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Effect of Reduction and Fixation of Posterior Malleolus Fracture on The Stability of Ankle Fracture with Dislocation

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Abstract

Objective: To compare the effect of internal fixation of posterior malleolar fracture with ankle fracture and investigate the effect of posterior malleolar fracture fixation on ankle stability.

Methods: Operation was performed on 56 patients with ankle fractures involving the posterior malleolar, 36 cases were treated with posterior malleolar fixation (posterior malleolar internal fixation group), and 20 cases were treated without posterior malleolar surgery (posterior malleolar non-fixation group). The results were compared and scored with Olenud-Molander ankle function scoring system.

Results: 56 patients were followed up for 12~36 months. One patient with open wound of each group was infected with superficial soft tissue before surgery, completely healed after anti-infection and transposition. All ankle fractures were healed. 5 cases in posterior malleolar non-fixation group were not recovered eventfully after operation, and the ankle joint was completely restored after subsequent fixation. One year after the operation, Olenud-Molander ankle function scoring system was graded: posterior malleolar fixation group: 24 cases in excellent, 10 cases in good, 2 cases in fair, and the excellent-good rate was 94. 44% (34/36); posterior malleolar non-fixation group: 8 cases in excellent, 10 cases in good, 2 cases in fair, the excellent-good rate was 90.00% (18/20).

Conclusions: Reduction and fixation of posterior malleolar fracture has an effect on stability of ankle joint. Attention should be paid to the management of posterior malleolus fracture

Key words: posterior malleolar fractures; fixation; stability

Introduction

In clinical practice, ankle fractures are normal and challenging to manage. It is also unclear whether ankle joint injuries of posterior malleolus injuries ought to be corrected and minimized [1]. 56 post-ankle fracture victims, whether 36 cases whether 20 cases, were handled in our clinic respectively, from January 2012 to April 2016, using posterior ankle fracture fixation and non-fixation. Meanwhile, both approaches were contrasted for their usefulness. That is how the study went.

1 materials and methods

1.1 Case data

56 participants, 32 males and 24 females, aged17 and 43 years, were included in the present research. On the left side there were 22 and on the right side there were 34 instances. Sources of accidents: 28 road incidents, 18 car accidents, sprains and 10 severe injuries. Sources of accident Forty cases have been diagnosed and 16 incidents have been active fractures. Supination of form of spiritual and external rotation: 1 degree, 4 degrees, 8 degrees of degree, 8 degrés of degree of degree III, 8 degrees of degrees of degree IV, 6 degrés of degree II, 3 degreed cases of degree III, 7 degrees of degrés III, and 8 IV-degree cases of degrés of pronation and external rotation. Six patients received Category III pronation kidnapping. Thirty-six patients had concurrent malleolus reduction and internal fixing and 20 had non-surgical (posterior malleolus no-fixation group) therapy. Within 8 hours of injuries both open fractures were treated, and the time between the closed fracture diagnosis

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and treatment was between 2 and 12 days.

1.2 Preoperative treatment

Emergency cases were handled as an emergency procedure. The ankle joint can be attempted before plaster fixation in patients who are having lective treatment, elevated arms, wear relaxing boots or local ice compress. At the same moment, the patient obtained vomiting, debumescence and other prescriptions, accompanied by operation after swelling and the skin wrinkling.

1.3 Operation technique

In the rear Malleolus internal connection group, the prone position was used and in the rear Malleolus non-fixing category the supine position was hired. The two groups initially manually adjusted their ankles to a stable location under spinal anesthetics. The bottom section of the fibula was mostly fastened in the back non-fixing community malleolus, repaired the fibula length as much as possible, which could be fastened to a frame, whilst the media malleolus was fastened with tension screws. In the back maleolar fixation community the back maleolar fastening behind peroneus longus and flexor pollicis longus muscle was subjected to a posterolateral incision, aside from the above-mentioned media and lateral malleolar fastening. The surgeon should also be vigilant to safeguard the sural nerve, show Volkmann's tuber and tibiofibular posterior ligament, plantarflect the foot, clear vision decreases of the posterior mallo and K-Wire temporarily connection. A strong decrease in the back malleolar bone block was verified by C-arm fluoroscopy and the cannulae screws or plate was provided for fixing. The incision tissue should be secured after an open wound and primary shutdown should be carried out if primary shutdown is necessary. 1 case of open wound was on the wound surface of the medial malleolus in the post-malleolus fixation community, and local transfer flap fixation was done in the second level. Drainage tubes have been inserted following treatment in both incisions.

1.4 postoperative management

Both patients with external plaster fixation were fixed in the neutral ankle role. Antibiotics are given normal for 2 days, but for a longer time Open Wound Antibiotics are given. Drain was replaced with less than 20 ml / day drainage rate. On the second day following service, active and passive practical door forging was initiated. Successful foot and ankle bending and plantar bending exercises were undertaken 2 to 3 weeks after treatment, following the removal of plaster. Radiographs have been taken to assess the clinical exert and to monitor radiographic outcomes at 1, 3 and 5 months after surgery. In the case that the distal tibiofibular condition has been repaired, the screws must be withdrawn within 3 months of procedure. One year after the procedure, a performance on the Olenud-Molander knee-scoring method was calculated and given.

