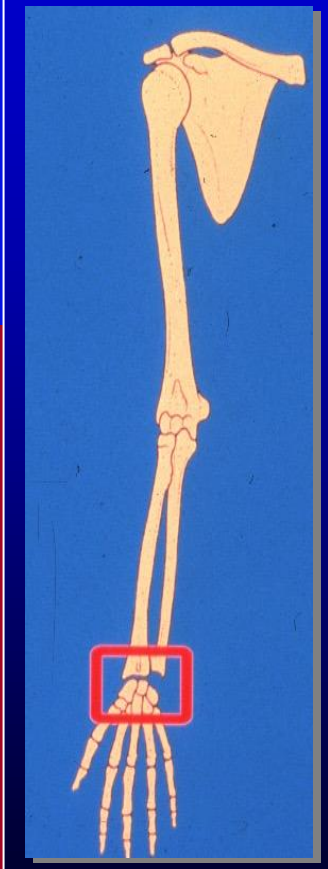
Distal Radius Fractures: Challenges and Opportunities

"The Canary in the Coal Mine" in detection of further fragility fractures



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AOA Own the Bone Program

Disclosures

- AO International Foundation, Hand Expert Group, developer of upper extremity fracture plate designs, per diem from foundation, no royalties etc
- Depuy/Synthes, contracted technical writing consultant and implant development consultant, contract ended.

Learning Objectives

- *Describe the incidence of upper extremity fractures and likelihood of subsequent fractures*
- *Explain challenges in identifying, evaluating, and initiating bone health treatment of upper extremity fracture patients*

Introduction & Assumptions

- Very Common Fracture - ? 640K/Yr USA
- Affects Very Young and Very Old
  - These are the populations that need least surgical intervention
- Surgical Indications May Depend on Patient Demands More Than X-ray Appearance
- Surgical Indications are evolving

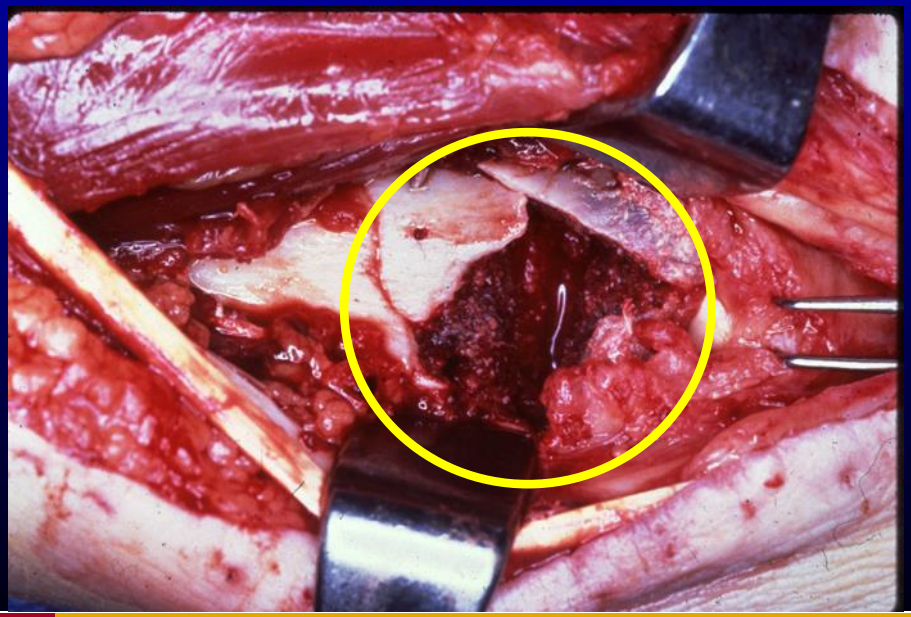
Colles 1814 Prior to Xray

- **Restoration of anatomy, especially articular congruity correlates with good results.**
- **…… Or, should he mistake the case for a dislocation of the wrist, and attempt to retain the parts in situ by light bandages and splint, the pain caused by the "pressure " on the back of the wrist will force him to unbind them; and if they are applied more loosely, he will find, at the expiration of a few weeks, that the deformity still exists in its fullest extent. (Abraham Colles, 1814)**

