Meanwhile, tibial plateau fractures are often accompanied with injuries in articular cartilage, knee ligament or meniscus (Duru Asiret et al. 2017). Any missed diagnosis or improper treatment may cause knee deformity, force line or stability problems, leading to joint function disorders (Han 2017). Football players have a relatively special occupation. With large amount of exercise, they are prone to tibial plateau fracture. In other words, football player is a high-risk group of this disease.

The tibial plateau is an important load structure of the knee joint. If fracture occurs, the inner and outer platforms will be unevenly stressed, resulting in osteoarthritis. The tibial plateau fracture (shown in Figure 1) is difficult to treat clinically. And the anatomical reduction of the articular surface cannot be done after treatment, thus it may affect the knee joint function to a varied degree (Yang et al. 2016). With the improvement of surgical techniques and surgical instruments, minimally invasive surgical techniques have been recognized and rapidly developed (Hazra et al. 2015). This study observed and analyzed the therapeutic efficacy of arthroscopy-assisted minimally invasive surgery in the treatment of tibial plateau fracture in football players, aiming to provide valuable guidance for clinical treatment. The contents are as follows.



Fig 1. Tibial plateau fracture

II Data and Method

Traditional surgery was applied on patients of the control group. The incision was made on the anteromedial or anterolateral side of the knee, and the tibial plateau and the upper part of the tibia were fully exposed. The joint capsule was transversely cut open under the meniscus, then the meniscus was pulled upward, and the fracture was restored in direct view to maximize the flatness of the plateau joint surface. Bone grafting was performed to repair bone defect. If the patient was complicated with meniscus injury or collateral ligament injury, corresponding repair should be performed. If collapsed fracture occurs, it is necessary to open the window in the anterior cortex of the tibia, and pry the periosteal detacher through the bone window until it is reset. Also, bone grafting was performed to repair bone defect (Chen et al. 2017). Finally, plate screw was used to internally fix the fracture.

Patients underwent Ecological medical treatment under arthroscopy. Combined spinal-epidural anesthesia was performed, then the tourniquet was placed on the knee. The incision was made in anteromedial and anterolateral knee. The joint cavity was flushed and the blood clots were removed from the joint cavity. Follow the arthroscopic examination sequence, check all joint cavities and pay attention to the posterior lateral of the plateau to avoid missed

diagnosis. Observe the injury inside the knee joint cavity, and use the blood pressure tourniquet to stop bleeding. If there was only one or two pieces that lightly collapsed and the fracture blocks were larger, the hook or kirschner wire were applied to restore the collapsed bone block under arthroscopy. When the restore was completed, we drilled a hole with the Picker's needle and tightly fixed with hollow nails, lag screws or absorbable screws. If there was a large collapse or a fracture that is difficult to restore, the incision was made under the tibial plateau under arthroscopy or in combined with C-arm X-ray machine. Before bone grafting, the micro-window was opened on fracture line of the tibial plateau cortex or the on the cortex, then the treatment was performed in the site of fracture. The periosteal detacher and osteotome were used to restore the collapsed platform. If bone grafting is needed, the contralateral iliac bone or the artificial bone is tightly packed and lag screw is used for fixation. For those with severe collapse or injury, the tibial plateau cartilage surface was restored under the arthroscopy, and multiple fine kirschner wires were used parallelly to the tibial plateau for temporarily fixation (Liu et al. 2016). The anatomical proximal tibial locking plate was placed close to the periosteum and inserted into the distal end of the fracture, and the plate screw was inserted into the distal end of the incision percutaneously with minimally invasive technique. For patients with meniscus, medial, lateral ligament or intra-articular ligament injury, the treatment was performed under arthroscopy. When the fracture reduction and fixation were finished, the arthroscopy and the C-arm X-ray machine were used to perform fluoroscopy to observe whether the collapsed joint surface was flat or whether there were any residual bone fragments. If no abnormalities were found, the joint cavity was flushed, a drainage tube was placed, and the incision was sutured layer by layer.

III Results

As shown in Table 1, each surgical index of the research group was significantly better than those of the control group ($p < 0.05$).

