

Is There A Role for Bone Grafting In Severely Comminuted Distal Radius Fractures Treated With Locking Plate Fixation?

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Introduction

Locking plate technology has decreased the need for bone grafting in comminuted distal radius fracture fixation

No guidelines when bone grafts are indicated

Suggested indications

- Large bony defects in severely comminuted metaphyseal fractures
- Short segmental bicortical bone loss
- Small, unstable, depressed intra-articular fragments

Aim

To evaluate the use of bone grafts in the setting of locking plate fracture fixation of distal radius fractures

Materials & Methods

A total of 59 patients were included into a prospective non-randomized cohort recruited between June 2009 to December 2010 in our centre.

The inclusion criteria the study were the use of distal radius fracture fixation with locking implants with use of bone grafts.

Postoperatively, the patients followed a standardised review interval at 6weeks, 3 months, 6 months, and 12 months.

They also received a standardised rehabilitation programme after surgery.

The outcome measures for our study were divided into clinical, radiographical and functional scores.

- Clinical: Wrist motion, grip strength
- X-Ray: Radiographic parameters, time to union
- Function: DASH, Green O'Brien

Table 4. Clinical outcomes

	6 months	12 months	24 months
Palmarflexion (°)	42 (10-70)	46 (30-60)	47 (30-60)
Dorsiflexion (°)	54 (25-80)	52 (20-80)	55 (40-70)
Supination (°)	82 (60-90)	82 (50-90)	86 (80-90)
Pronation (°)	80 (45-90)	79 (45-90)	82 (60-90)
Radial deviation (°)	16 (0-45)	16 (5-30)	16 (5-25)
Ulnar deviation (°)	25 (10-40)	26 (10-40)	29 (20-40)
Grip strength (°)	16 (4-47)	20 (2-48)	19 (5-32)

Table 5. Radiological outcomes

	Immediate	6 months	12 months	24 months
Radial Height (mm)	9 (4-15)	9 (0-13)	9 (0-12.8)	9 (-2-13)
Radial Inclination (°)	20 (7-29)	19.2 (0-28)	18 (0-37.6)	18.5 (-3-27)
Volar Tilt (°)	4 (-19-17)	5 (-20-20)	7 (-22-13.7)	7.5 (-14-16)

Table 6. Functional outcomes

	12 months	24 months
DASH	9	4
Green O'Brien		
-Excellent	9 (18%)	12 (30%)
-Good	16 (32%)	19 (48%)
-Fair	22(44%)	9 (22%)
-Poor	3 (6%)	0 (0%)

Results

Bone graft utilized in 59 of 450 patients (13%)

Age 55 years old (Range 16-96)

Gender 27 ♂ : 32 ♀

Injury Side Right 27, Left 33

Plate location Volar 31, Dorsal 9, Combined 19

Bone graft source* Autologous 24

Synthetic 35

Follow up period 15mths (6-31mths)

There was no significant donor site morbidity.

The average time to union was 2 months. No significant differences between outcomes of synthetic and autologous bone grafts were observed.

Table 1. Surgical indications for bone grafting

Indication	Number
Dorsal metaphyseal comminution	13
Bicortical defect/ structural support	29
Intra-articular depression	17

Table 2. Sources of bone graft

Source	Number
Autologous	24
Olecranon	19
Iliac crest	3
Distal radius	1
Ulna	1
Synthetic	35

Table 3. Fracture Classification

AO Type	Number
A1	0
A2	3
A3	11
B1	1
B2	1
B3	3
C1	4
C2	10
C3	26

Discussion

Bone grafting remains an essential part of distal radius fixation armamentarium despite introduction of locking plate fixation

Locking systems alone may not be sufficient in maintaining reduction of large dorsal defects or depressed articular fragments

Bone grafts are indicated for

- Structural- large metaphyseal defects to maintain reduction
- Reduction of articular depressed fragments

Results show no significant differences between use of autologous and synthetic bone grafts