Wilhelm Roentgen - 11/8/1895

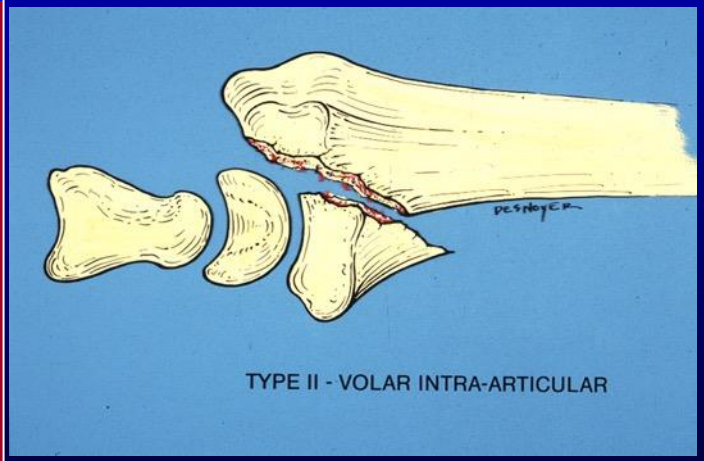
The Problem - DRFx

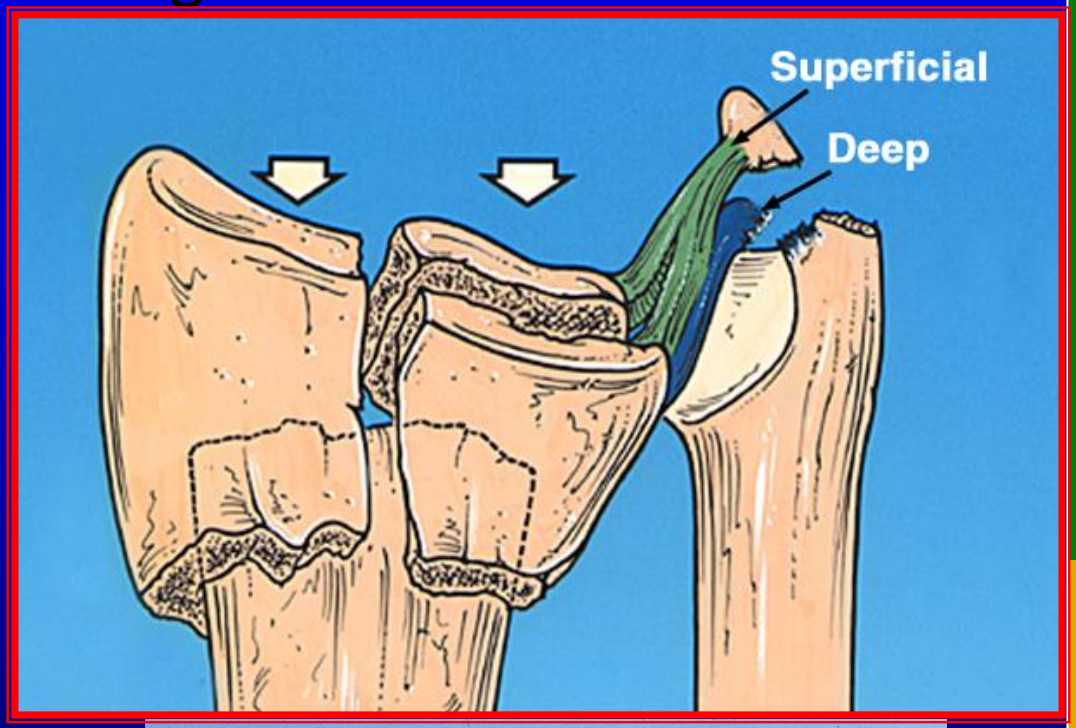
- Central depression of articular surface
- Restore the ”shell” of cortical and subchondral bone
- Leaves the cancellous bone compacted

