Distal Radius Fractures: Palmar or Dorsal Approach?

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26° Congresso Brasileiro De Cirurgia da Mão
Distal Radius Fractures: Palmar or Dorsal Approach?

Distal radius, what has been proposed

1. Simple splint
2. Circular splint
3. Pinning
4. Intrafocal pinning (Kapandji)
5. Axial pinning
6. External fixator
7. Dorsal plate
8. Palmar plate
9. Combined plates
10. With or without grafting (bone or bone substitute)

There is no consensus on the management of these fractures. But definitions seem unclear in many papers. This might be the reason of discrepancy.
Distal Radius Fractures: Palmar or Dorsal Approach?

Definitions

- Tension band
- Neutralisation
- Splint (Bridge)
- Buttress
Distal Radius Fractures: Palmar or Dorsal Approach?

Definitions

- **Tension band**

  Palmar buttress must be present. K-wire better with porosis.
Definitions

- **Neutralisation**
  Needs interfragmentary compression. Seldom possible at the distal radius.
Distal Radius Fractures: Palmar or Dorsal Approach?

Definitions

- **Splint (Bridge)**

Often the case at the distal radius and in the rule presented as buttress-plate.
Distal Radius Fractures: Palmar or Dorsal Approach?

Definitions

- **Buttress**

  The best technique for Barton fractures. Defines the approach!
• Cast immobilisation

Avoids surgery, i.e. complications.
But cannot maintain length, rotation or axes.

I.e. if reduction necessary => open!
Distal radius, treatment controversy

- Pinning Willeneger

Difficult, does not always maintain correction as shown. Inadequate if porosis. Does not stabilise gliding.
Distal Radius Fractures: Palmar or Dorsal Approach?

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- Pinning Kapandji

Overcorrection possible.
Limited indications.
Not always sufficient alone.

(Trumble et al., JHS 23A:381, intrafocal pinning of distal radius fractures with and without external fixator)
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- Pinning Py

Cannot maintain length.

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- Pinning Ulson

We have no experience.
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- External Fixator (mainly placed dorsally)

Grafting also dorsal for motion does not make sense.
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• External Fixator

Leung KS et al. An effective treatment of comminuted fractures of the distal radius. JHS 15A:11-17, 1990

100 cases treated with external fixator.

As suggested by Jakob RP and Fernandez DL.

Leung KS et al. JHS 15A:11-17, 1990

The authors concludes:
why use another technique, despite
- one metacarpal fracture,
- one pin tract infection,
- 5 Transient sensory radial nerve and 3 median nerve impairment,
- 4 dystrophy (RSD)
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- **External Fixator**

  External fixator despite its apparent simplicity is a subtle matter.

  Seems less frequently used actually (at least if considering publications).

- **Experience of Geneva**
  (Fusetti C., Della Santa D.)

  - **Review of 30 fractures, all over 60**

    23 women, 7 men
    Age: average, 72 years (60-85)
    Fractures: 17 A2, 7 A3, 4 C1, 2 C2
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Experience of Geneva
(Fusetti C., Della Santa D.)

• Review of 30 fractures, all over 60

Follow-up: 15 months

<table>
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<td>+6,2mm</td>
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<tr>
<td>Add / Abd</td>
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<tr>
<td>Sup / Pro</td>
<td>98%</td>
<td>85%</td>
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Experience of Geneva
(Fusetti C., Della Santa D.)

• Review of 30 fractures

Complications:
Two malunions
One tendinitis (dorsal, screws too long)
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Experience of Geneva
(Fusetti C., Della Santa D.)

- **After 60 years of age, we obtained satisfactory results provided:**
  - Correct placement of distal screws
  - Correct screw length

With multiple surgeons, even young ones, AO plate, Matthys

Plates:
Many models!
more or less stable
Design and Biomechanics of a Plate for the Distal Radius

David Gesensway, MD, Matthew D. Putman, MD, Peter L. Mente, PhD, Jack L. Lewis, PhD, Minneapolis, MN

JHS 20A:1021-27, 1995
Distal radius fractures: palmar or dorsal approach?

**Conclusion:** Dorsal plating effective, but not for restoring radial height.

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JHS 31A:382-6, 2006

Treatment of Distal Radius Fractures With a Low-Profile Dorsal Plating System: An Outcomes Assessment

Paul M. Simic, MD, Jason Robison, MD, Michel J. Gardner, MD, Richard H. Gelberman, MD, Andrew J. Weiland, MD, Martin I. Boyer, MD

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Distal radius, treatment controversy
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Plates:
Various metals

i.e., Titan

However with many complications

Kambouroglou GK, Axelrod TS
Complications of the AO/ASIF
Titanium distal radius plate system
JHS 23A:737-741, 1998 (2 cases)
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Plates:
More or less volume

The problem of anatomy

a) dorsal

b) palmar
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Plates:
Have to be placed safely, firmly

Safely?

Subchondral Bone excellent

Very distal danger!

Screws should not be too long
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Carter P.R et al.
JHS 23A:300-7, 98

Dorsal approach
Special plate

73 cases – 96% intraarticular
88% reduction maintained.
19% required plate removal
Gartlan and Werley for outcome

Open Reduction and Internal Fixation of Unstable Distal Radius Fractures With a Low-Profile Plate: A Multicenter Study of 73 Fractures

Peter R. Carter, MD, Hugh A. Frederick, MD, Georgiann F. Laseter, OTR, FAOTA, CHT, Dallas, TX

- Great expertise is needed
- Plate, stainless steel, no bending.
- Only 9 patients were older than 65.
- big plate.
- Authors moderately satisfied…..
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Rozental TD, Blazar E. Functional outcome and complications after volar plating for dorsally displaced unstable fractures of the distal radius.


