Forearm Rotation Limitations Following Trauma

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IAOM-US Hand & Upper Extremity Track
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Mirka Normand, MA, OTR/L, CHT, COMT

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Objectives

- Identify anatomic structures that comprise the DRUJ, PRUJ, and IOM that can become potential pain generators and inhibitors of forearm motion.
- Explain how the volar and dorsal radioulnar ligaments play a key role in stabilization of the distal radioulnar joint (DRUJ).
- Demonstrate how to test for alignment issues at the DRUJ and limitations at the proximal radioulnar joint (PRUJ).
- Perform joint mobilization techniques at the PRUJ to facilitate improved forearm pronation and supination.
- Issue home programs which help patients maximize forearm rotation including neuromuscular re-education at the PRUJ

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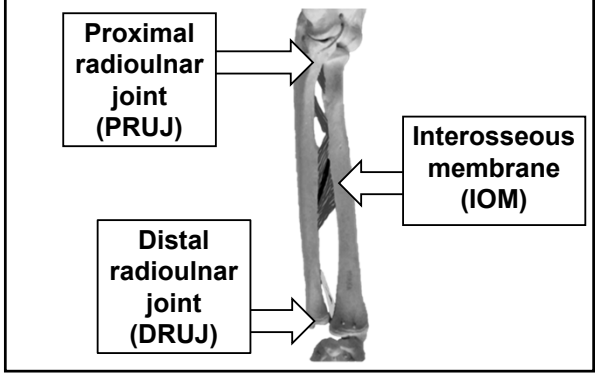
The key players….



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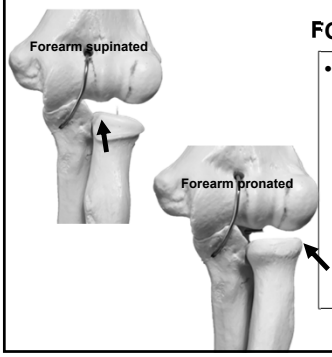
The forearm: radioulnar articulation



FOREARM PRONATION

- the bony thickening on the proximal aspect of the radial head pushes the radius distally; however, the radius "shortens" as it crosses over the ulna

4

The forearm: radioulnar articulation

P-A view of a left wrist

FOREARM PRONATION

- at the distal radioulnar joint (DRUJ), the ulnar head will appear "longer"

5

The forearm: radioulnar articulation

FOREARM SUPINATION

- the bony thickening on the proximal aspect of the radial head rests between the capitulum & trochlea
- causes the radius to translate proximally

6

The forearm: radioulnar articulation

A-P view of a left wrist

FOREARM SUPINATION

- at the distal radioulnar joint (DRUJ), the ulnar head will appear to "shortened"

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Interosseous membrane (IOM)

- provides a unique function for stability at the DRUJ and the ulnar aspect of the wrist
- tough membrane not easily injured, but can be torn with a traumatic event

FUNCTIONS:

- almost no nociceptors
- load transfer system
- proprioceptive function: involved in coordination of the forearm
- mechanics: holds the radius & ulna together as a unit

Razak, H.R.B.A., An anatomical and biomechanical assessment of the interosseous membrane of the cadaveric forearm. Journal of Hand Surgery (European Volume) 2020; 45(4) 369-374.

Stuart PR, Berger RA, Linscheid RL, An K. The dorsopalmar stability of the distal radioulnar joint. J Hand Surg 2000; 25A:689-699.

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Interosseous membrane (IOM)

- **axis of rotation: from ulnar head (fovea) to radial head**
- **fibers are almost parallel to the pronation/supination axis**

Altman E. The ulnar side of the wrist: clinically relevant anatomy and biomechanics. J Hand Ther. 2016;29:111-122.

Kholinne, E., Kwak, J-M., Sun, Y., Koh, K-H. & Jeon, I-H. The role of the interosseous ligament in forearm rotation: A biomechanical study. Journal of Orthopaedic Surgery. 2020; 28(3).

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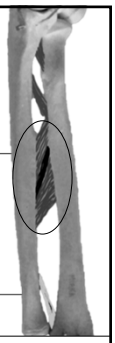
Interosseous membrane (IOM)



FIBER TYPES:

Middle ligamentous complex

- **attached from the distal ulna to the proximal radius**
- **increased tension in neutral or slight supination**
- **increased tension with UE weight-bearing**

Formerly known as OA Fibers (Oblique-A)

Razak, H.R.B.A., An anatomical and biomechanical assessment of the interosseous membrane of the cadaveric forearm. Journal of Hand Surgery (European Volume) 2020; 45(4) 369-374.

Farr LD, et al. Anatomy and biomechanics of the forearm interosseous membrane. J Hand Surg Am. 2015; 40(6):1145-1151..

Adams JE. Forearm instability: anatomy, biomechanics, and treatment options. J Hand Surg Am. 2017; 42(1):47-52..