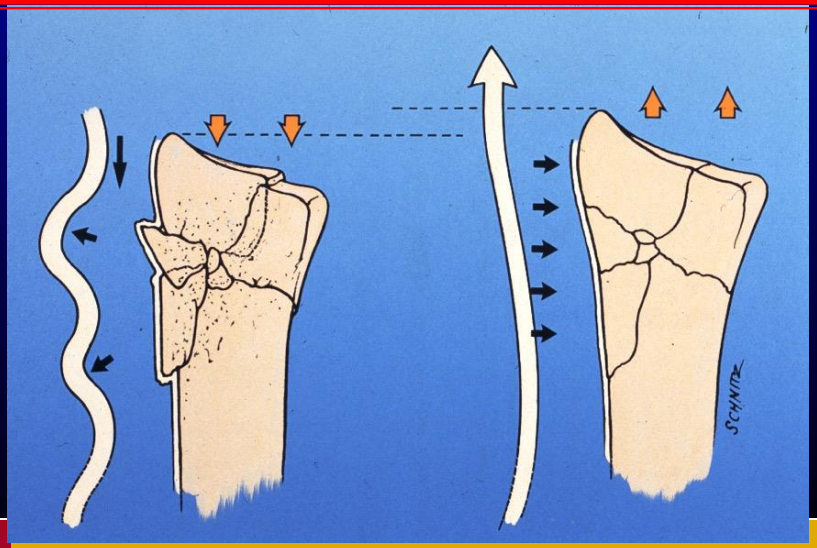


Patterns of Fracture - Diego Fernandez Switzerland

- **Shear**
- **Bending**
- **Compression**
- **Avulsion**

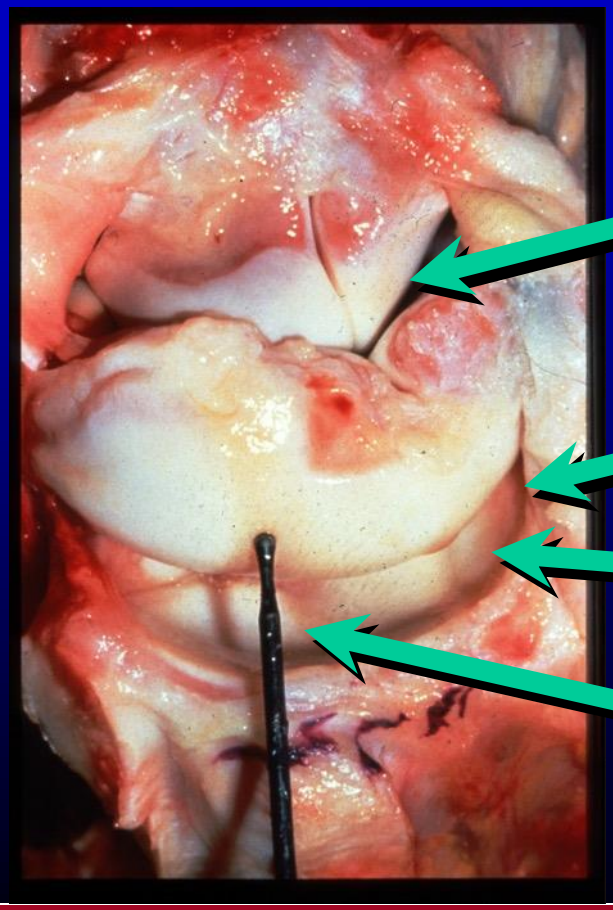






The Distal Radius Bone Map

- **Wrist, 3 Columns, 3 joints**



