

CLINICAL APPLICATION EFFECT OF POSTEROLATERAL APPROACH COMBINED WITH MEDIAL APPROACH FOR THE TREATMENT OF THREE ANKLE FRACTURES

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ABSTRACT

Background: Treatment of the ankle fracture has been debated among orthopedic surgeons. **Objective:** To explore the clinical operation process of the three-ankle fracture patients through the posterolateral approach combined with the medial approach through internal fixation, and analyze its clinical value.

Method: We selected 32 patients who needed three-ankle fracture internal fixation surgery. According to different approaches, they were divided into a control group and an experimental group with 16 cases each. The experimental group was treated with posterolateral approach combined with medial approach. Three ankle fractures, while the control group was treated with traditional approach internal fixation surgery. The total curative effect after surgery, the incidence of postoperative complications, The therapeutic effects of the two surgical methods were compared, and the clinical results were analyzed. **Value.**

Result and Conclusion: The results show that the use of posterolateral combined medial approach internal fixation for the treatment of three ankle fractures will be more helpful to shorten the operation time, reduce postoperative complications, and have an excellent postoperative ankle function score, which has a higher clinical application value.

Keywords: Triankle fracture, Internal fixation surgery, Posterolateral combined medial approach.

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Introduction

The ankle joint, together with the femoral head and the knee joint, is an important part of the formation of the lower limbs, and it is essential to maintain the balance and stability of the human body⁽¹⁾. In daily life, the ankle joint is required to buffer the foot pressure of the human body and walk. Sports activities such as jumping, running and climbing have higher requirements for the motion control of the ankle joint⁽²⁾. The frequent use of the ankle joint in daily life also makes the ankle joint vulnerable to injury. For example, the three-ankle fracture that often occurs in clinical practice is one of

the types of ankle fractures. The three ankles mainly include the medial malleolus, lateral malleolus, and the posterior malleolus formed by the downward extension of the posterior edge of the distal tibia. Three ankle fractures and fractures of different degrees at the same time are called three malleolus fractures⁽³⁾. The three ankles are an important part of the ankle joint. The internal and external ankles are essential to maintain the integrity and stability of the ankle joint⁽⁴⁾. Studies have shown that when a quarter of the posterior ankle fracture fragment occurs on the articular surface, the pressure distribution on the articular surface is very likely to change⁽⁵⁾. The normal anatomical structure of the ankle point is

destroyed after a three-ankle fracture. Under normal physiological conditions, the ankle joint bears almost all of the body's gravity. Therefore, once a patient has a three-ankle fracture, it will not only affect normal walking and life, but also cause certain physical and mental effects. harm⁽⁶⁾. Treatment methods are divided into conservative treatment and surgical treatment. Regardless of the treatment method, if it is not handled properly, it can lead to malunion of the fracture end, which will have a greater impact on the patient's future work and life⁽⁷⁾. Conservative treatment is closed reduction with bone setting, and external fixation with splint, plaster, and functional brace at the same time. This method is low in cost, less traumatic, easy to operate, less painful for the patient, and fast fracture healing, but there is the possibility of loss of reduction. Once the patient's ankle joint is reset, it will cause secondary injury to the patient's ankle joint, which will seriously affect the patient Quality of life⁽⁸⁾.

At present, the effective method for the treatment of three ankle fractures is internal fixation with steel plate and screws. However, the surgical approach is clinically controversial. Different surgical approaches have different therapeutic effects. Traditional internal fixation surgery has large trauma and poor fixation effect. The reduction and fixation of the fracture site is more laborious. If the reduction is difficult, the posterior joint capsule needs to be cut, which will cause greater damage to the local blood⁽⁹⁾. Studies have found that the posterolateral combined medial approach can fully expose the posterior ankle and perform reduction under direct vision when the three ankle joint fractures are treated by internal fixation⁽¹⁰⁾. In this study, 32 patients who came to our hospital for internal fixation of three ankle fractures were treated with traditional approach internal fixation surgery and posterolateral combined medial approach internal fixation surgery respectively, and the treatment results were analyzed in order to explore the different surgical procedures.