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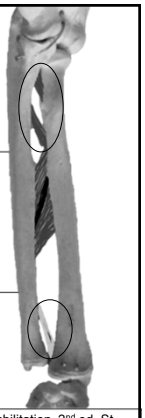
Interosseous membrane (IOM)



FIBER TYPES:

Proximal and Distal membranous portions

- **attached from the proximal ulna to the distal radius**
- **increased tension with radial distraction**
- **increased tension in pronation**

Formerly known as OB Fibers (Oblique-B)

Adams JE. Forearm instability: anatomy, biomechanics, and treatment options. J Hand Surg Am. 2017; 42(1):47-52..

Neumann D. Kinesiology of the musculoskeletal system: foundations for rehabilitation. 2nd ed. St. Louis: Mosby 2010.

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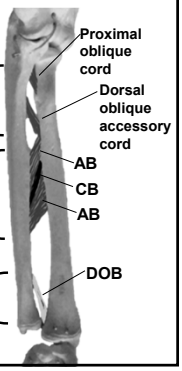
Interosseous membrane (IOM)

FIVE DISCRETE COMPONENTS:

- Central band (CB)
- Distal oblique bundle (DOB) (40% of pop.)
- Accessory band (AB)
- Dorsal oblique accessory cord
- Proximal oblique cord



Trehan SK, Orbay JL, Wolfe SW. Coronal shift of distal radius fractures: influence of the distal interosseous membrane on distal radioulnar joint instability. J Hand Surg Am. 2015; 40:159-162.

Adams JE. Forearm instability: anatomy, biomechanics, and treatment options. J Hand Surg Am. 2017; 42(1):47-52..

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Interosseous membrane (IOM)

kinematics

Cadaveric studies revealed that the distal interosseous membrane (DIOM), especially the distal oblique bundle (DOB) have variable width and thickness. Specimens with a distinct DOB and increased DIOM thickness had increased DRUJ stability.

Trehan SK, Orbay JL, Wolfe SW. Coronal shift of distal radius fractures: influence of the distal interosseous membrane on distal radioulnar joint instability. J Hand Surg Am. 2015; 40:159-162..

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Interosseous membrane (IOM)

kinematics

Increased dorsal angulation (which can occur with a distal radius fracture) caused interosseous membrane tightness and limited maximum pronation and maximum supination

Kihara H, et al. The effect of dorsally angulated distal radius fractures on distal radioulnar joint congruency and forearm rotation. J Hand Surg. 1996;21(A):40-47.

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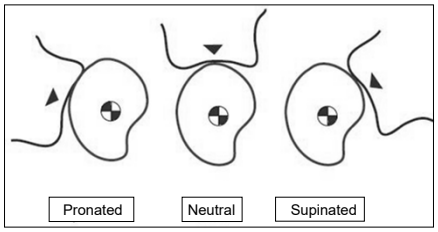
DRUJ: biomechanics



- FA rotation: concave distal radius rolls & glides in the same direction on the fixed distal ulna

Zancolli EA. Atlas of surgical anatomy of the hand. New York: Churchill-Livingstone; 1992:414

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Dynamic Ulnar Variance

FA Supination without Grip

FA Pronation with Grip

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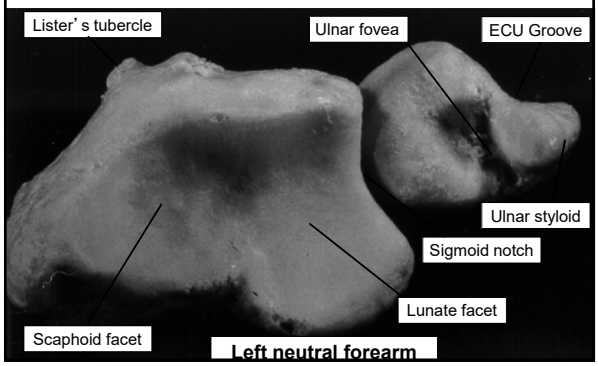
DRUJ: bony anatomy



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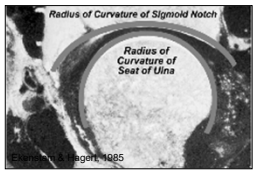
DRUJ: bony anatomy



Transverse section of the DRUJ

"An inherently unstable joint"

Ekenstam A, Hagert C. Anatomical studies on the geometry and stability of the distal radio ulnar joint. Scand J Plast Reconstr Surg 1985; 19:7-25.

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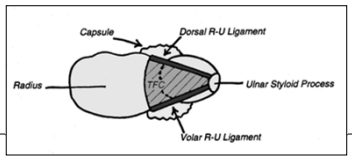
DRUJ: intrinsic stabilizers

- **triangular fibrocartilage (TFC)**
- **volar & dorsal radioulnar ligaments (superficial & deep)**
- **ulnar collateral ligament (UCL)**
- **capsule**



Tsai PC & Paksima N. The distal radioulnar joint. Bulletin of the NYU Hospital for Joint Diseases. 2009; 67(1):90-96.

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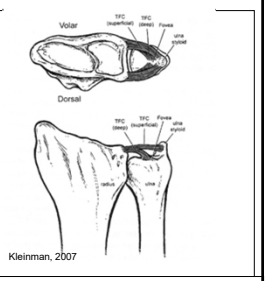
DRUJ: intrinsic stabilizers

volar & dorsal radioulnar ligaments

-superficial: ulnar styloid

-deep: ulnar fovea

(ligamentum subcruentum)



Kleinman W. Stability of the distal radioulnar joint: biomechanics, pathophysiology, physical diagnosis, and restoration of function. What we have learned in 25 years. J Hand Surg 2007; 32A (7):1086-1105.

