Distal Radius Fracture
Clinical Practice Guideline

Linked to the International Classification of Function, Disability, and Health from the Hand Rehabilitation and Orthopaedic Sections of the American Physical Therapy Association

Preliminary work and future plans
Presented by: Susan Michlovitz, PT, PhD, CHT
Ithaca, NY
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Methods for Developing CPG Distal Radius Fracture

Training at APTA (3 of team members-2012 and 2013)
Selection of team
Outline: developed our outline (following format of 2 recent guidelines of Non-arthritic Hip Joint Pain and Ankle Ligament Sprains)
Search: strategies for all categories
Selection of articles/review and assignment of levels and grades
Synthesis and consensus, recommendations
Review, revise, and final document

Our team

Susan Michlovitz, PT, PhD, CHT
Christos Karagiannopoulos, PT, PhD, CHT
Joy MacDermid, PT, PhD
Saurabh Mehta, PT, PhD
Jerry Huang, MD

4 PTs and one orthopaedic hand surgeon

Susan Michlovitz, PT, PhD, CHT

• Cayuga Hand Therapy & PT, Ithaca, NY
• APTA Lifetime Member
• Associate Clinical Professor, McMaster University
• Clinical Associate Professor, Columbia University
• Editorial Advisory Board, Journal of Hand Therapy
• 2013 American Society of Hand Therapists (ASH) President

Christos Karagiannopoulos, PT, PhD, CHT

PhD (2014) with research emphasis on sensorimotor impairment following DRF
Part-time faculty at Temple University (1999-2012)
Published in JOSPT and JHT
Manuscript reviewer for JHT 2013-2014
Clinical practice with ATI

Financial disclosures

• I have no financial disclosures
Challenges in developing CPG for DRF

- Lack of uniformity of surgeons categorizing patients for their management
- Patients treated by cast or splint; treated by ORIF
- Patients without complications/with complications
- Patients with comorbidities and lifestyle habits that complicate fracture healing and recovery of motion

Levels of evidence grading

I Evidence obtained from high quality diagnostic studies, prospective studies, or randomized controlled trials
II Evidence obtained from lower-quality diagnostic studies, prospective studies, or randomized controlled trials (e.g., weaker diagnostic criteria and reference standards, improper randomization, no blinding, less than 80% follow-up)
III Case controlled studies or retrospective studies
IV Case series
V Expert opinion

(http://www.cebm.net) for diagnostic, prospective, and therapeutic studies.

Grades of recommendation


Our group will grade according to guidelines described by Guyatt et al as modified by MacDermid et al.
Incidence of DRF
• Most common fracture of distal UE
  • Especially for females > 65 years
• @ 18% fractures in emergency care
• Lower incidence 2nd – 4th decades of life
  • Males > females by 1.4 times
• Sharp incidence increase 5th decade of life
  • Females > males by 15 times
• Max incidence 6th decade of life
  • Females 30% greater probability

Pathoanatomic features of distal radius fracture
• Radial shortening
• Loss of palmar tilt
• Radial inclination
• Articular gap or step-off
• Distal radioulnar joint stability
• Concomitant ulnar styloid fracture

Risk factors: Distal radius fracture
• Osteopenia/osteoporosis
• Low impact
  • Fall on an outstretched hand (FOOSH) from standing height
• High impact
  • Fall from a height
  • High velocity accident: skiing, snowboarding, motorcycling
• Fall risks/Reduced balance

Imaging studies for
• making the diagnosis and detecting potential associated injuries/co-morbidities
• determining success of anatomic reduction
• assisting to determine prognosis/predicted outcome?
• (maybe to) determine fracture healing to progress weight-bearing and torque activities

Imaging studies
• Plain radiographs
• CT
• MRI

Classifications
Diagnosis
Diagnosis of Fracture
Diagnosis of Associated Injuries
Fracture Pattern Classification
Fracture Rehabilitation Classification
Diagnosis of Fracture

- Clinical deformity
- Open vs. closed injury
- Standard 3 view radiographs of the injured wrist

Diagnosis of Associated Injuries

- Ulnar styloid fracture
- Distal radioulnar joint
- Soft tissue injuries (up to 70%)
- TFCC tears (40-50%)
- Intercarpal injury (Scapholunate or Lunotriquetral) (30%)