41 patients
4 loss of reduction
3 plate removal (tendon).

Volar plating:
High complication rate.
High incidence of fracture collaps
Individual approach necessary

Treatment of dorsally displaced distal radius fractures with a double dorsal plate: a study of 12 patients.

- 1 excellent
- 7 good
- 3 fair
- 1 bad i.e., 25% unsatisfactory

Authors concluded that they applied the column theory developed by Rikli et Regazonni JBJS 78B:588-592.

Authors seem satisfied!

Authors concluded that they applied the column theory developed by Rikli et Regazonni JBJS 78B:588-592.

Which gives good results (?).
Personal problem:

What is the 3 columnar theory, in other words, which columns are meant?

In this example, we have two plates…

Focuses on the approach: radial (nerv) or dorsal (tendons).

Complications 20%,
- tendon,
- volar tilt
- Radialis (if radial approach)

No definitive answer!

However, in elderly over 60 years of age it functions….


Ostéosynthèse des fractures du radius distal par plaque postérieure: avantages et inconvénients
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Plates:
Alternative, use the bone as a plate.
Safe.
Nearly no metal.
No problems with tendons.

Plates “sandwich”
Much metal bone substitute mandatory. Can be extremely difficult.
Its use avoids the external fixator.
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And what?
How shall we find a definitive answer?

Editorial
Judging the evidence, F.T. Horan,
JBJS, 87B, 1589

All surgeons search their knowledge in
order to come to the best diagnostic
and practical solution to the problem
which they face.

Evidence based medicine:
i.e., recognise and define the best sci-
entific observation which might influ-
ence practice.

Level I: high quality randomised,
controlled trial.

Level II: randomised study of
lesser quality.

Level III: retrospective comparative
or systematic reviews.

Is it possible to carry out a high qual-
ity randomised control trial of surgical
operative method?

According to A.J. Carr (JBJS 87B:1593)
between 1992 – 2002, only 19 papers
(3.1%) for shoulder were of sufficient
quality….
Conclusion:
Be careful.
A popular dogma does not always reflect reality.
Common sense remains essential.
Of course, try to do better…

Common sense
J. Taleisnik, JHS 23A:570-574, 1998

It dictates that we should not subject our patients to surgical procedures that we would not want performed on ourselves…
It dictates that we should not treat surgically what is not clearly supported by objective findings.
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- But what is an objective finding?
- Who detects the bias of a study?
- Who presents objective findings?
- Why can’t we reproduce some presented papers?

Palmar plate fixation of the AO Type C2 fracture of distal radius using a locking compression plate. A biomechanical study in a cadaveric model. *JHS 28B*:263-266
Leung E, Zhu L, Ho WW, Chow SP.

Experimental model

Facts: 80% of the load is transmitted through the radius.

Fixation of the fracture needs biomechanical stability to avoid secondary displacement.
Palmar plate fixation of AO Type C2 fracture of distal radius using a locking compression plate - a biomechanical study in a cadaveric model


From the Department of Orthopaedia Surgery, Queen Mary Hospital, The University of Hong Kong, Hong Kong and the Department of Orthopaedia and Traumatology, The First Military Medical University Nanfang Hospital, Guangzhou 510515, People’s Republic of China

The stability of palmar plate fixation using a locking compression T-plate was compared with that of a conventional palmar T-plate and a dorsal T-plate in a cadaveric model of an AO type C2 fracture of distal radius. The wrist axial load transmission through the radius was tested for each fixation. The results show that, under 100N axial load, the palmar locking compression T-plate restores stability comparable to that of the intact radius, and is superior to conventional palmar or dorsal T-plates.

Journal of Hand Surgery (British and European Volume, 2003) 28B: 3: 263-266
Leung E, Zhu L, Ho WW, Chow SP. JHS 28B:263-266

Experimental model
8 frozen forearms (4 cadavers)
Standardized osteotomy.
3 implants:
- Dorsal
- Palmar T-plate
- Palmar oblique Plate
- Axial load (100 N)
- Load sensor
Discussion:
Design of volar plate easier.
Placement volar less demanding, less traumatic (no bone excision: Lister).
Anatomy more favourable.
Angular stability of the screw are important.

The study demonstrate that palmarly LCP plate is superior to conventional palmar and dorsal T-plates.

I have a similar experience based on experience as a surgeon,
on observation as a teacher,
on observing younger fellows.

But
one has to be pragmatic,
surgery is not a dogma,
patients are not reproducible,
fractures are variable and seldom similar,
the same for the bone quality.
Facit
Volar plate might be a valuable solution for most cases, since material is much better nowadays. However, combined solutions might be valuable. Alternatives are necessary.

I prefer the volar approach:

But there is no rule without exceptions. If possible with bone substitute.
Open reduction and internal fixation of comminuted, intraarticular fractures of the distal radius. As stated by these authors, and despite better material, osteosynthesis of distal radius fractures remains a challenge and requires skill, precision and planning.

I am aware I did not give a clear answer.

I hope however that the thoughts and facts I presented will help you in decision making, since the success of an operation starts by analysis the x-rays.