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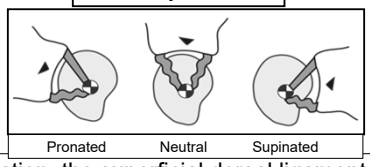
DRUJ: dynamic stability

rotatory motion



- with pronation, the superficial dorsal ligament guides the motion
- with supination, the superficial volar ligament guides the motion

Schuind F, et al. The distal radio ulnar ligaments: A biomechanical study. J Hand Surg 1991; 16A:1106-1114.

Acosta R, Hnat W, Scheker LR. Distal radio-ulnar ligament motion during pronation and supination. J Hand Surg (Br). 1993; 18B: 502-505.

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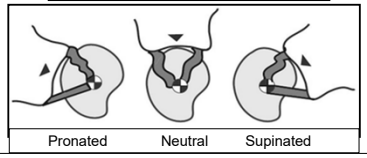
DRUJ: dynamic stability

translatory motion (glide)



- with pronation, the deep volar ligament "catches" the radius, controlling the volar translation
- with supination, the deep dorsal ligament controls the dorsal translation

Ekenstam, FA. Anatomy of the distal radioulnar joint. Clin Orthop Rel Res. 1992; 276: 14-18.

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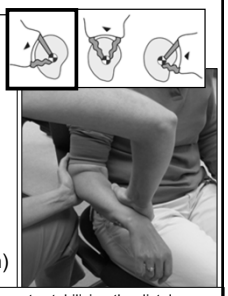
DRUJ: dynamic stability

Both dorsal & volar ligaments contribute to pronation & supination…

Forearm pronation:

Tests superficial dorsal ligament with rotatory pronation (i.e. passive FA pronation)



Xu J, Tang JB. In vivo changes in the lengths of the ligaments stabilizing the distal radioulnar joint. J Hand Surg. 2009; 34A: 40-45.

Acosta R, Hnat W, Scheker LR. Distal radio-ulnar ligament motion during pronation and supination. J Hand Surg (Br). 1993; 18B: 502-505.

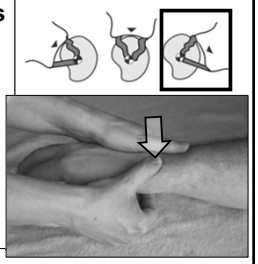
23

DRUJ: dynamic stability

Both dorsal & volar ligaments contribute to pronation & supination…

Forearm pronation:

Tests deep volar ligament with volar translation (i.e. translation testing in pronation)



Xu J, Tang JB. In vivo changes in the lengths of the ligaments stabilizing the distal radioulnar joint. J Hand Surg. 2009; 34A: 40-45.

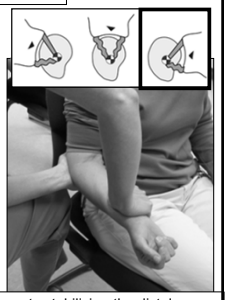
24

DRUJ: dynamic stability

Both dorsal & volar ligaments contribute to pronation & supination…

Forearm supination:

Tests superficial volar ligament with rotatory supination (i.e. passive FA supination)



Xu J, Tang JB. In vivo changes in the lengths of the ligaments stabilizing the distal radioulnar joint. J Hand Surg. 2009; 34A: 40-45.

Acosta R, Hnat W, Scheker LR. Distal radio-ulnar ligament motion during pronation and supination. J Hand Surg (Br). 1993; 18B: 502-505.

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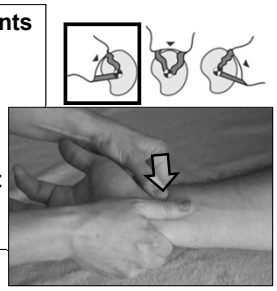
DRUJ: dynamic stability

Both dorsal & volar ligaments contribute to pronation & supination…

***Forearm supination*:**

Tests deep dorsal ligament with dorsal translation (i.e. translation testing in supination)



Xu J, Tang JB. In vivo changes in the lengths of the ligaments stabilizing the distal radioulnar joint. J Hand Surg. 2009; 34A: 40-45.

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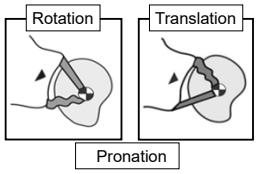
DRUJ: dynamic stability



• with pronation, the superficial dorsal R-U ligament tightens (controlling rotation) and the deep volar R-U ligament tightens (controlling translation)

Xu J, Tang JB. In vivo changes in the lengths of the ligaments stabilizing the distal radioulnar joint. J Hand Surg. 2009; 34A: 40-45.

