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ABSTRACT

Clinical Scenario: Distal radius fractures commonly occur in contact sports but have a significant effect on those that involve upper extremity usage. Throwing, catching, shooting, gripping, and hitting abilities are highly impacted by radius fractures. **Focused Clinical Question:** In patients with distal radius fractures, what is the effect of volar locked plating surgery versus external fixation surgery on grip strength? **Search Strategy:** Participants included in this review were between 18-80 years of age and sustained an isolated distal radius fracture with >3-mm shortening within the previous two weeks prior to entering the study. Exclusion criteria were patients with a contralateral radial malunion, open fractures, or any other associated fracture or injury. A search was conducted using the following databases: *PubMed, Cinahl Plus with Full Text, ProQuest Nursing Collection, and Cochrane Library*. The key terms were: distal radius fractures, external fixation, volar plating, plates, internal fixation, grip strength, and distal radius fracture surgical treatments. The initial search resulted in 293 hits, with nine that met the inclusion criteria. **Evidence Quality Assessment:** The evidence was appraised with use of the PEDro scale and Oxford 2011 Levels of Evidence. The PEDro score requirement was a score of at least 6/10. The scores of the articles reviewed ranged from 6/10-8/10. The Oxford 2011 Levels of Evidence scores were two for all eight articles. **Results and Summary of Search:** All eight articles included were randomized controlled trials. Grip strength was significantly better in the volar plate group than the external fixation group in the earlier follow-ups, at three months up to six months, for 5/8 studies. However, there were no significant differences between volar plating and external fixation by the one-year follow-up for any study. Some strengths of the studies were the high follow-up rate s among the patients and similar patient features at baseline. Some limitations included uneven numbers of patients in each group, as well as small-numbered groups. Some findings may not correlate with younger populations well, as these studies focused on primarily older populations with an average age of 40-60 years. The duration of these studies was also short, with the follow-ups being only up to one year, so improvement in grip strength was sometimes anticipated but not recorded. **Clinical Bottom Line:** Overall, the short-term effect of the volar plating surgical method for repairing a distal radius fracture is superior in improving grip strength compared to external fixation; however, the long-term results are not significantly different. The SORT score of the studies used is "B". **Implications:** Volar plating would be more beneficial for patients involved in sports or activities with significant hand usage. With quicker improvement associated with volar plating, the patient may be able to progress through rehabilitation at a faster rate and continue to advance to more functional activities sooner, resulting in an earlier return to play time. **Word Count:** 466.

CLINICAL SCENARIO

- Distal radius fractures commonly occur in contact sports but can be seen in any sport where an individual falls on an outstretched arm
- Grip strength is a primary function affected by distal radius fractures
- Radial fractures complicate typical daily tasks and activities as well as athletic abilities in upper extremity-focused sports
- Volar plating surgery versus external fixation surgery on grip strength for radius fractures
- The main focus for athletes with a distal radius fracture is to return to play as quick as possible without complications
- Grip strength is an important function of the wrist that must be restored before returning to play
- Grip strength was measured with dynamometers or vigorimeters and the results were recorded as kilograms or as a percent of the uninjured side

FOCUSED CLINICAL QUESTION

- In patients with distal radius fractures, what is the effect of volar locked plating surgery versus external fixation surgery on grip strength?



Figure 1. This image shows the external fixation surgical technique on the distal radius.

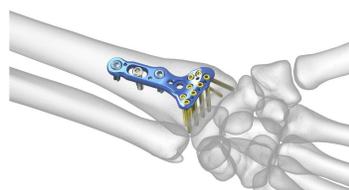


Figure 2. This image shows the volar plate surgical technique on the distal radius.

SEARCH STRATEGY

- Inclusion Criteria:** Participants were 18-80 years of age and sustained an isolated distal radius fracture with >3-mm shortening within the previous two weeks prior to entering the study.
- Exclusion Criteria:** Patients with a contralateral radial malunion, open fractures, or any other associated fracture or injury
- Databases:** *PubMed, Cinahl Plus with Full Text, ProQuest Nursing Collection, and Cochrane Library*.
- Keywords:** Distal radius fractures, external fixation, volar plating, plates, internal fixation, grip strength, and distal radius fracture surgical treatments
- Initial Search Results:** A total of 293 hits; nine that fit inclusion criteria

EVIDENCE QUALITY ASSESSMENT

- The evidence was appraised with use of the PEDro scale and Oxford 2011 Levels of Evidence
- The PEDro score requirement was a score of at least 6/10.
- The scores of the articles reviewed ranged from 6/10-8/10.
- The Oxford 2011 Levels of Evidence scores were two for all nine articles.

RESULTS AND SUMMARY OF SEARCH

Table 1. Comparison of Grip Strength Results

Study		External Fixation (% of uninjured wrist)	Volar Plating (% of uninjured wrist)	P-Value
Wei, D ¹	3 months	49 ± 10	60 ± 16	-
	6 months	75 ± 21	59 ± 13	-
	12 months	69 ± 34	75 ± 25	-
Williksen, J ⁷	6 months	70	79	0.03*
	12 months	81	86	0.17
Navarro, C ²	3 months	52	63	0.007*
	12 months	82	88	0.072
Roh, Y ³	3 months	33	42	0.02*
	6 months	47	56	0.04*
	12 months	75	78	-
Gradl, G ⁸	6 months	72.2 ± 3.8	80.2 ± 2.9	0.23
	12 months	86.8 ± 2.8	84.1 ± 3.3	0.68
Wilcke, M ⁴	3 months	46	72	< 0.001*
	6 months	72	89	< 0.001*
	12 months	85	94	0.08
Egol, K ⁵	3 months	29	36	0.13
	6 months	52	41	0.35
	12 months	100	85	0.26
Jeudy, J ⁶	3 months	57.1	68.6	0.03*
	6 months	75.5	83.8	0.02*

Table 1. Comparison between external fixation surgery and volar plating surgery on grip strength. * The value indicates statistical significance (p<.05).

RESULTS AND SUMMARY OF SEARCH, CONT.

- Volar Plating had significantly higher (p<.05) grip strength than external fixation in early follow-ups at 3 months for four studies, and at 6 months for four studies.
- Five of the eight studies showed significantly greater improvements in grip strength with volar plating than external fixation by the 3 or 6 month follow-ups, but there were no significant differences at the 12 month follow-up.
- One strength of the studies was the patient similarities at baseline
- Another strength was the high patient follow up rate
- One limitation included older population patient groups rather than the younger population
- Another limitation was the small –numbered groups and the uneven numbers of patients in each group
- An additional limitation was that the duration of follow up was at maximum one year, so further improvement was anticipated but not recorded

CLINICAL BOTTOM LINE

- The short-term effect of the volar plating surgical method for repairing a distal radius fractures is superior in improving grip strength compared to external fixation
- The long-term results, at one year follow up, are not significantly different
- This evidence is rated as B on the SORT scale

IMPLICATIONS

- Patients involved in sports with significant hand and wrist usage, such as baseball, gymnastics, or tennis, should consider volar plating for quicker recovery early on to advance to functional activities sooner
- Quicker improvements in strength in early treatment allows for faster progression through rehabilitation
- May allow for quicker return to play with earlier rehabilitation involvement
- Because volar plating improves function faster, the patient's overall satisfaction and confidence may be greater than if external fixation was used.

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