

## Functional Comparison of Immediate and Late Weight Bearing after Ankle Bimalleolar Fracture Surgery

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**Abstract:** *Aim:* The aim of the study is to compare immediate weight bearing with below-knee cast or immobilization with plaster splint in 6 weeks in patients after operative treatment for ankle bimalleolar fractures.

*Methods:* Fifty-three patients with ankle bimalleolar fractures were treated operatively in 2005 to 2010 and then were randomly allocated to two groups. Immediately weight bearing in a below-knee cast (26 patients) and immobilization in a plaster splint for the first six postoperative weeks (27 patients). A mean age 37.9 (min 17; max 72). An average follow-up 26.1 months. (min 14; max 55). All fractures were classified with Lauge-Hansen classification. Functional results of both groups were evaluated with AOFAS for the postoperative one year after surgical treatment.

*Results:* According to the AOFAS scoring system, results were excellent and good in 17 patients in group 1. On the other hand, results were excellent and good in 14 patients in group 2.

*Conclusion:* As a result we think that weight bearing protocol should be advantaged for patients with ankle bimalleolar fractures after surgical treatment immediately.

**Keywords:** Ankle fracture, cast, degenerative arthritis, immobilization, surgery, weight bearing.

### INTRODUCTION

Bimalleolar ankle fractures are one of the most common fractures of orthopaedic surgery. They are often treated surgically [1]. Functional success of bimalleolar ankle fractures after surgery depends on surgical method and post-operative rehabilitation [1, 2]. There are different approaches for weight bearing after surgery [3-5]. Casting is often preferred after surgical treatment of ankle fractures and it gives confidence to the surgeon in terms of the risk of loss of reduction [6].

Immediate weight bearing has many advantages such as gaining a good range of motion, decreasing risk of soft tissue atrophy and osteoporosis [2, 7-11].

In our study, we compared functional results of patients who had taken weight bearing with below-knee cast after bimalleolar ankle surgery immediately with functional results of patients who took immobilization with plaster splint for 6 weeks after ankle bimalleolar fractures [9].

### MATERIAL AND METHODS

Eighty five patients underwent surgery due to bimalleolar ankle fracture between years 2005 - 2010 and fifty three patients who participated in the study were retrospectively evaluated. Patients who had immediate weight bearing in a below-knee cast (26 patients, 17 male and 9 female) were in group 1 and immobilization in a plaster splint for the first six postoperative weeks (27 patients, 13 male and 14 female ) were in group 2. The mean age was 35.9 (min 16; max 64) in group 1 and 39.9 (min 19; max 72) in group 2. Average follow-up was 26.1 months. (min 14; max 55). All fractures were classified according to Weber and Lauge-Hansen classification systems (Table 1). Functional results of both groups were evaluated with AOFAS after one year from surgical treatment.

Bimalleolar ankle fracture with additional fracture of any other part of body, patient with systemic diseases, the isolated lateral malleolus, medial malleolus or trimalleolar ankle fracture and patients with open fractures were excluded from the study. Patients underwent surgery after on an average of 1.3 days (min 1, max 4) following fracture. In the group 1, 5 patients received general anesthesia. Spinal anesthesia was administered to 17 patients and the peripheral block anesthesia was administered to 4 patients. In the group

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**Table 1. Fractures were identified according to Weber and Lauge-Hansen classification.**

	Weber			Lauge- Hansen			
	Type A	Type B	Type C	SER	PER	SAD	PAB
<b>Immediate weight bearing</b>	4	8	14	13	7	5	1
<b>Late weight bearing</b>	3	17	7	14	6	6	1

SER: Supination-external rotation.  
 PER: Pronation-external rotation.  
 SAD: Supination-Adduction.  
 PAB: Pronation-abduction.

2, 3 patients received general anesthesia. Spinal anesthesia was administered to 18 patients and the peripheral block anesthesia was administered to 6 patients. Operations have been performed by different surgeons. We used semitubular plate, anatomical distal fibula plate, K wire for lateral malleolar fracture and malleolar screws or tension band technique for medial malleolar fracture. A transfixation screw was used from lateral to medial and from the posterior to anterior with 30 degree angles for the patient who had a syndesmotic injury according to radiological examination during surgery. We removed the transfixation screws after 6-8 weeks, postoperatively under local anesthesia. No screw breakage was seen during follow-up.

Patients were discharged from hospital postoperatively first day except some patients, who were discharged at surgical site with extreme pain, or anesthesia-related complications.

Short leg cast was done after surgery in the first group and they were allowed to bear weight at the first postoperative first day as much as they could tolerate. Plaster bandages and stitches up procedure were performed by opening a window at the cast. A short-leg splint was applied to the second group postoperatively and they were not allowed to bear weight for 6 weeks. Sutures were received at the postoperative 15<sup>th</sup> day in both groups.