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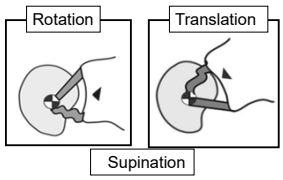
DRUJ: dynamic stability



• with supination, the superficial volar R-U ligament tightens (controlling rotation) and the deep dorsal R-U ligament tightens (controlling translation)

Xu J, Tang JB. In vivo changes in the lengths of the ligaments stabilizing the distal radioulnar joint. J Hand Surg. 2009; 34A: 40-45.

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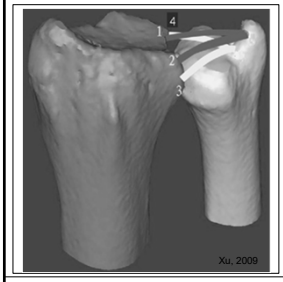
DRUJ: dynamic stability



• **dynamic loading is an important component of DRUJ instability**

• **Under loaded conditions, the foveal insertion had a greater effect on stability than did the styloid insertion**

Xu J, Tang JB. In vivo changes in the lengths of the ligaments stabilizing the distal radioulnar joint. J Hand Surg. 2009; 34A: 40-45.

Haugstvedt J, et al. Relative contributions of the ulnar attachments of the triangular fibrocartilage complex to the dynamic stability of the distal radioulnar joint. J Hand Surg. 2006; 31: 445-451.

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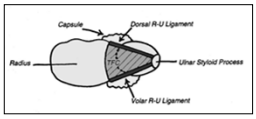
DRUJ: intrinsic stabilizers



capsule

• DRUJ joint capsule provides no significant stability in neutral or mid-range

• provides stability at end-range forearm pronation & supination

Wantanabe H, Berger R, Berglund LJ, Zobitz ME, An KN. Contribution of the interosseous membrane to distal radioulnar joint constraint. J Hand Surg 2005; 30A:1164-1171.

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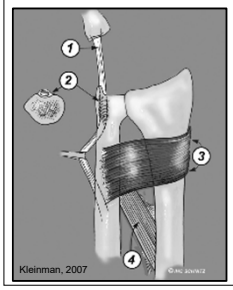
DRUJ: extrinsic stabilizers



1-ECU tendon

2-ECU subsheath

3-Pronator Quadratus

4-distal portion of IOM

Kleinman W. Stability of the distal radioulna joint: biomechanics, pathophysiology, physical diagnosis, and restoration of function. What we have learned in 25 years. J Hand Surg 2007; 32A (7):1086-1105.

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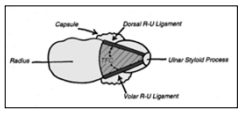
DRUJ: rotational stability

- The R-U ligaments and TFC play a key role in stability of the DRUJ in absence of the distal portion of the interosseous membrane (IOM)
- If distal IOM is intact, injury to the R-U ligaments will not demonstrate an instability



Gofton WT, Gordon KD, Dunning CD, Johnson JA, King GJ. Soft-tissue stabilizers of the distal radioulnar joint: an in vitro kinematic study. J Hand Surg. 2004; 25(3):423-431.

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DRUJ: longitudinal stability

- **when superficial & deep fibers of the volar & dorsal radioulnar (R-U) ligaments were transected, the radius migrated proximally with load** **Positive Ulnar Variance**
- **clinical application: following traumatic injury to the ulnar wrist, radiographic evidence of an ulnar + wrist may indicate disruption of the deep fibers of the TFCC**

Shen J, et al. Ulnar-positive variance as a predictor of distal radioulnar joint ligament disruption. J Hand Surg 2005; 30A: 1172-1177.

33

Distal radial fracture: a benign trauma?

Increased dorsal angulation (which can occur with a distal radius fracture) caused interosseous membrane tightness and limited maximum pronation and maximum supination

Prior to fracture

Post-fracture

Increased dorsal angulation

Kihara H, et al. The effect of dorsally angulated distal radius fractures on distal radioulnar joint congruency and forearm rotation. J Hand Surg. 1996;21(A):40-47.

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Distal radius fracture: restricted forearm rotation

- As little as 10° of dorsal angulation significantly increased distal displacement of the ulna with the TFCC intact
- When the TFCC was sectioned, a significant increase in volar, dorsal, and distal displacement of the ulna occurred

Nishiwaki M, Welsh M, Gammon B, et al. Distal radioulnar joint kinematics in simulated dorsally angulated distal radius fractures. J Hand Surg. 2014; 39(4): 656-663.

35

Distal radius fracture: restricted forearm rotation

Evaluated 22 cases of healed distal radius fractures with restricted forearm rotation….

- Limited pronation: ulnar head was located volarly with severe dorsal tilt of the distal radius
- Limited supination: ulnar head was located dorsally with severe ulnar-positive variance

Ishikawa J, et al. Influence of distal radioulnar joint subluxation on restricted forearm rotation after distal radius fracture. J Hand Surg. 2005; 30A:1178-1184.

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Forearm rotation limitations can occur from…

- **The proximal radioulnar joint (PRUJ)**
- **The interosseous membrane (IOM)**
- **The distal radioulnar joint (DRUJ)**

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Forearm Rotation Assessment: PROM

- **Forearm pronation:**

•Stabilize the humeral epicondyles to prevent shoulder compensation.
•Guide forearm through full range of passive pronation with a lumbrical grip of the distal forearm.
•Apply gentle overpressure at end range.

