



Distal Radius Fractures: Closed Treatment?




Boston Medical Center

Operative Indications

- Age
- Initial films
 - ◊ Dorsal comminution
 - ◊ Intraarticular involvement
- Postreduction films
 - ◊ Carpal Alignment
- Loss of reduction



Carpal Malalignment...

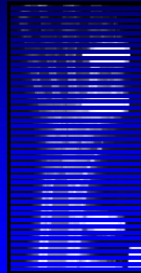


**REDISPLACED UNSTABLE FRACTURES OF THE
DISTAL RADIUS**
A PROSPECTIVE RANDOMISED COMPARISON OF FOUR METHODS OF
TREATMENT
M. M. MCQUEEN, C. HAJDUCKA, C. M. COURT-BROWN
From the Royal Infirmary of Edinburgh, Scotland

- Mass grip strength
- Key grip
- Chuck grip

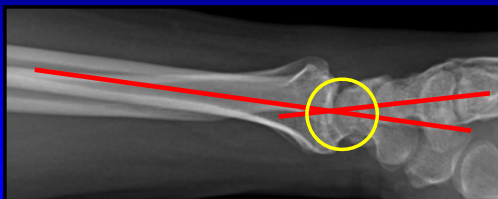
McQueen, et al '96

- 4 Groups
 - ◊ Re-manipulation CRC
 - ◊ Ex fix ± cast
 - ◊ ORIF + BG
- No difference
 - ◊ Clinical parameters



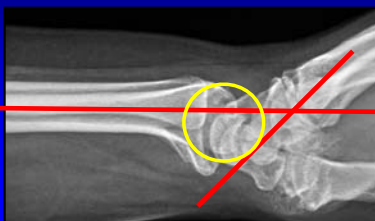
McQueen, et al '96

- Carpal alignment



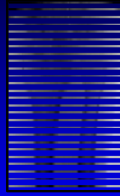
McQueen, et al '96

- Carpal Malalignment



Barton, et al 2007

- 60 Patients
 - Avg age 69
- Moderate shortening
- NO affect on outcome



Pivotal Study



Do young patients with malunited fractures of the distal radius inevitably develop symptomatic post-traumatic osteoarthritis?

D. P. Forward,
T. R. C. Davis,
J. S. Sithole

*From Nottingham
University Hospitals,
Nottingham,
England*

Forward, et al

- 106 patients
- Avg age 25, Rx = CRC
- **Followup avg 38 yrs!!!**
 - Avg age 64
- ROM, grip strength, pain
- Arthritis
- **DASH and PEM**

Forward, et al

- Malunion
 - ♦ < 20 degrees radial angulation
 - ♦ Any dorsal tilt
 - ♦ 2mm shortening
- Osteoarthritis
 - ♦ Knirk and Jupiter
- Validated scores

Forward, et al

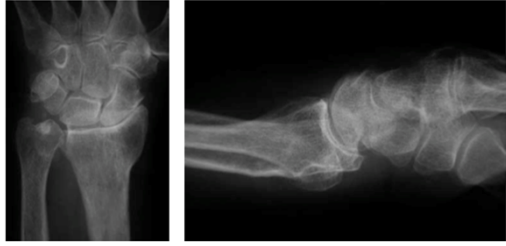
- Anatomic findings
 - ♦ 65% malunion (18% all criteria)
 - ♦ Avg volar (-1) and 4 degrees
- Arthritis
 - ♦ 50% Equal to contralateral
 - ♦ 43% Worse, 7% Better
 - ♦ 65% Intraart had only 0,1
 - ♦ 10 degrees dorsal RR = 1.2

Outcomes!

- ROM: 92% and 98% (step)
- Grip: 89% and 99% (dorsal)
- No pain: 81% vs 91%
- DASH: 9 and 13 (control 10)
- PEM: 5% and 9% less (sd 15)

Example

MALUNITED FRACTURES OF THE DISTAL RADIUS AND SYMPTOMATIC POST-TRAUMATIC OSTEOARTHRITIS



38 years post injury

Recent Case

- 72 Year old woman
- Fell at home
- Dominant wrist



Casted



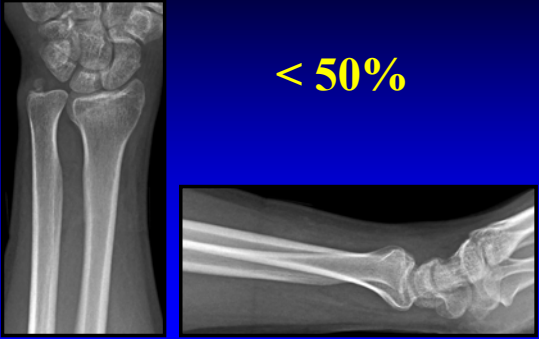
Healed

Pain Free!




What's the right %?

< 50%



What Predicts Position?

- If heal with carpus aligned
 - Good results
- Multiple factors predict loss of reduction
- What really matters?



