

Comparative Clinical Outcomes of Locking Versus Dynamic Compression Plates for Radius and Ulna Fractures: A Meta-Analysis

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Introduction: Locking compression plates (LCPs) provide angular stability for forearm fracture fixation but are considerably more costly than dynamic compression plates (DCPs) or limited-contact DCPs (LC-DCPs). Their comparative clinical value remains unclear. This systematic review and meta-analysis evaluated union time, functional outcomes, and complication rates for LCPs versus nonlocking plates in radius and/or ulna fractures.

Methods: A PRISMA-guided systematic review and meta-analysis were conducted. Studies were eligible if they included skeletally mature patients with acute radius and/or ulna fractures, directly compared LCPs with DCPs or LC-DCPs, and reported at least one clinical or radiographic outcome. Primary endpoints were time to union, delayed union, and nonunion; secondary outcomes included functional scores and radiological assessments. Data were pooled using a random-effects model, with odds ratios (OR) and 95% confidence intervals (CI) reported.

Results: Eight studies involving 525 patients were included (238 LCP, 221 DCP, 66 LC-DCP). In five studies comparing LCPs with DCPs, LCP fixation achieved a significantly shorter mean union time (MD -1.8 weeks, 95% CI -3.13 to -0.47, p=0.01), with no differences in superficial SSI or implant removal. In three studies versus LC-DCPs, LCPs showed a trend toward reduced union time (MD -2.21 weeks, p=0.07) and significantly greater wrist ROM (MD 4.77°, 95% CI 0.69–8.85). No significant differences were noted for delayed union, SSI, neurologic injury, operative time, or other joint ROM.

Discussion: LCP fixation may accelerate fracture union compared with DCPs and offers modest wrist motion benefits over LC-DCPs, without additional clinical advantages. Given their higher cost, LCPs should be considered selectively, particularly in cases with poor bone quality, complex fracture patterns, or distal intra-articular joint fractures.

Clinical Relevance: LCP may shorten fracture healing time and provide modest functional benefits compared with conventional plates, but they do not reduce complication rates and are significantly more expensive. Their use should therefore be reserved for patients with poor bone quality, complex fracture patterns, or distal intra-articular involvement, rather than routine application in all forearm fractures.

Table 1- Overview of Included Studies Comparing Locking Compression Plate Versus Dynamic or Limited Contact Dynamic Compression Plate Fixation

Authors	Country	Publication year	Study Design	Population				Fracture Type		
				Total	LCP	DCP	LCDCP	LCP	DCP	LCDCP
Mallick et al.	India	2018	Retrospective cohort	60	30	30	-	30 both-bone 0 isolated radial 0 isolated ulnar	30 both-bone 0 isolated radial 0 isolated ulnar	-
Shivata et al.	India	2022	Prospective interventional study	30	15	15	-	15 both-bone 0 isolated radial 0 isolated ulnar	15 both-bone 0 isolated radial 0 isolated ulnar	-
Azboy et al.	Turkey	2013	Retrospective cohort	42	22	20	-	13 both-bone 4 isolated radial 5 isolated ulnar	12 both-bone 2 isolated radial 6 isolated ulnar	-
Tsung et al.	Taiwan	2025	Retrospective cohort	244	98	146	-	39 both-bone 34 isolated radial 25 isolated ulnar	34 both-bone 38 isolated radial 54 isolated ulnar	-
Stevens et al.	Netherlands	2008	Retrospective cohort	19	9	10	-	NA	NA	-
Meena et al.	India	2013	Prospective study	40	20	-	20	20 both-bone 0 isolated radial 0 isolated ulnar	20 both-bone 0 isolated radial 0 isolated ulnar	-
Saikin et al.	India	2011	Prospective comparative study	36	18	-	18	18 both-bone 0 isolated radial 0 isolated ulnar	18 both-bone 0 isolated radial 0 isolated ulnar	-
Gill et al.	India	2017	Randomized prospective cohort study	54	26	-	28	26 both-bone 0 isolated radial 0 isolated ulnar	28 both-bone 0 isolated radial 0 isolated ulnar	-

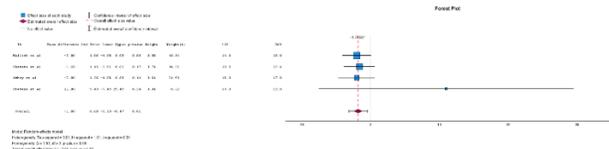


Figure 1- Forest Plot Comparing the Mean Duration to Union Between Locking Compression Plate Versus Dynamic Compression Plate Fixation

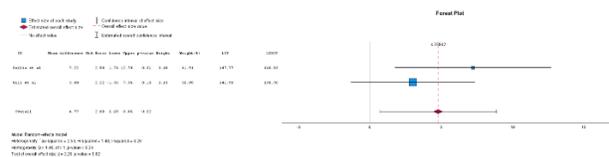


Figure 2- Forest Plot Comparing the Wrist Joint ROM Between Locking Compression Plate Versus Limited-Contact Dynamic Compression Plate Fixation