Note: Overpressure should be applied perpendicular to the dorsal aspect of the distal radius.

Compare with uninvolved side

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Forearm Rotation Assessment: PROM

- **Forearm supination:**

•Stabilize the humeral epicondyles to prevent shoulder compensation.
•Guide forearm through full range of passive supination with a lumbrical grip of the distal forearm.
•Apply gentle overpressure at end range.

Note: Overpressure should be applied perpendicular to the volar aspect of the distal radius.

Compare with uninvolved side

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DRUJ: special tests

- **DRUJ Ballottement test**:

(Assesses DRUJ mobility)

  - For DRUJ instability or TFCC involvement
  - Place the forearm in neutral
  - Firmly grasp the distal radius & carpus
  - Apply a volar-directed force to the distal ulna, perpendicular to the dorsum of forearm, allowing the distal ulna to return to neutral

King GJW. Physical examination of the wrist. In: Gilula LA, Yin, Y (Eds) *Imaging of the wrist and hand,* Philadelphia, WB Sanders, 1996: 5-18.

40

DRUJ: special tests

- **DRUJ Ballottement test:**
  - Then apply a dorsal-directed force, allowing the distal ulna to passively return to neutral
  - Compare the amount of excursion of the affected side to the unaffected
    - (+) test: Increased translation on the affected side

Onishi T, Omokawa S, Iida A, et al. Biomechanical study of distal radioulnar joint ballottement test. J Orthop Res. 2017; 35:1123-1127.

Kim JP and Park MJ. Assessment of distal radioulnar joint instability after distal radius fracture: comparison of computed tomography and clinical examination results. J Hand Surg. 2008; 33A: 1486-1492.

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DRUJ: special tests

- What's the best test to evaluate DRUJ instability?
  - Compared the following clinical tests:
    - Ulno-Carpal Stress test (Nakamura, 1997)
    - Piano-key sign (Cooney, 1998)
    - DRUJ Ballottement test (King, 1996)

…only the DRUJ ballottement test demonstrated a statistically significant degree of accuracy in the evaluation of DRUJ instability

Moriya T, Aoki M, Iba K, et al. Effect of triangular ligament tears on distal radioulnar joint instability and evaluation of three clinical tests: a biomechanical study. J Hand Surg. (European Vol) 2009; 34E:2:219-223.

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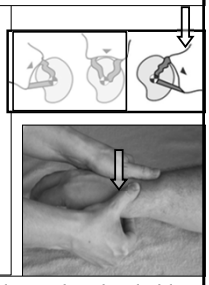
DRUJ: special tests

- **Radio-ulnar ligament additional tests:**

Volar Deep radio-ulnar ligament shift test

- Stabilize distal ulna and ulnar carpal column with a contralateral lumbrical grip; forearm pronated.
- Perform volar translation of the distal radius.
- Let the distal radius return to its original position.
- Repeat translation as needed for better assessment.



(+) test: increased movement compared to uninvolved side

Chidgey LK. The distal radioulnar joint: problems and solutions. J Am Acad Orthop Surg. 1995; 2: 95–109.

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Volar radio-ulnar ligament shift test

Video demonstration

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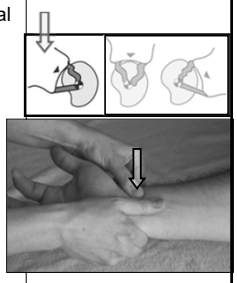
DRUJ: special tests

- **Radio-ulnar ligament additional tests:**

Dorsal Deep radio-ulnar ligament shift test

- Stabilize distal ulna and ulnar carpal column with an ipsilateral lumbrical grip; forearm supinated.
- Perform dorsal translation of the distal radius.
- Let the distal radius return to its original position.
- Repeat translation as needed for better assessment.



(+) test: increased movement compared to uninvolved side

Chidgey LK. The distal radioulnar joint: problems and solutions. J Am Acad Orthop Surg. 1995; 2: 95–109.

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Dorsal radio-ulnar ligament shift test

Video demonstration

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DRUJ: special test interpretation

- If the patient's passive translation test is normal, the DRUJ mobility is normal….performing joint mobilization on the DRUJ may produce hypermobility in the future! ☹

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DRUJ: treatment

- If the DRUJ is hypermobile in one direction and hypomobile in the other…may be a mal-alignment or subluxation of the DRUJ. If you re-position the ulnar head and forearm rotation improves, then consider manual pressure on the ulnar head or splinting to maintain proper alignment!

