Implant Removal and Complication Rates of Mini versus Small-Fragment Implants for Lateral Malleolar Fixation

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INTRODUCTION: Implant removal after open reduction and internal fixation (ORIF) of ankle fractures is common, with recent studies quoting a up to a 27% implant removal rate. Mini-fragment implants have gained popularity for their smaller size, with studies showing similar load to failure to small-fragment implants. Two studies have been published on mini-fragment versus small fragment fixation of distal fibula fractures with conflicting implant removal rates. We hypothesized mini-fragment implant use for ORIF of the distal fibula would lead to a lower implant removal rate with no increased complications.

METHODS:

We performed a multi-center retrospective review at two level-one trauma centers of patients aged 18 and older with ORIF of a lateral malleolar or bimalleolar ankle fracture (CPT codes 27792 and 27814). A retrospective review was performed to determine if the patient received ORIF of the distal fibula with mini-fragment implants (2.0mm, 2.4mm, and 2.7mm screw and plate constructs) or small-fragment implants (one-third tubular plates or pre-contoured locking plates with at least one 3.5mm screw). The primary outcome was elective implant removal of the distal fibular plate. Secondary outcomes included complications requiring reoperation. T-tests were used for analysis continuous variables and chi-square testing for categorical variables.

RESULTS:

A total of 453 patients were included with a mean age of 51 years (range 18-99). In total, 228 patients had bimalleolar fixation, and 225 had lateral malleolar fixation only. Fifty-three (12%) patients received mini-fragment fixation. The mini-fragment and small-fragment fixation groups were similar in age, gender, BMI, ASA, smoking status, and presence of diabetes. Patients with bimalleolar ankle fractures were more likely to receive mini fragment fixation (68%) compared to patients with isolated lateral malleolar fractures (48%) (p=0.006). The rate of distal fibula implant removal for the mini-fragment group was 11% compared to 14% in the small-fragment group (p= 0.563). There was no statistically significant difference in complication rates between the mini fragment group and the small fragment group at 6% and 7%, respectively (p=0.764).

DISCUSSION AND CONCLUSION:

In a large multicenter retrospective review, we found that the implant removal rates and complications requiring reoperation were similar between mini-fragment and small fragment fixation of distal fibula fractures. The hypothetical benefit of low-profile mini-fragment implants should be balanced with the higher implant cost.

	Patient Demographics and Outcomes		
	Mini Fragment	**Small Fragment**	**P-Value**
Number	53	400	
Mean Age (years)	46.8	51.3	0.082
Sex			0.709
Female	54% (29)	52% (208)	
Mean BMI	29.1	30.2	0.309
Bimalleolar Fixation	68% (36)	48% (192)	**0.006**
ASA Class			0.463
1	28% (15)	24% (94)	
2	55% (29)	50% (200)	
3	17% (9)	25% (102)	
4	0% (0)	1% (4)	
Diabetes	6% (3)	15% (60)	0.056
Smoker	21% (11)	20% (79)	0.863
	Outcomes		
Hardware Removal	**11% (6)**	**14% (57)**	**0.563**
Complications	**6% (3)**	**7% (27)**	**0.764**

ASA: American Society of Anesthesiologists Classification