Methods

Patients undergoing internal fixation for three-ankle fractures were divided into a control group and an observation group according to different surgical approaches, with 16 cases in each group. The causes of injuries in the control group and observation group were mostly traffic accidents, falls from heights, falls and sprains. The control group and the observation group were compared in terms of gender, age, cause

of injury, Lauge-Hansen classification, etc. There was no statistical difference ($P>0.05$).

All patients were anesthetized with epidural or combined spinal and epidural anesthesia. Control group patients: for medial malleolus fractures, an arc-shaped incision is made at the front or back of the ankle bone, and the fracture site is fixed with screws. For lateral malleolus fractures, a standard lateral longitudinal incision was used, and an anatomical plate was used to fix the fracture site. Posterior malleolus fractures are treated with indirect reduction. Screws are inserted backward from a small incision in the front of the joint to fix the posterior malleolus.

Observation group: A longitudinal incision was made along the midpoint of the lateral malleolus and Achilles tendon, and part of the peroneal brevis muscle was peeled off the back of the lateral malleolus. The fractured part of the lateral malleolus will be exposed, and select the appropriate size 1/3 tube steel plate or reconstruction plate is placed on the back of the fibula and fixed with screws; the posterior malleolus fracture is exposed from the gap between the peroneus brevis and the flexor pollicis longus. The surface is flat, and the lag screw or support plate is selected according to the size of the fracture and the degree of comminution. Do not change the position at this time, make a curved incision on the anterior or posterior side of the medial malleolus, and use screws to fix the fractured part of the posterior malleolus under direct vision.

Results

All patients were diagnosed with three ankle fractures through medical history and imaging examinations (Figure 1-2).

In the observation group, the amount of bleeding during the operation, the operation time, the time in bed after the operation, the time to get out of bed, and the time required for fracture healing were all significantly reduced. The results are shown in Table 1.

The incidence of postoperative complications in the observation group was significantly lower than that in the control group, as shown in Table 2.

Follow-up for half a year after the operation, observe and compare the recovery of ankle joint function between the two groups. Biard-Jackson ankle joint scoring system was used to comprehensively evaluate the recovery of ankle joint function, and the four levels were: excellent,

good, fair, and poor. The excellent and good rate of ankle joint function in the observation group was significantly higher than that in the control group ($P < 0.05$) as shown in Table 3.

During the follow-up, we found that the X-ray film of the patient after the operation showed that the internal fixation was in place and the fracture was well reduced (Figure 3).



Figure 1: Three-ankle fracture front and side view shows obvious displacement of the ankle joint surface with subluxation of the ankle joint.



Figure 2: 3Dct shows that the fractured ends of the medial malleolus are comminuted, the fractures of the lateral malleolus are slightly displaced, and the posterior malleolus is significantly displaced.

Group	Intraoperative blood loss (ml)	operation time (min)	Fracture healing time (d)	Weight-bearing time to get out of bed (d)	Postoperative bed time (d)
Control group	85.26±11.12	65.63±8.64	145.34±16.13	133.22±20.34	7.56±1.24
Observation group	56.58±10.21	45.98±7.86	97.49±16.45	113.25±13.41	4.10±0.87
t	11.31	6.40	12.17	8.69	8.17
P	0.00	0.00	0.00	0.00	0.00

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

Group	Number of cases	Incision infection	Limb numbness	Total incidence
Control group	16	0	0	0
Observation group	16	2(12.5)	2(12.5)	4(25)
χ^2				7.03
P				<0.05

Table 2: Comparison of complications between the two groups [n(%)].

Group	Number of cases	Excellent	Good	generally	Difference	Excellent rate
Control group	16	10	3	2	1	13(81.25%)
Observation group	16	7	3	3	3	10(62.5%)
χ^2						4.33
P						0.03

Table 3: Comparison of ankle function recovery between the two groups [n(%)].



Figure 3: After internal fixation of three ankle fractures with steel plate, see the fractured ends are well aligned and the articular surface is anatomically reduced, and the internal fixation is reliable.