Goal: optimize alignment & stability of the DRUJ

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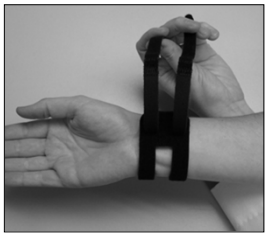
DRUJ: treatment



Wrist Widget

49

DRUJ: treatment

Ulnar Squeeze

50

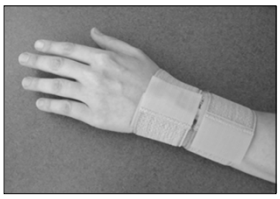
DRUJ: treatment

Bullseye Brace

51

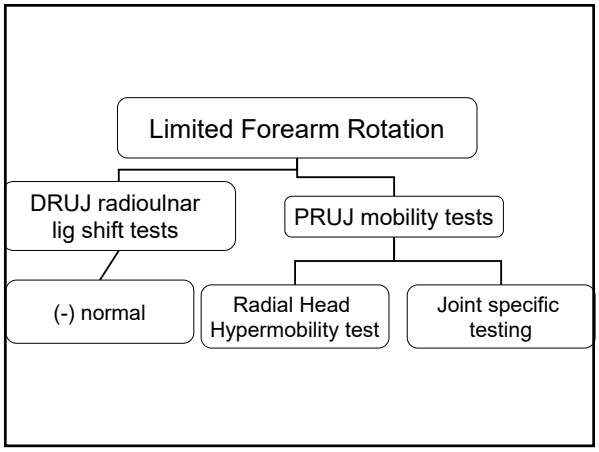
DRUJ: treatment

Wrist Restore



If a patient also has ECU tenosynovitis, the Wrist Restore may not be the best option!

52

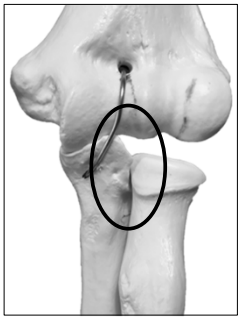


53

Proximal Radioulnar Joint: PRUJ

Maximal loose-packed position

70° Flexion
35° Supination



54

PRUJ: special tests

Radial Head Hypermobility Test

- Palpate the radial head, and maintain your index finger in the joint line
- Note the position of the radial head in relation to the capitulum as passive elbow flexion and extension is performed

55

PRUJ: special tests

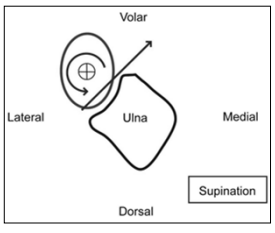
Radial Head Hypermobility Test

- Most common problem: the radial head rests or moves too far in a dorsal-lateral direction
- A malalignment at the PRUJ can contribute to limited forearm rotation
- Compared to unaffected side

56

PRUJ: joint specific tests

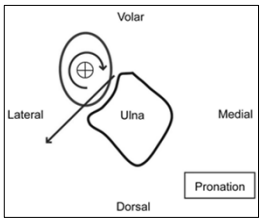
With supination, the radial head rolls in a dorsal-lateral direction & glides in a volar-medial direction



57

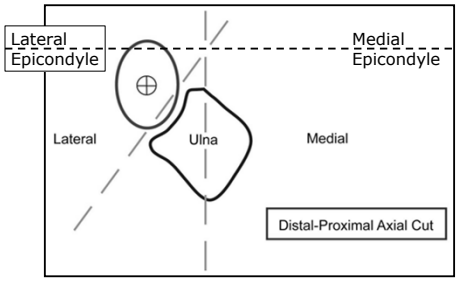
PRUJ: joint specific tests

With pronation, the radial head rolls in a volar-medial direction and glides in a dorsal lateral direction



58

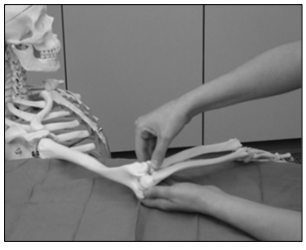
PRUJ: radial notch



59

PRUJ: joint specific tests

Assessing volar-medial & dorsal-lateral glide of the radial head

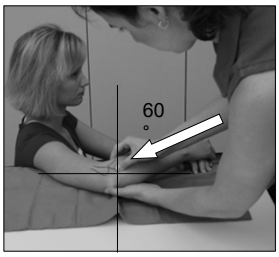


- The patient's forearm now rests on the treatment table
- The patient may assist by using the uninvolved hand to maintain 35° of supination

60

PRUJ: joint specific tests

Volar-medial glide of the radial head

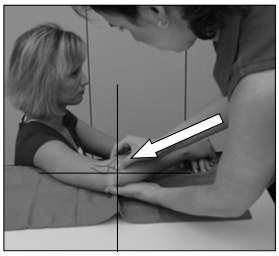


- The patient's ulna is stabilized, while the radial head motion is assessed.
- Direction of testing: 60° from vertical (line through both epicondyles)

61

PRUJ: joint specific tests

Volar-medial glide of the radial head

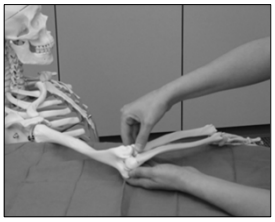


- Assess the **excursion** and **end-feel** of this motion
- If limited, this may contribute to limitations with **supination**!

62

PRUJ: joint specific tests

Dorsal-lateral glide of the radial head

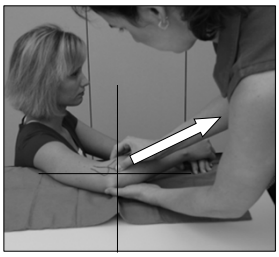


- Now pull in the opposite direction in the same plane to test dorsal-lateral mobility

63

PRUJ: joint specific tests

Dorsal-lateral glide of the radial head



- Assess the **excursion** and **end-feel** of this motion
- If limited, this may contribute to limitations with forearm **pronation**!