2 Results

The follow-up period varying from 12 to 36 months was observed in both cases. One patient in each category had bad states of skin, soft tissues and postoperative superficial incision, which were completely cured after an anti-infection and improvements in the dressing. The fractures healed in 35 cases in the reverse internal malleolus and in 19 cases in the immediate non-fixation malleolus. After 18 months of therapy, an extra patient in the post-malleolus fixation community had been treated and a post-malleolus condition had recovered after 15 months of care. Five patients were unable entirely to eliminate the tibiotalary joint and the prior displacement of the talus in the posterior non-fixation malleolus community. The second post maleolus reduction and repair is done to achieve full repositioning and cure of the ankle joint. Table 1 displays Olenud-Molander ankle feature levels of both classes of 1 year following surgery. The outstanding incidence of posterior malleolus internal fixation was greater than that of the posterior Malleolus non-fixing community and statistically meaningful (P<0.05). The variations were not meaningful. Fig 1 displayed a common scenario.

Table 1. **Comparison of ankle joint function between the two groups 1 year after operation (number)**

Group	Total	Excellent	Good	Fair	Excellent-good rate (%)
Posterior malleolus internal fixation	36	24	10	2	34/36(94.44)
Posterior malleolus non-fixation	20	8	10	2	18/20(90.00)
χ 2 value					0.416
P value					0.008

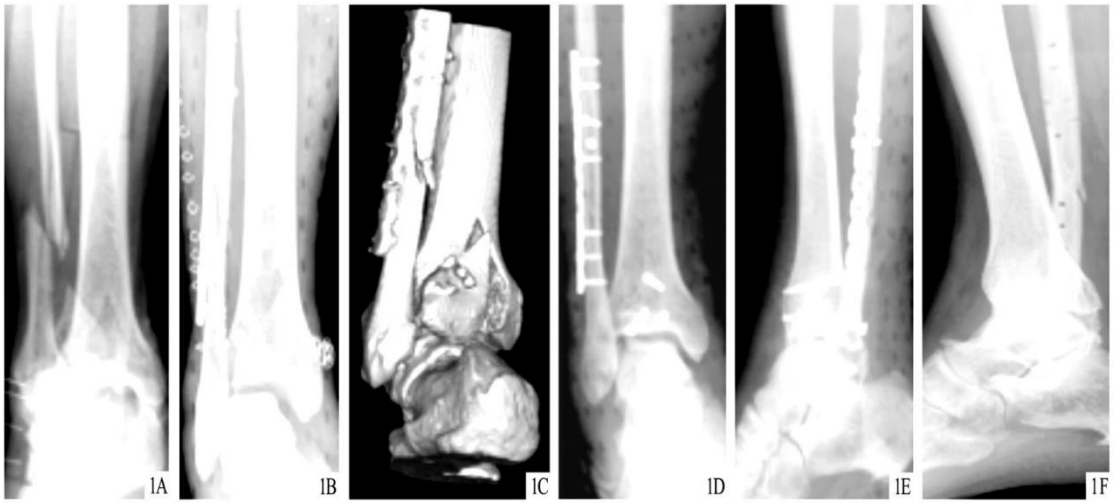

Figure 1. **Reduced and internal fixing was administered to a patient (52 years old, male) with open dislocation of his right leg and trimalleolar fracture.**

A. The preoperative anti-operative X-ray reveals a trimalleolar fracture and a lateral dislocation of the foot.
A, C. A, C. Increased medial malleolus and a non-reduction of a significant portion of back malleolus were seen in X-ray and CT respectively three days after an emergency surgery without internal fixation.
D. 3 days after second ankle fixation, usual ankle point was seen in x-ray;
E, F. The posterior malleolus, fracture recovery, and in-situ ankle exclusion were seen goodly at 1 year after the second surgery. In the posterior X ray a promising reduction was found.

3 Discussion

3.1 Significance of posterior malleolus fracture fixation

The ankle joint is a system made of ligaments, soft tissues and osteograms secure by incorporation. Posterior malleolus is the binding point to the posterior tibiofibular ligament and to the cross tibiofibular ligament, which preserves the integrity of the lower tibiofibular joint and cavity of the ankle along with the lateral and posterior malleoli, which are essential to protect the structural anatomy and flexibility of the ankle joint[2]. This is called Volc-mann tubercle. There is actually no universal assessment norm for treating post-maleolar fractures of ankle fractures. Harper et al. (1990) and Raasch et al. (1992) assumed that if the lateral malleolus has been fixed properly, the talus would not be moved afterwards, particularly though the posterior malleolus has been moved. However, tibiotalar balance plays a significant part in human weight and movement. The survey reveals that if only the anterior, lateral and syndesmostic malleolus is set and not adequately decreased and repaired the posterior malleolus, the reduction or absence of the posterior malleolus block would result in lowering of the contact region of the tibiotalar joint, an rise in tibiotalar joint strain per unit level, and a modification of the weight bearing field. Moreover, long-term wear contributes to increased articular cartilage and subchondral bone injury, resulting in functional obstruction of ankle joint and secondary traumas, which has significant implications for patients ' quality of life. Furthermore, the therapeutic success of the fracture is greater even though the posterior malleolus arises [5]. The repair and rehabilitation of the posterior maleolar fracture must also be improved.