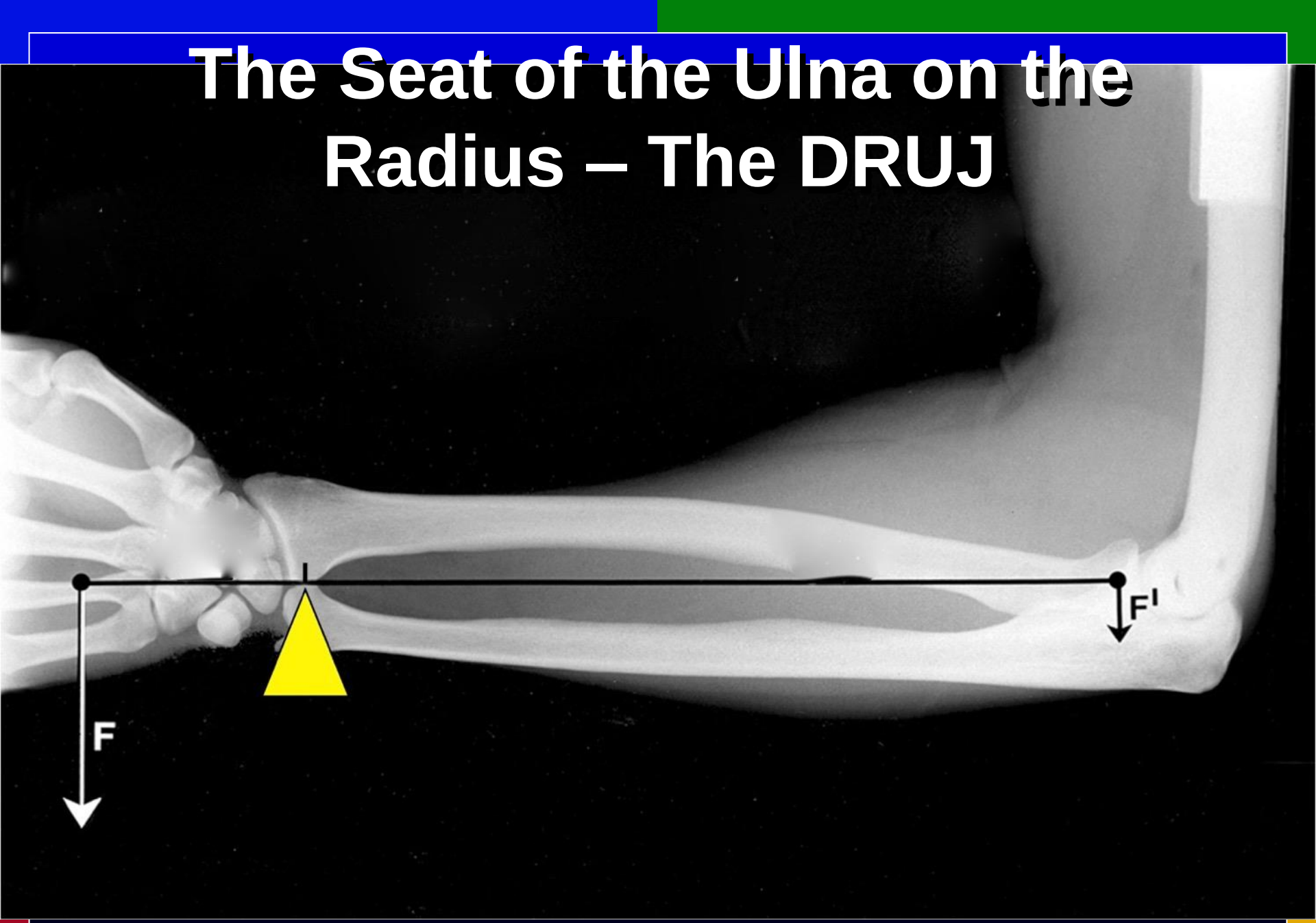
Midcarpal joint

radiocarpal joint

Ulna/Distal RU Joint

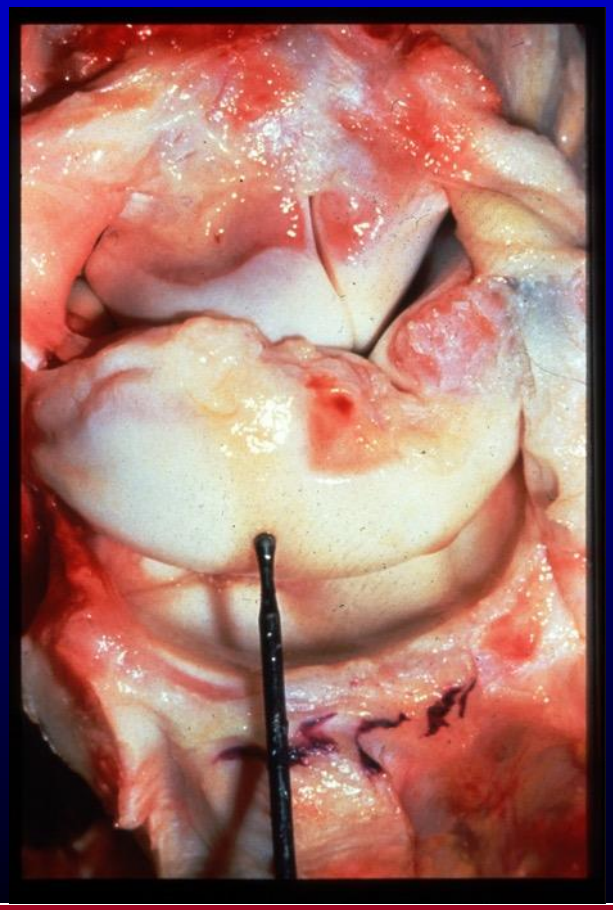
Radius

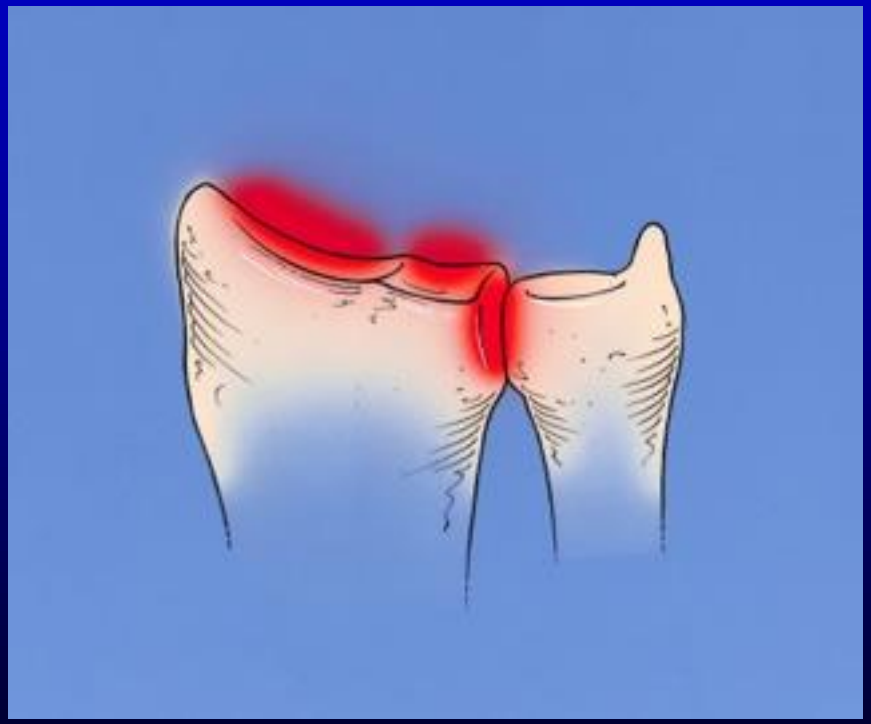
The Seat of the Ulna on the Radius – The DRUJ