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PRUJ: special test interpretation

- If the patient's radial head is hypermobile, consider stabilization with a counterforce brace
- If the PRUJ is hypomobile, perform joint mobilization to improve forearm rotation

65

PRUJ: treatment

Radial Head hypermobility: Counterforce Brace

- A counterforce brace can reposition a malaligned radial head!

this can exacerbate radial tunnel symptoms!

66

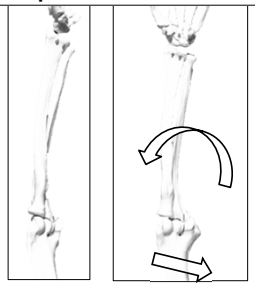
PRUJ: treatment

Neuromuscular Re-education (nm re-ed) for home exercise program

- Gently pull radial head in volar-medial direction with active supination

67

Supination: PRUJ biomechanics



Neutral **Supination**

Proximal Radioulnar Joint (PRUJ)

- Opposite arthrokinematics: The radial head rolls in a dorsal-lateral direction and glides volar-medial
- When facilitating supination, we want to follow the joint's normal arthrokinematics pattern by promoting the glide in a volar-medial direction

Neumann D. Kinesiology of the musculoskeletal system: foundations for rehabilitation. 2nd ed. St. Louis: Mosby 2010.

68

PRUJ: treatment

Radial Head hypomobility:

Improving Supination

Volar-medial glide of the radial head

- May begin treatment in neutral, then pre-position the patient's forearm in supination (available range)

69

PRUJ: treatment

Radial Head hypomobility:

Improving Supination

Volar-medial glide of the radial head

- To add more stretch to the PRUJ capsule, the patient can be pre-positioned in more supination
- 40 second holds x 6 repetitions

70

Volar-Medial Gliding of Radial Head

Video demonstration

71

PRUJ: treatment

Radial Head hypomobility:

Neuromuscular re-education

- Perform gentle passive/active assistive forearm supination; guiding the radial head in a volar-medial direction

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Neuromuscular Re-education: Supination

Video demonstration

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Neuromuscular Re-education for Supination: Home Program

Video demonstration

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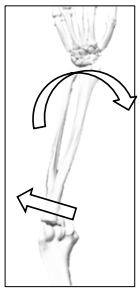
Pronation: PRUJ biomechanics

Neutral



Pronation

Proximal Radioulnar Joint (PRUJ)

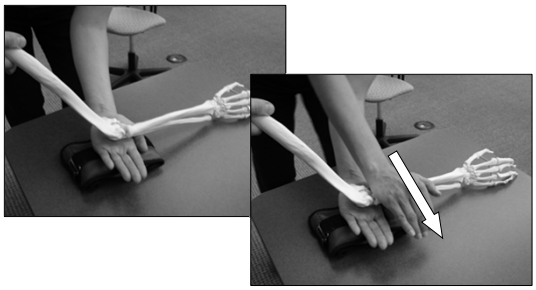
- Opposite arthrokinematics: The radial head rolls in a volar-medial direction and glides dorsal-lateral
- When facilitating pronation, we want to follow the joint's normal arthrokinematics pattern by promoting the glide in a dorsal-lateral direction

Neumann D. Kinesiology of the musculoskeletal system: foundations for rehabilitation. 2nd ed. St. Louis: Mosby 2010.

75

PRUJ: treatment

Dorsal-lateral glide of the radial head



76

PRUJ: treatment

Improving Pronation

Dorsal-lateral glide of the radial head

- The patient's olecranon rests on therapist's hand and a cuff weight.
- The patient's forearm is maintained at 35° of supination with support from towel or cuff weight.

77

PRUJ: treatment

Improving Pronation

Dorsal-lateral glide of the radial head

- May begin treatment in this position (maximal loose-packed position)
- 40 seconds holds x 6 repetitions

78

PRUJ: treatment

Improving Pronation

Dorsal-lateral glide of the radial head

- To add more stretch to the PRUJ joint capsule, the patient can be pre-positioned in more pronation
- 40 second holds x 6 repetitions

79

Dorsal-Lateral Gliding of Radial Head

Video demonstration

80

PRUJ: treatment

Radial Head hypomobility:

Neuromuscular re-education

- Perform gentle passive/active assistive forearm pronation, guiding the radial head in a dorsal-lateral direction.

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Neuromuscular Re-education: Pronation

Video demonstration

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Neuromuscular Re-education for Pronation: Home Program

Video demonstration

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Let's put it all together!