SCIENTIFIC ARTICLE

Predicting Alignment After Closed Reduction and Casting of Distal Radius Fractures

Joey LaMartina, MD, Andrew Jawa, MD, Charlton Stucken, MD, Gabriel Merlin, MD,
Paul Tornetta III, MD

Distal Radius Fractures




Lafontaine, et al

1. Age > 60 years
2. Dorsal Angulation > 20°
3. Dorsal Comminution
4. Intra-articular fracture
5. Associated ulnar fracture

≥ 3 criteria = loss of reduction


**PREDICTION OF INSTABILITY
IN DISTAL RADIAL FRACTURES**
BY P.J. MACKENNEY, FRCS, M.M. MCQUEEN, MD, FRCSED(ORTH), AND R. ELTON, PHD
Investigation performed at the Edinburgh Orthopaedic Trauma Unit, The New Royal Infirmary, Edinburgh, Scotland

- **Malunion formula risk factors**
 - ♦ **Age***
 - ♦ **Comminution**
 - ♦ **Ulnar variance > 3mm**
 - ♦ **Does own shopping**




Study Purpose

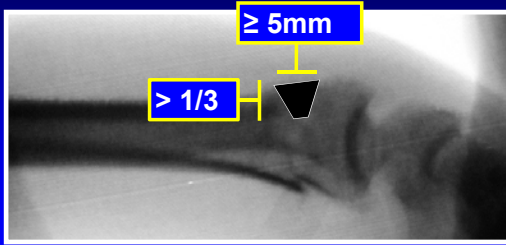
- **Independently validate:**
 - ♦ **McQueen Malunion Formula**
 - ♦ **Lafontaine's Criteria**
- **Evaluate**
 - ♦ **Post-reduction volar cortical alignment ("Volar Hook")**
 - ♦ **Specific definition for dorsal comminution**



Volar Hook



Dorsal Comminution



Patient Cohort

- 546 Distal radius fractures
 - 271 $< 10^\circ$ angulation or partial articular
 - 74 Unacceptable initial reductions and treated operatively
 - 14 Displaced within 2 weeks and treated operatively
 - 19 Inadequate/incomplete xrays

Patients and Methods

- 168 patients
 - 116 female
 - 52 male

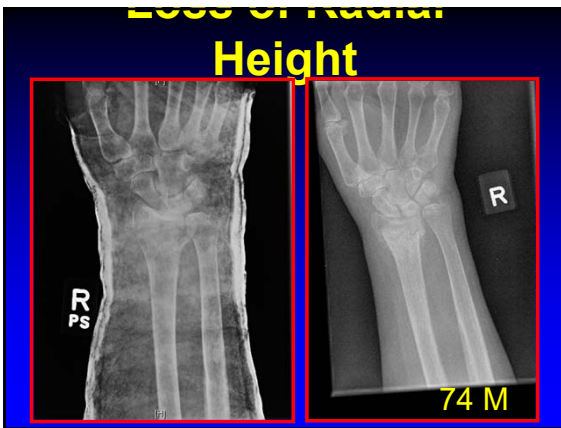


- Average age = 52
- Average f/u = 89.3 days

Results: At Union

Lafontaine Total	Ulnar Variance	P < .0001
	Radial Height	P < .0001
	Radial Inclination	P < .0001
McQueen Equation	Ulnar Variance	P = .0008
	Radial Height	P < .0001
	Radial Inclination	P < .0001

Loss of Radial Height



Results: Multivariate


	Dorsal Tilt	Ulnar Variance	Radial Height	Radial Inclination
Final Position	Volar Hook Dorsal Comminution	Age of Patient	Age of Patient Intraarticular Fracture	Age of Patient
Δ During Treatment	Volar Hook Dorsal Comminution	Dorsal Comminution	Age of Patient	Age of Patient

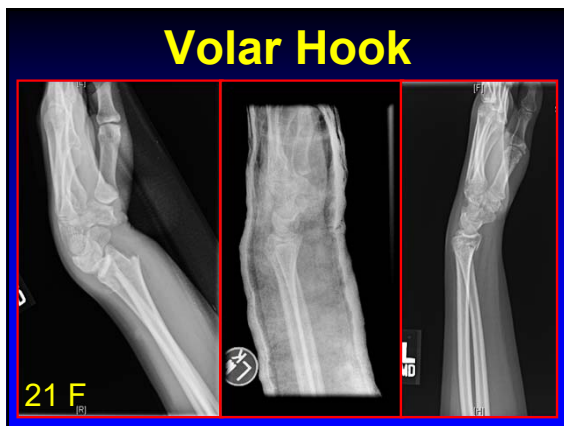
Results: Multivariate

	Dorsal Tilt	Ulnar Variance	Radial Height	Radial Inclination
Final Position	Volar Hook Dorsal Comminution	Age of Patient	Age of Patient Intraarticular Fracture	Age of Patient
Δ During Treatment	Volar Hook Dorsal Comminution	Dorsal Comminution	Age of Patient	Age of Patient

Results

- Carpal alignment
- Predicted by:
 - ♦ Volar hook (P = .001)
 - ♦ Age of patient (P = .03).





Conclusions

- McQueen and Lafontaine
 - Radial Height, Radial Inclination, Ulnar variance
- Volar Hook = strongest predictor!
 - Δ and final volar tilt
 - Carpal malalignment



Recommendations

- Older than 80
 - Almost all
- Healthy older
 - If volar hook, no joint subluxation and carpus aligned
- Young
 - Same as above plus no large stepoff and shortening < 5mm