3.2 Pointer for fixation of posterior malleolus fracture

Mackot et al. concluded that the ankle joint flexibility relies primarily on the tibiotal joint 's touch region, specifically the weight-bearing portion of the ankle joint. After numerous biomechanical researches, several researchers consider about 25 per cent of the joint surface to be a gold norm for post-malleolus fractures when it comes to the extent of the posterior malleolar fraction that has to be fixed [6]. Some scientists often assume that surgical repair should be suggested if the joint surface reaches 10 percent, so tibiotalar articulation tension allows the fragment post-malleolus fracture to roll back and up quickly. This irregular movements appear to take place a phase on the distal tibial joint surface and impact

tibiotalar articular stress distribution that results in ankle pain and traumatic ankle Arthritis. Accorde with several researchers and our own clinical practice, we feel it important to obtain a reduction of opening as well as internal connection as much as possible of anatomical smoothness, where the posterior maleolar fragment reaches 25% of the articular surface of the distal tibias, with or without a displacement of more than 2 mm. Tibiofibular fixation of the ankle joint may be used if necessary to improve the overall flexibility of the ankle joint. However, resulting malleolar fractures can be accidental if the postponal bone mass is minimal and less than 5 mm from the distal tibia fracture surface is displaced

3.3 Association of the posterior malleolus with the inferior tibiofibula

The back lower tibiofibular ligament and the inferior transverse tibiofibular ligament both join the distal postteromedial tibia and hold the distals distal tibia intact along with the lateral and posterior tibios. Post maleolar fractures may happen when the talus impacts the posterior maleolus or tibiofibular ligament in the posterior maleolus, which is pushed by external forces. Gardner et al . [7] considered that the decrease and fixation of the posterior maleolars could improve the stability of the tibiofibular articulation. Three instances of syndesmoses fixation in the rear malleolar connection were reported in the current trial, primarily because of the deltoid ligament tear ankle fractures. In the back malleolus unfixed group there were 6 tibiofibular syndesmosis fixations which was considerably superior to those from the rear malleolar fixation community. When it comes to the reasons that the inferior tibiofibular syndesmosis must be corrected, most researchers claim that if the deltoid ligament damage or the surgical palleolus is not securely set, the inferior tibiofibular syndesmosis must be adjusted to fibular fractures; if the fibular fracture is 3.0/4.5 cm above the horizontal s;

3. 4 Treatment of complications

In the subsequent non-fixing malleolus community, 5 patients had incomplete reduction of tibiotalar joint following surgery and reported subluxation. However, during the second reduction and repair of posterior maleolus the ankle joint was diminished and healed entirely. In one case, the skin and soft tissue conditions in each patient were weak and postoperatively superficial wound infections were fully treated following an anti-infection and dressing change ...

3. 5 Study experience

Detailed radiograph examination before operation is required in patients with ankle fractures associated with recurrent malleolus fractures. In order for certain patients to thoroughly evaluate the secure nature of the mass, three-dimensional ankle CT should also be performed and the MRI analysis is also required. In either case it is preferable to minimize the size and screw connection of the rear malleolus, even where the rear malleolus block is thin, if the rear malleolus is positioned in the equal condition and the articular surface of the rear tibia is less than 10%. In this research, all 36 patients in the posterior malleolus Internal Fixation Community were used for deferred incision and in one incision the pre- and deferred methods were used. The lateral malleolus first was repositioned and set from the anterior approach of the muscle peroneal longus, and then the gap between the muscle peroneal longus and the muscle flexor pollicis longus. The bone block and back tibiofibular ligament of the posterior malleolus may be shown well through these techniques. Based on bone block size, the screw or buttress plate connection is chosen. If a back tibiofibular ligament trauma is noticed during surgery, even after fixation the back malleolus stays fragile, the lower tibiofibular screw fastening can be inserted. The literature shows the disparity in usefulness for selecting the internal fixing of the posterior malleolar fractures, either cannulate screws or no slip sheets. The resulting malleolar fractures with an articular surface presence above 25 percent are considered to be better repaired with plates and to be of greater long-term effectiveness than screw fixing [8-10].

In conclusion we find that post-malleolar fractures have an impact on ankle stabilization by contrasting or not the effectiveness of internal fixation of post-malleolar fractures and we can pay attention to the treatment of posterior malleolar fractures.

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