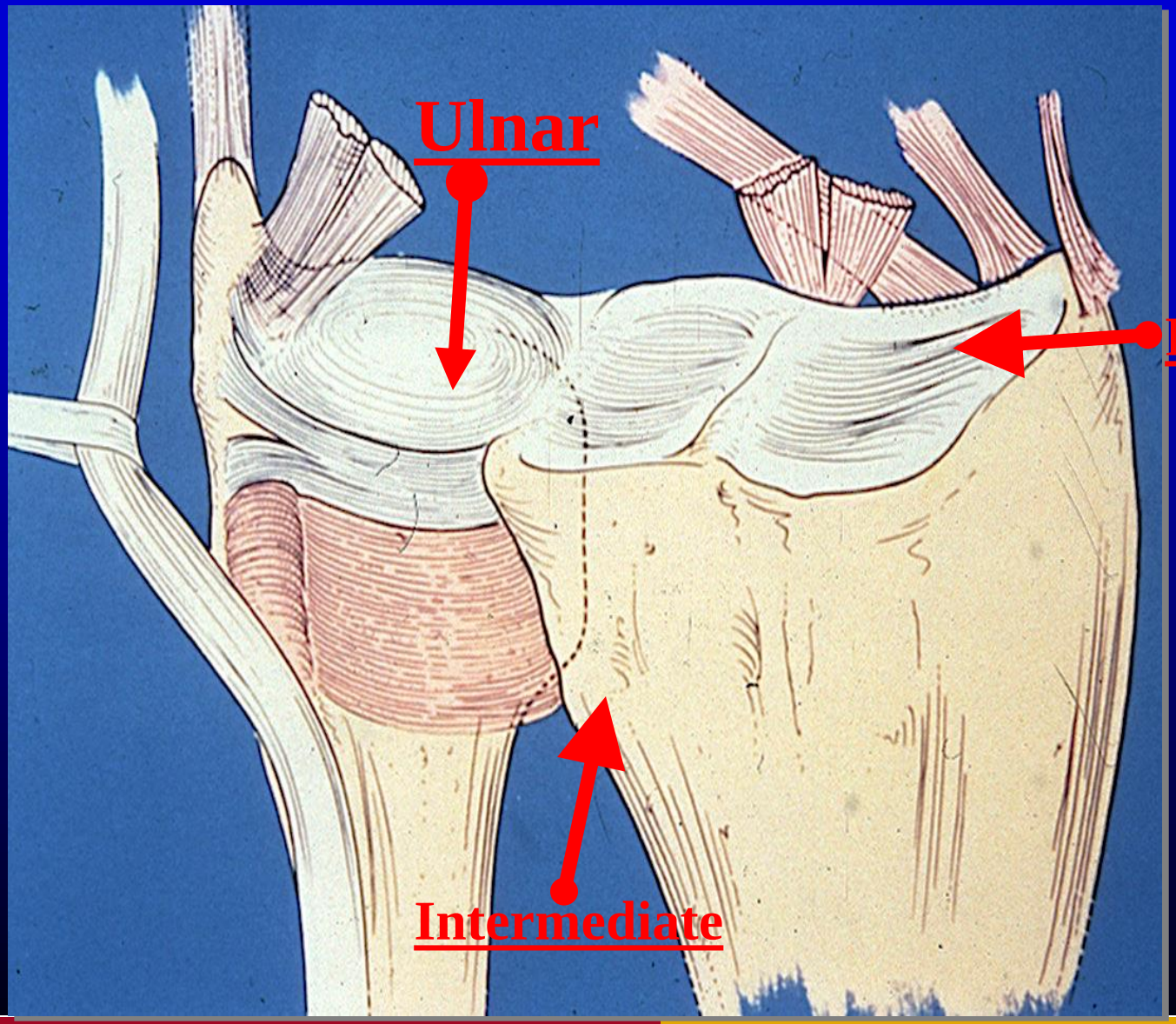
The Distal Radius Bone Map

- **Lunate fossa and sigmoid notch has relatively dense bone.**





Column Concept Expanded



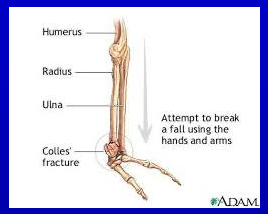
Scaphoid fossa

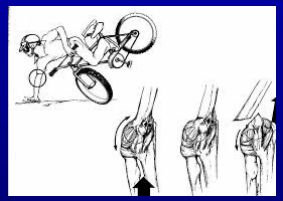
Lunate Fossa

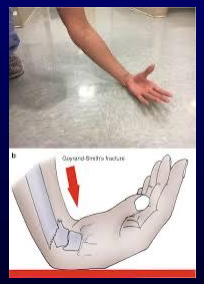
DRUJ

FOOSH – Fall On Out Stretched Hand