Patients were called and seen at the outpatient department for control at the 15<sup>th</sup> days, 1<sup>st</sup>, 3<sup>rd</sup>, 6<sup>th</sup> months, 1<sup>st</sup> year and 18<sup>th</sup> months postoperatively. Mean follow-up was 26.1 (14-55) months. Patients' ankle anteroposterior, lateral, and mortise radiographs were taken at each control and fracture callus formation were examined radiologically. The patients were also assessed for early or late superficial and deep tissue infection in the surgical area, fracture nonunion, delayed and malunion. At the end of the first year, the functional assessment of patients was performed according to the AOFAS scoring system. All data were analyzed according to the Mann Whitney U statistical method.

**RESULTS**

Union was achieved at all patients in both groups. In the early period, superficial skin infection at the incision site was identified in 2 patients in group 1 and 4 patients in group 2 and treated with daily dressing and antibiotics. None of the patients show delayed union or malunion. However, demineralization and degenerative arthritis were detected radiologically in 7 patients in group 2 (13%) and 3 patients in group 2 (11%). According to the AOFAS scoring system, results were excellent in 3, good in 14, moderate in 7, and

poor in 2 patients in group 1. On the other hand, results were excellent in 3, good in 11, moderate in 11, and poor in 2 patients in group 1.

**DISCUSSION**

The main objective of surgical treatment of bimalleolar ankle fractures is gaining a stable fixation with open reduction and internal fixation and so providing painless and functional ankle motion and early return to work and daily activities [2, 3]. There are various approaches for early weighting after surgical treatment of bimalleolar ankle fractures [2-5, 12, 13].

There are several studies emphasizing the importance of postoperatively early weight bearing. In these studies, partial weight bearing was given in a short leg cast or ankle foot orthoses at early stage and [2, 4, 6, 8, 14] full load after 1-2 weeks of immobilization [15-18]. Dogra *et al.* compared early non-weightbearing ankle mobilization with ankle immobilization following surgical treatment of bimalleolar ankle fractures. At 3 months there was no significant difference between the two groups in the range of ankle movements or pain. There was however a significant difference in the gait pattern with a higher proportion of cases in the early ankle mobilization group having a symmetrical gait [2]. Ahl *et al.* gave early and late loading after treatment of trimalleolar and bimalleolar ankle fracture and they compared the two groups and did not detect any functional differences [13]. Cimino *et al.* prospectively investigated the effect of early mobilization and unrestricted weight bearing on final ankle motion in 51 operatively stabilized ankle fractures. Patients were treated with an ankle-foot orthosis (AFO) or a cast. Full weight bearing was unrestricted in both groups. The results of this series indicate that early motion of a fractured ankle treated operatively does not affect ankle motion. Early motion is not associated with increased morbidity or loss of reduction [19]. We immediately allowed patients to load up as much as they can tolerate in a short leg cast. In our series, function and subjective evaluations were performed by the AOFAS scoring system and statistically significant differences were not found and the results were consistent with the results of Dogra *et al.* [2]. However, late load bearing after surgery due to bimalleolar fractures increases the incidence of degenerative arthritis more than we can see in the case of early load bearing. On the other hand, early load bearing helps the patients to overcome the psychological trauma of surgery and to return to the daily activities earlier. With this method, the loss of labor and the cost of treatment will be reduced to a minimum level.

Postoperative swelling, pain and joint movements, rigidity incidence is changing from 2% up to 60% and there is no significant differences between the early full or partial weight bearing and after a certain period of immobilization [2, 13, 14]. In our study, while the pain and swelling were seen in 7 patients (26%) in group 1 in 8 patients (31%). There was no advantage in preventing the pain and swelling between groups ( $p < 0.001$ ).

In case of increased duration of postoperative immobilization, the frequency of occurrence of the demineralization, posttraumatic osteoarthritis, cartilage damage, and Sudeck's atrophy increase [5, 7, 16]. Also Salter *et al.* show that the early load bearing and mobilization contribute to the healing of articular cartilage very positively [20]. Although our study does not have a significant difference in the long term, it is accepted generally in literature that early mobilization after fracture treatment is effective in the prevention of degenerative changes [16, 21, 22].

Two other advantages of starting early load bearing are decreased postoperative incidence of thromboembolism and minimized use of low-molecular-weight heparin [18, 19, 22].

Operations by different surgeons, non-standardized surgical techniques and follow-up methods are the limitations of our study. However, there was no significant difference between two groups according to surgical techniques and used materials.

As a result, our goal is to prevent the late return to work and daily activities in these patients and sudeck atrophy due to long immobilization with early weight bearing. However, a significant difference was not demonstrated in our study in this respect. Therefore full load immediately after surgery and early return to their daily activities are the main consequences which can be drawn from our study.

## CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

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