Diagnosis of Associated Injuries

- MRI vs. MR Arthrogram
- Role of wrist arthroscopy for diagnosis and treatment of intra-articular ligament injuries
- No correlation between clinical outcomes for untreated partial SL or LT ligament tears
- Complete TFCC tears generally have DRUJ instability while partial tears are usually stable

Prognosis – Pain and Functions

<table>
<thead>
<tr>
<th>Demographic, Health, and Clinical Characteristics</th>
<th>What is the Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socioeconomic status and education level</td>
<td>Poor socioeconomic status and less than high school level education is shown to impact outcomes (Pakisona 2014; MacDermid 2002)</td>
</tr>
<tr>
<td>Injury compensation, presence of comorbidities</td>
<td>May play a small role in pain and functional outcomes 1 year post-DRF (Grewal 2007)</td>
</tr>
<tr>
<td>Age</td>
<td>Controversial role; increased risk of delayed recovery with advancing age (Rob et al 2014) VERSUS perceived disability may be lower in elderly (Grewal 2007)</td>
</tr>
<tr>
<td>Clinical Exam Pain</td>
<td>Baseline pain of &gt;35/50 on PRWE pain scale elevates risk of chronic pain (Mehta 2015) Baseline PRWE scores of &gt;50/100 indicate prolonged time loss from work post-DRF (MacDermid 2007)</td>
</tr>
</tbody>
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Classification: ICD-9 and 10 Codes

Distal radius fracture

ICD-9 code: 813.42
ICD-10 codes for health conditions:

- S52.5 Fracture lower end of radius

Classification: ICD-10

- Other ICD 10 codes for associated health conditions
- S63.0 Dislocation of distal radioulnar joint
- S52.7 Fracture and dislocation of radius and ulna
- S63.3 Traumatic rupture of ligament of wrist
Search for ICD-10 radius fracture

• [http://apps.who.int/classifications/icd10/browse/2015/en#/S52.5](http://apps.who.int/classifications/icd10/browse/2015/en#/S52.5)

Diagnosis: Fracture classification systems/paradigm

• Many to describe
  • AO/ASIF and Fernandez-Jupiter most commonly used
  • Rikli-Regazzoni 3-column approach
  • Broader framework of fracture characteristics

• Do these help direct care?
  • Limited and equivocal evidence exists:
    • Diagnostic value
    • Predictive value for functional recovery
    • Poor intra- and inter-rater reliability

Fracture classification systems/paradigm

<table>
<thead>
<tr>
<th>Fracture</th>
<th>Year</th>
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</thead>
<tbody>
<tr>
<td>Colles' Fracture</td>
<td>1814</td>
</tr>
<tr>
<td>Barton's Fracture</td>
<td>1888</td>
</tr>
<tr>
<td>Gartlan &amp; Werley</td>
<td>1911</td>
</tr>
<tr>
<td>Lidstrom</td>
<td>1959</td>
</tr>
<tr>
<td>Olden et al</td>
<td>1965</td>
</tr>
<tr>
<td>Frykman</td>
<td>1967</td>
</tr>
<tr>
<td>Melone</td>
<td>1984</td>
</tr>
<tr>
<td>Smith's fracture</td>
<td>1991</td>
</tr>
<tr>
<td>AO/ASIF</td>
<td>1991</td>
</tr>
<tr>
<td>Fernandez</td>
<td>1993</td>
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</tbody>
</table>

CLINICAL GUIDELINES: Impairment/Function-Based Diagnosis

Fracture rehabilitation classification- ICF

Comprehensive ICF Core Set for Hand Conditions

ICF Set for DRF

Preliminary review by MacDermid and Michlovitz

• b body function
• s body structure
• d disability
• e environment

Will assign to examination and interventions as we develop guideline
ICF: Body Function DRF
b260 proprioceptive function
b265 touch function
b840 sensation related to the skin
b280 sensation of pain
b7100- mobility of single joint
b7101 mobility of several joints
b715 stability of joint functions (DRUJ)

ICF: Body Function DRF
b7300 power of isolated muscles and muscle groups
b7301 power of muscles of one limb
b740 muscle endurance functions
b760 control of voluntary movement functions

ICF Body structure: DRF
s7301 structure of forearm
S770 additional musculoskeletal structures related to movement

ICF Activities and Participation DRF
d234 Carrying out daily routine
d360 Using communication devices and techniques
d430 Lifting and carrying objects
d4400 Picking up
d4402 Manipulating
d4450 Pulling
d4451 Pushing
d4453 Turning or twisting the hands or arms