Discussion

The ankle joint often plays a heavy-bearing role in human body functions. Once a fracture occurs, it will seriously affect the patient's motor function and self-care ability, and it will also adversely affect the patient's mental state^(11,12). The common type of ankle fracture in clinic is the three-ankle fracture. There are many factors that cause the three-ankle fracture, such as traffic accidents, falls from high altitude, etc. Clinically, it is very necessary for the treatment of three ankle fractures. Langenhuijsen et al⁽¹³⁾ Studies have shown that as long as the posterior ankle fracture exceeds 10% of the distal articular surface, reduction and fixation are performed, otherwise the weight-bearing area of the ankle joint will be reduced. At the same time, three ankle fractures have the characteristics of complex injury mechanism, severe injury symptoms, special anatomical structure, and high reduction requirements. In the course of treatment, it is difficult to restore the fractured end with simple plaster fixation⁽¹⁴⁾.

All these make the treatment of three ankle fractures have many difficulties, and improper treatment can lead to the occurrence of traumatic arthritis. The purpose of three-ankle fracture treatment is to maximize the function of the ankle joint, make it anatomically reset as much as possible, and carry out reliable fixation, so that the patient

can perform functional exercises early after the operation and promote the recovery of the ankle joint function. Currently, internal fixation is commonly used to treat ankle fractures⁽¹⁵⁾. Three malleolus fractures involve 3 plane bone injuries (posterior malleolus, lateral malleolus, and medial malleolus). During the treatment, all three planes of bone need to be reduced and fixed. Medial malleolus fractures usually use a medial arc incision. In the treatment of lateral malleolus and posterior malleolus fractures, the choice of surgical approach has always been controversial^(15,16).

The traditional approach is to adopt a lateral approach to reduce and fix the lateral malleolus. Fractures of the posterior malleolus cannot be fixed under direct vision. Screws are used from front to back in front of the ankle joint. Fixation, this method can only expose the posterior malleolus fracture from one side, and cannot fully expose the blastocyst end joints, and due to the traction of the posterior joint capsule, the posterior malleolus fractures are often displaced proximally. If reduction is difficult, it needs to be incised. Joint capsule, which breaks the local blood greatly⁽⁹⁾. In addition, because this method is not operated under direct vision, in addition to poor reduction, it is also easy to damage the nerves, blood vessels and tendons in front of the ankle joint⁽⁹⁾.

Posterior malleolus fractures are mostly located on the posterior side of the tibia, and a small part are located on the posterior side. Therefore, it is difficult to expose and fix the fracture from the anterolateral, medial and posterior side. The posterolateral median arc incision can fully expose the lateral malleolus and posterior malleolus, and no important nerves and blood vessels pass through^(9,17). Heim reported 60 cases of three ankle fractures treated with surgery, 30 of which were treated with this method and he found that this method would be more beneficial to treat patients with severe posterior ankle fractures⁽¹⁸⁾. Talbot uses a posterolateral approach to treat posterior ankle fractures. This method allows the operator to directly explore articular cartilage fragments and talar cartilage or compression injuries, and the treatment effect is better⁽¹⁹⁾. In addition, the posterolateral approach has the advantage of direct visualization, which will allow the inspection of joints for osteochondral fragments, talar cartilage damage or impaction damage, while the fracture can be directly removed during the operation, and the intermediate callus or periosteum can be removed. Once again promote

anatomical joint reduction⁽²⁰⁾.

Therefore, the posterolateral surgical approach will be more conducive to the treatment of the lateral malleolus and posterior malleolus fractures in the three-ankle fracture. In this study, we used posterolateral combined medial approach internal fixation surgery to treat three ankle fractures, and achieved good clinical treatment results. The results showed that the weight-bearing time to get out of bed, postoperative bed time, operation time, intraoperative blood loss, and fracture healing time for patients with three ankle joint fractures treated by posterolateral and medial approach internal fixation were significantly lower than those of traditional approaches. At the same time, the incidence of complications in the observation group was significantly lower, and the rate of excellent ankle function was significantly higher. These results show that three ankle fractures are treated with posterolateral combined medial approach internal fixation surgery, which is less traumatic, helps shorten the operation time, promotes the patient's early recovery, improves the ankle joint function, and reduces postoperative complications.

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