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

Groups	Surgical time (min)	Intraoperative bleeding volume (mL)	Post-operative drainage (mL)	Out-of-bed activity time (d)	Hospital stay (d)
Research group (n=80)	80.93±10.25	40.22±7.31	33.10±4.12	3.18±1.02	8.5±0.8
Control group (n=80)	116.89±9.26	65.70±9.03	60.37±3.26	5.93±1.21	12.6±1.2
T	9.03	13.28	20.39	11.20	9.27
P	<0.05	<0.05	<0.05	<0.05	<0.05

As shown in Table 2, The excellent and good rate was the research group was markedly higher than that of the control group ($p < 0.05$). And the image of a patient in the research group before and after treatment was shown in Figure 3 and Figure 4, respectively.



Fig 2. The X-ray before therapy

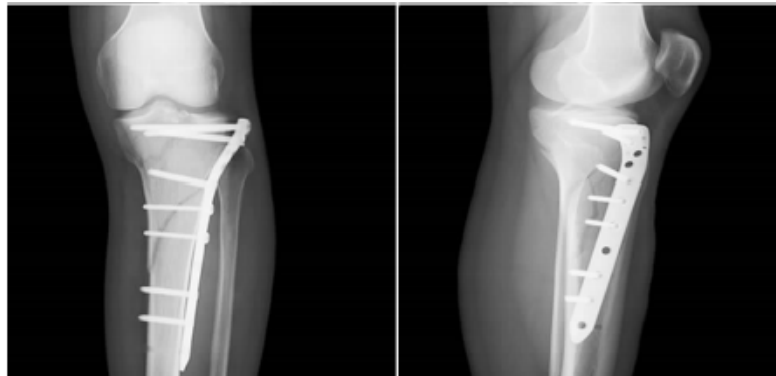


Fig 3. The X-ray after therapy

IV Discussion

Usually caused by high-energy injuries, tibial plateau fractures are rather difficult to treat. Arthroscopy-assisted minimally invasive percutaneous internal fixation has rather good therapeutic efficacy in the treatment of tibial plateau fractures, and it meets the concept of biological fixation and microenvironment protection. There are advantages of arthroscopy-assisted minimally invasive surgery in the treatment of tibial plateau fractures: clear exploration of the fracture state, the extent and position of the articular surface collapse as well as the degree of cartilage damage, etc. Also, it is effective to implant treatment and reduce the incidence of fracture nonunion. Meanwhile, with the help of arthroscopy, we can observe the invisible areas of the naked eye and the structural damage inside the joints that cannot be displayed by X-ray, CT and MRI, reduce the chance of misdiagnosis, minimize the damage of knee joint, satisfy the minimally invasive concept, perform early functional exercise and reduce the incidence of knee joint adhesion and the like. Moreover, we could better place the internal fixation to prevent damage to the articular cartilage and carefully observe the injuries of cruciate ligament, meniscus and joint capsule. Once any damage is observed, direct treatment could be performed. For example, reconstruction therapy can be directly implemented in cruciate ligament injury, partial meniscus resection or trimming could be performed for meniscus injury. With this approach, we can reduce the hospitalization time as well as the complication rate.

Each surgical index (surgical time, bleeding volume, hospital stay, post-operative drainage) of the research group was significantly better than those of the control group ($p < 0.05$). The excellent and good rate was the research

group (93.75%) was markedly higher than that of the control group (75.00%) ($p < 0.05$). Also, the complication rate of the research group was significantly lower than that of the control group ($p < 0.05$). These results fully demonstrated that application of arthroscopy-assisted minimally invasive surgery in the treatment of tibial plateau fracture could yield ideal results, which is in line with relevant researches (Wu et al. 2018).

V Conclusion

To sum up, application of arthroscopy-assisted minimally invasive surgery in the treatment of tibial plateau fracture in football players could significantly improve the total therapeutic efficacy as well as reduce hospital stay and promote recovery, which is worth popularization. Arthroscopy-assisted minimally invasive surgery has more advantages, exerts significant curative effect, and possesses higher safety. However, it is also necessary to strictly follow the surgical indications in order to fully exert the curative effect. In addition, arthroscopic surgery has limitations, mainly reflected as: limited view, the full review of fracture requires other imaging data, especially for the metaphyseal injury. Moreover, it is difficult to deal with comminuted fracture caused by high energy injury or severe joint surface collapse with arthroscopy only. Bone grafting or other biological materials must be implemented. Therefore, there are many things to be aware of. However, given the limited sample size in this study, a larger sample size research should be conducted in the future to fully support our result.

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