Google Search





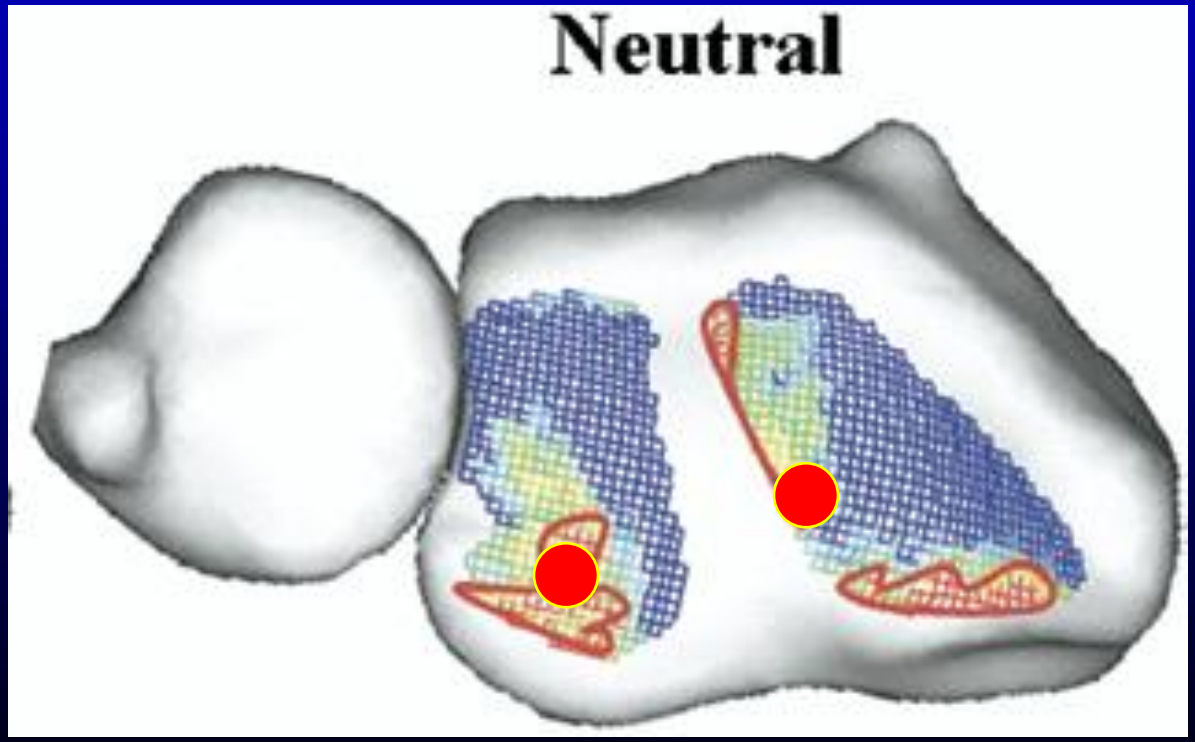


Gravity is not just a good idea…….. It's the LAW, Tom FIscher

Load Transmission Through the Wrist in the Extended Position

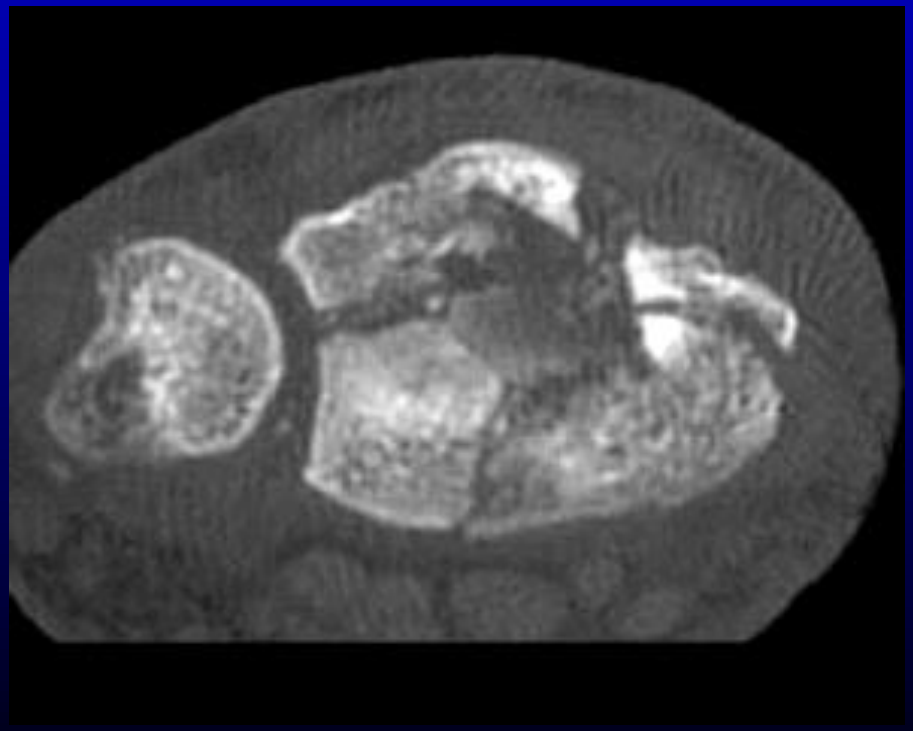
Masataka Majima, MD, Emiko Horii, MD, Hiroshi Matsuki, MD, Hitoshi Hirata, MD, Eiichi Genda, MD

