

# Impact of Initial Immobilization on Outcomes in Unstable Weber B Ankle Fractures: A Retrospective Cohort Study

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## INTRODUCTION:

Patients with Weber B ankle fractures and medial clear space (MCS) widening on stress radiographs represent a subset of unstable ankle injuries that may require surgical stabilization. Initial emergency department management varies, with patients receiving a cast or splint after reduction. It remains unclear whether splint or cast immobilization affects clinical or radiographic outcomes. This study examines whether the initial method of immobilization in unstable Weber B ankle fractures influences MCS measurements—particularly in relation to the 4 mm threshold for surgical decision-making—as well as the need for operative intervention and complication rates.

## METHODS:

We retrospectively reviewed 295 patients treated for Weber B ankle fractures between January 1, 2017 and February 15, 2025. Inclusion criteria were age  $\geq 18$ , isolated fibular fracture with MCS widening on external rotation stress radiographs indicating syndesmotic instability, and three-view ankle x-ray imaging data at initial, post-reduction, and follow-up time points. Patients with bimalleolar or trimalleolar fractures were excluded. We compared MCS values, surgical rates, reduction attempts, and complications across initial immobilization types. Statistical analysis included t-tests and chi-square tests, with  $p < 0.05$  considered statistically significant.

## RESULTS:

Of the 96 unstable Weber B patients who were eligible, 74 were casted and 22 splinted. The mean age of the cohort was  $54 \pm 16$  years; 56% were female. Diabetes and active smoking were present in 19% and 20% of patients, respectively. There were no significant differences in age ( $p = 0.45$ ), sex ( $p = 0.10$ ), diabetes prevalence ( $p = 0.94$ ), or smoking status (0.69) between casted and splinted groups, indicating comparable baseline characteristics.

There was no significant difference in surgical rates between casted and splinted patients ( $p = 0.34$ ). Initial pre-reduction MCS values were not significantly different between groups (6.73 mm vs. 7.09 mm,  $p = 0.71$ ), nor were the number of attempts to achieve reduction in casted versus splinted patients ( $p = 0.19$ ). However, post-reduction MCS was significantly smaller in the cast group compared to the splint group (2.79 vs. 3.41 mm,  $p < 0.01$ ), and follow-up MCS remained significantly lower in the cast group (2.73 mm vs. 4.14 mm,  $p < 0.01$ ). While the change in MCS from initial injury to post-reduction did not differ significantly ( $p = 0.79$ ), the change from post-reduction to follow-up was significantly smaller in casted patients ( $p < 0.01$ ), suggesting more stable maintenance of reduction over time. Additionally, a significantly greater proportion of casted patients maintained the reduction at follow-up compared to splinted patients ( $p = 0.04$ ), reinforcing the association between initial casting and radiographic stability.

There were no statistically significant differences in complication rates between casted and splinted groups, whether analyzed as overall complication percentages ( $p = 0.48$ ) or by individual complication type, including pre- and post-operative skin issues ( $p = 0.35$ ), emergency department visits ( $p = 0.82$ ), or infections occurring pre- or post-operatively ( $p = 0.36$ ). No cases of compartment syndrome occurred in either group. Of the five patients with skin-related complications, three occurred in casted patients and two in splinted patients; none had diabetes, and only two were active smokers (one in each group). Both infections occurred in non-diabetic, non-smoking patients.

## DISCUSSION AND CONCLUSION:

Initial immobilization with a cast in unstable Weber B ankle fractures was associated with significantly improved post-reduction and follow-up radiographic alignment, as measured by MCS. Casted patients were more likely to maintain MCS values below the 4 mm threshold commonly used to guide surgical decision-making. The data suggest that casting promotes a more stable reduction and reduces loss of reduction over time in unstable Weber B ankle fracture patients.

Importantly, the absence of increased complication rates among all patients—including higher-risk patients with diabetes or active smoking—suggests that casting is a safe initial immobilization strategy in this population. This indicates that the superior radiographic stability observed with casting is not offset by an increased complication burden, supporting casting as a safe and potentially preferable initial immobilization strategy. Further prospective studies can inform the development of standardized immobilization protocols for unstable Weber B fractures.

Table 1. Demographics

Variable	Casted (n = 74)	Splinted (n = 22)	P-value
Age (mean ± SD)	54.89 ± 15.75	51.77 ± 17.28	0.45
Female, % (n)	60.81% (45)	40.90% (9)	0.098
Male, % (n)	39.19% (29)	59.01% (13)	—
Diabetes, % (n)	18.92% (14)	18.18% (4)	0.94
Active smokers, % (n)	18.92% (14)	22.72% (5)	0.69

Table 2. Radiographic Outcomes (Medial Clear Space in mm)

Variable	Casted (n = 74)	Splinted (n = 22)	P-value
Initial injury MCS (mm)	6.73 ± 3.01	7.09 ± 4.18	0.71
Post-reduction MCS (mm)	2.79 ± 0.50	3.41 ± 0.83	< 0.01
Follow-up MCS (mm)	2.73 ± 0.54	4.14 ± 1.10	< 0.01
Change in MCS (Initial to Post-reduction)	-3.93 ± 2.99	-3.68 ± 4.24	0.79
Change in MCS (Post-reduction to Follow-up)	-0.11 ± 0.62	0.51 ± 0.67	< 0.01

Table 3. Complication Rates by Initial Immobilization Type

Variable	Casted (n = 74)	Splinted (n = 22)	P-value
Any complication	16.22% (12)	22.72% (5)	0.48
Skin issues	4.05% (3)	9.09% (2)	0.35
Emergency department visits	10.81% (8)	9.09% (2)	0.82
Infections	1.35% (1)	4.54% (1)	0.36
Compartment syndrome	0.00% (0)	0.00% (0)	—