

The Effect Immobilization Mechanisms Have on Radiographic Outcomes and Complication Rates in the Conservative Treatment of Distal Radius Fractures: A Systematic Review

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Purpose:

Though there is a high incidence of distal radius fractures (DRF), there is limited consensus on the appropriate mechanism for immobilizing these fractures during conservative treatment. This systematic review evaluates the evidence regarding the effect different DRF immobilization constructs have on complication rates and functional outcomes in adults with DRFs.

Methods:

We searched PubMed, Medline, and EMBASE for articles that studied the effect immobilization mechanism has on outcomes in adults with DRFs. After the relevant studies were selected, the treatment groups were divided into four categories: above elbow constructs (AEC), below elbow constructs (BEC), radial gutter or thumb spica constructs, and dorsal-volar splints. In addition to a qualitative comparison of the studies, an Analysis of Variance (ANOVA) was performed to detect statistically significant differences (alpha <0.05) between the treatment categories.

Table 1: Comparison of percentage of patients experiencing treatment complications and patient-reported outcomes by casting strategy

	Casting Treatment				p value
	Above Elbow (n)	Below Elbow (n)	Dorsal-Volar Splint (n)	Gutter (n)	
Loss of reduction ¹	21.8 ± 10.5 (142)	6.0 ± 2.5 (311)	25.4 ± 7.5 (280)	36.8 ± 6.0 (68)	0.04
Pain	63.6 (33) *	32.4 ± 4.9 (68)	66.3 ± 22.4 (92)	-	0.45
Nerve Injury or Weakness	-	10.3 ± 6.3 (107)	9.2 ± 2.5 (152)	3.3 (30) *	0.59
Operation	4.3 (47)*	6.0 ± 4.8 (200)	8.7 ± 2.0 (69)	20 (30) *	0.18
DASH	31.3 ± 15.5 (156)	15.3 ± 5.1 (199)	-	33.9 ± 27.4 (78)	0.62

¹Post-Hoc Analysis shows significant difference between below elbow and gutter casting

*One study identified in this treatment group reported the above complication so standard deviation cannot be calculated

Results:

After inclusion criteria were applied, 22 studies remained for review. In studies that compared AEC with BEC, BEC patients had equal or better radiographic outcomes and increased range of motion. Studies that compared AEC with gutter/spica casts found that AEC patients had better Disabilities of the Arm, Shoulder, and Hand (DASH) scores, but there were no differences in radiographic outcomes between the groups. Studies that compared BEC with gutter/spica casts and studies that compared gutter/spica casts with dorsal-volar splints found no significant differences between the groups in terms of loss of reduction or the need for surgery. They also found no differences in ability to perform activities of daily living or return to work between the groups. An ANOVA of the included studies demonstrated that BEC have significantly lower rates of loss of reduction compared to gutter or spica constructs. However, there were no significant differences between the other groups for loss of reduction, need for operation, pain, or DASH scores (Table 1).

Conclusions:

Evidence suggests that AEC are likely equal or inferior to BEC. The comparisons between the other immobilization constructs did not yield sufficient information to recommend a particular construct. However, comparisons between studies were limited, as many studies did not provide summary statistics for reported results and did not use the same definitions for certain outcomes.