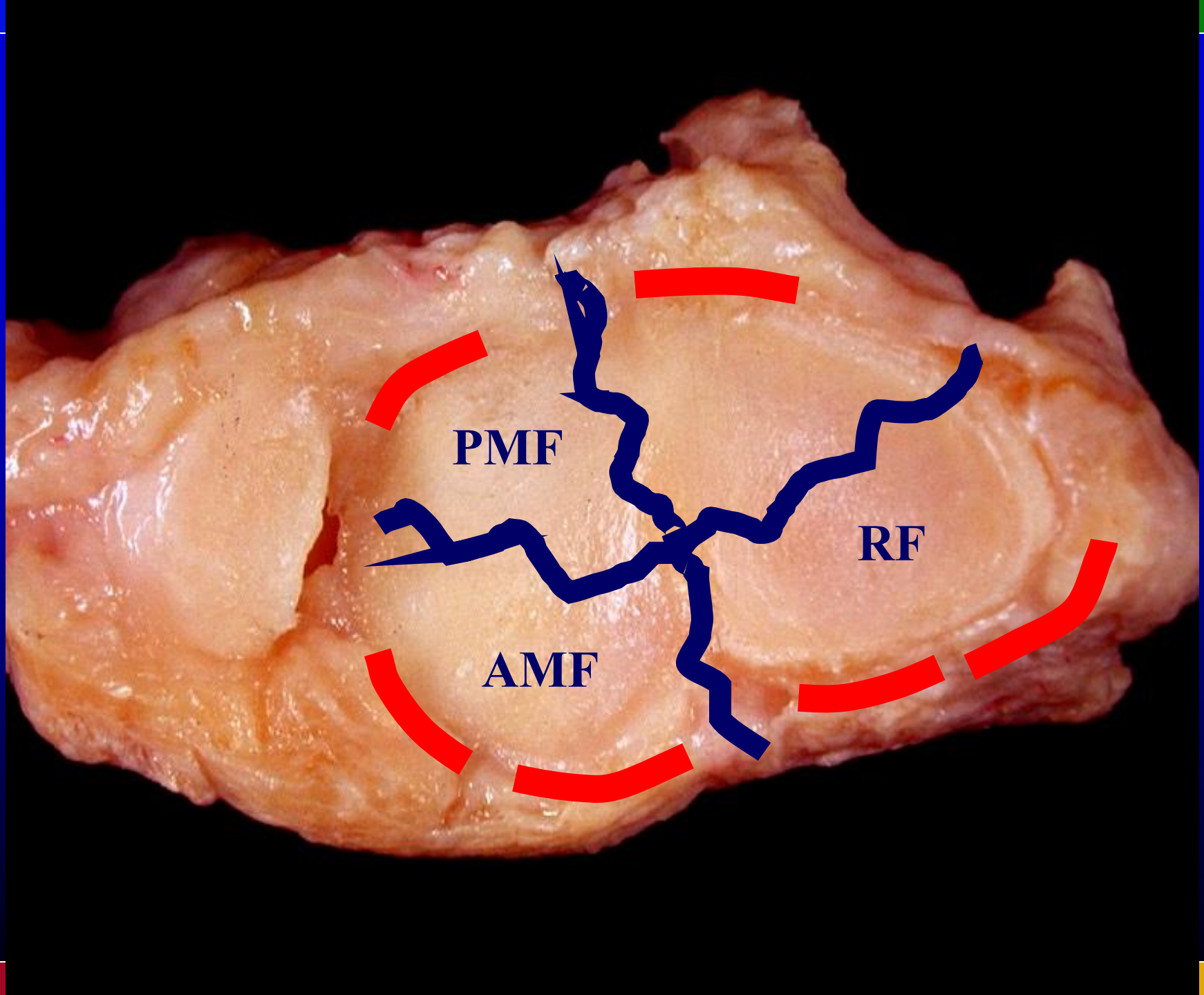
(J Hand Surg 2008;33A:182 – 188.)