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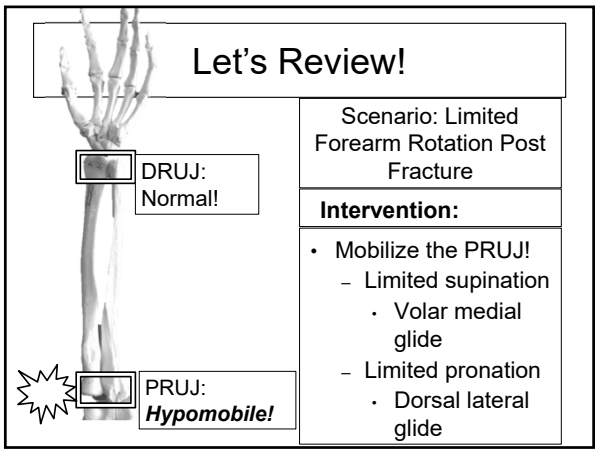
Let's Review!
DRUJ: Normal!
PRUJ: Hypomobile!
Scenario: Limited Forearm Rotation Post Fracture
Intervention:
• Mobilize the PRUJ!
– Limited supination
• Volar medial glide
– Limited pronation
• Dorsal lateral glide

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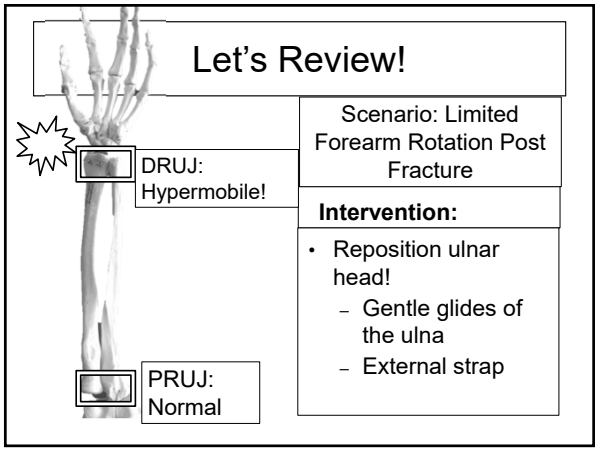
Let's Review!
DRUJ: Hypermobile!
PRUJ: Normal
Scenario: Limited Forearm Rotation Post Fracture
Intervention:
• Reposition ulnar head!
– Gentle glides of the ulna
– External strap

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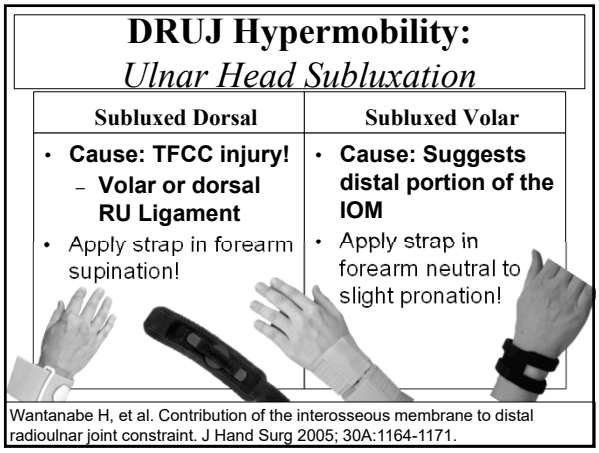
DRUJ Hypermobility:
Ulnar Head Subluxation
Subluxed Dorsal
• Cause: TFCC injury!
– Volar or dorsal RU Ligament
• Apply strap in forearm supination!
Subluxed Volar
• Cause: Suggests distal portion of the IOM
• Apply strap in forearm neutral to slight pronation!
Wantanabe H, et al. Contribution of the interosseous membrane to distal radioulnar joint constraint. J Hand Surg 2005; 30A:1164-1171.

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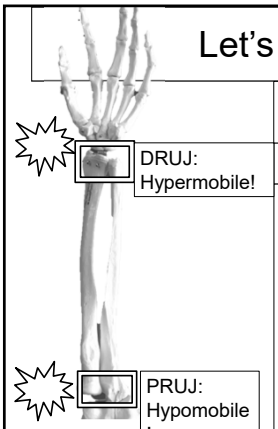
Let's Review!



Scenario: Limited Forearm Rotation Post Fracture

Intervention:

- **DRUJ: Reposition ulnar head!**
  - Gentle glides of the ulna
  - External strap
- **PRUJ: Joint mobilizations**
  - Supination: volar medial glide
  - Pronation: dorsal lateral glide

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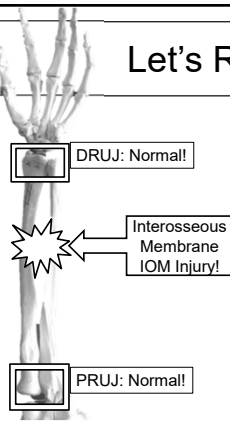
Let's Review!



Scenario: Limited Forearm Rotation Post Fracture

Intervention:

- Education!!
- Adapt activities
- ***No*** manual treatment

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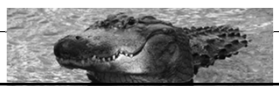
Treatment for forearm rotation limitations when IOM is culprit…

- If a forearm rotation limitation exists with normal mobility at the DRUJ & PRUJ, patient education is critical.
- Caution with joint mobilization, especially at the DRUJ, as this can promote ligamentous instability.
- Caution with static-progressive FA splinting, as this could produce laxity at the DRUJ.



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