ICF Activities and Participation DRF
d470 Using transportation
d475 Driving
d430 Toileting
d630 Preparing meals
d640 Doing housework
d920 Recreation and leisure

WHAT IS THE CLINICAL MANAGEMENT BY SURGEON
Non operative
• Cast/splint
Operative
• ORIF volar plate
• Percutaneous pinning K wires
• Decision making

Goal: restore anatomy
CLINICAL GUIDELINES: Examinations

Outcomes Measures
Physical Impairment
Activities and Participation

Examination: Outcome Measures
- Patient-rated Wrist Evaluation
- Work and performing arts/sports modules
- Quick DASH
- Patient Specific Functional Scale

Examination: Activities and Participation

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>Inception</th>
<th>Measure for Assessing Activity and Participation in DRF</th>
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</thead>
<tbody>
<tr>
<td>QuickDASH</td>
<td>Beaton 2005</td>
<td>Goldhahn 2014</td>
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<tr>
<td>Patient-Specific Functional Scale</td>
<td>Stratford 1995</td>
<td>Fairbairn 2012</td>
</tr>
</tbody>
</table>

Examination: Physical Impairment
- Edema- Figure-of-8, volume displacement
- Pain- NRS
- Sensibility
  - Ten-test screen
  - Semmes-Weinstein monofilaments
  - Static 2-point
  - Moving 2-point
- Range of motion
- Dexterity
  - FDT
- Joint position sense
  - Karagiannopoulos et al 2013
- Grip strength
  - Max grip vs. sustained grip force
- Push off test
  - Israel et al 2014

Jebesen-Taylor Hand Function Test has poor validity and responsiveness when applied to surgically-treated hand patients, including those with DRFs.
Sears and Chung 2010
Dexterity- what measure to suggest?
Functional Dexterity Test?
Examination: Physical Impairment

Active wrist JPS test

- Simple protocol: Passive positioning/Active reproduction
- Most clinically meaningful test for SM impairment following DRF
- Strongly correlated with function (PRWE) and pain

Kariagiannopoulos, Siler, Michlovitz, Tierney. JHT, 2013; 26(3); 204-215.

Examination: Physical Impairment

Ability to weight bear
Push off test
When weight bearing permitted


CLINICAL GUIDELINES:

Interventions

DRF Rehabilitation phases

Early protection (fracture healing) phase:
- Patient education and counseling
- Pain management
- Edema management
- Sensibility management
- Post-operative scar management
- PROM/A/AAROM
- Conscious proprioception: JPS training

Later Mobilization phase:
- Neuromuscular training
- Strengthening
- ADLs and work re-integration

INTERVENTION DRF:

PATIENT EDUCATION AND COUNSELING

Path to recover
Educating about pain
Counseling patients at high risk for (another) fracture

INTERVENTION DRF:

DIAGNOSIS SPECIFIC INSTRUCTIONS

- Incorporating home exercise programs
INTERVENTION DRF: MANUAL THERAPY

• Joint mobilization?
• Scar mobilization?

INTERVENTION DRF: THERAPEUTIC EXERCISE AND ACTIVITIES

INTERVENTION DRF: NEUROMUSCULAR RE-EDUCATION

Splints and/or Custom Orthoses

• Protect structures during fracture healing
• Restore motion
• Provide stability

INTERVENTION DRF PAIN AND EDEMA CONTROL MODALITIES

Intervention:
Supervised therapy compared to Home exercise program

• Studies that compared patients with complications following DRF have not been found
• In patients without complications no difference in outcomes between supervised clinic-based versus

There have been challenges to supervised in clinic therapy following DRF
American Academy of Orthopedic Surgery v1.0 12-05-2009
A home exercise program is an option for patients prescribed therapy after distal radius fracture.
• Strength of Recommendation: Weak

The five studies reviewed excluded, by design, patients with complications (finger stiffness, CRPS)

The summary reflects the effect of therapy in DRF that were healing without any adverse events.

Discussion?
Questions?
Comments?

(some) References

References - Prognosis

(some) References

References - Prognosis
References – Outcome Measures


Dixon D, Johnston M, McQueen M, Court-Brown C. The Disabilities of the Arm, Shoulder and Hand Questionnaire (DASH) can measure the impairment, activity limitations and participation restriction constructs from the International Classification of Functioning, Disability and Health (ICF). BMC Musculoskelet Disord 2008 Aug 20;9:114.