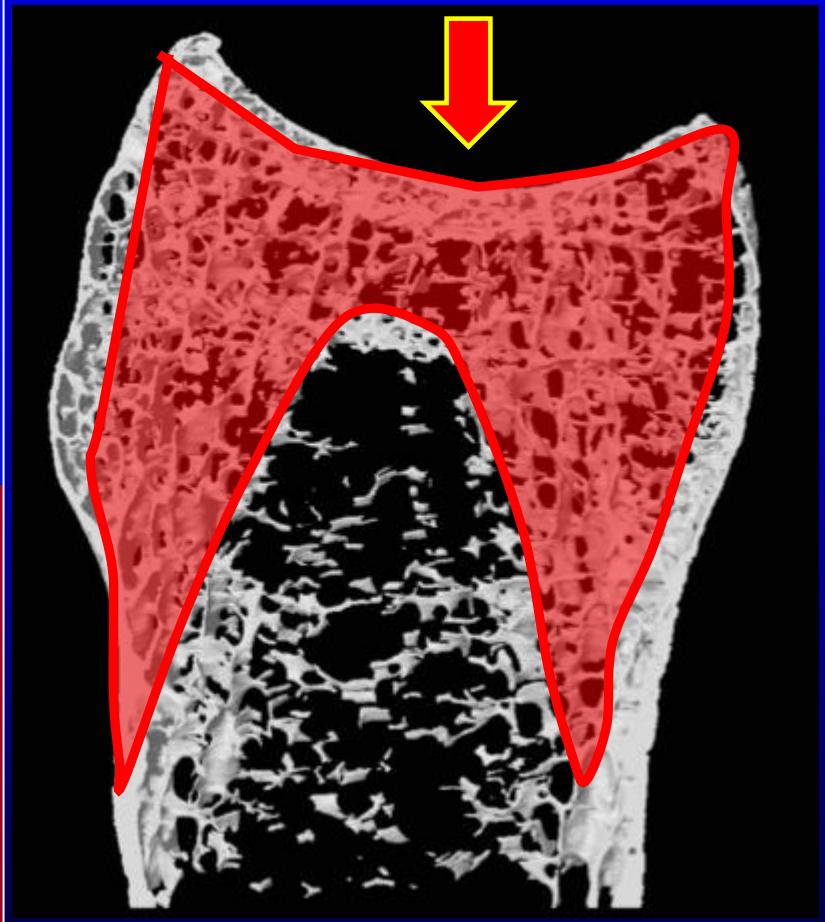
Ligament Contribution to Patterns of Articular Fractures of the Distal Radius

Daniel G. Mandziak, MBBS, Adam C. Watts, MBBS,
Gregory I. Bain, PhD,
Journal of Hand Surgery. 2011.07.014



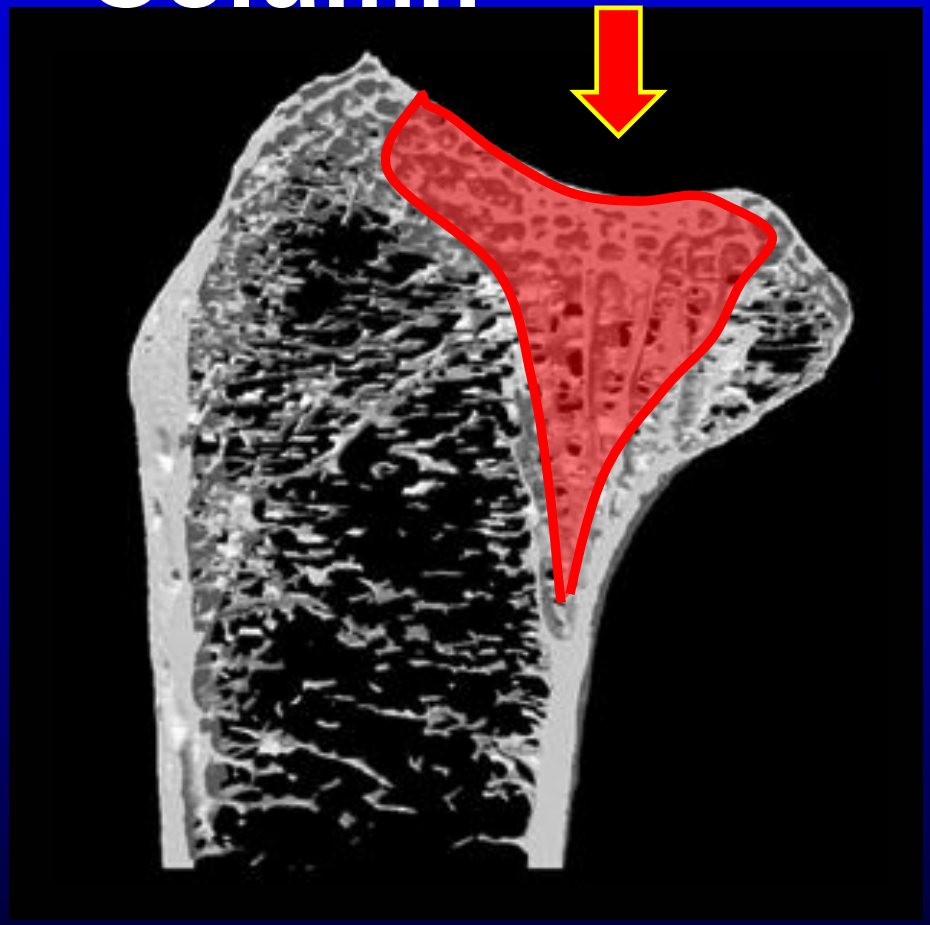

PMF
RF
AMF

Radial Column

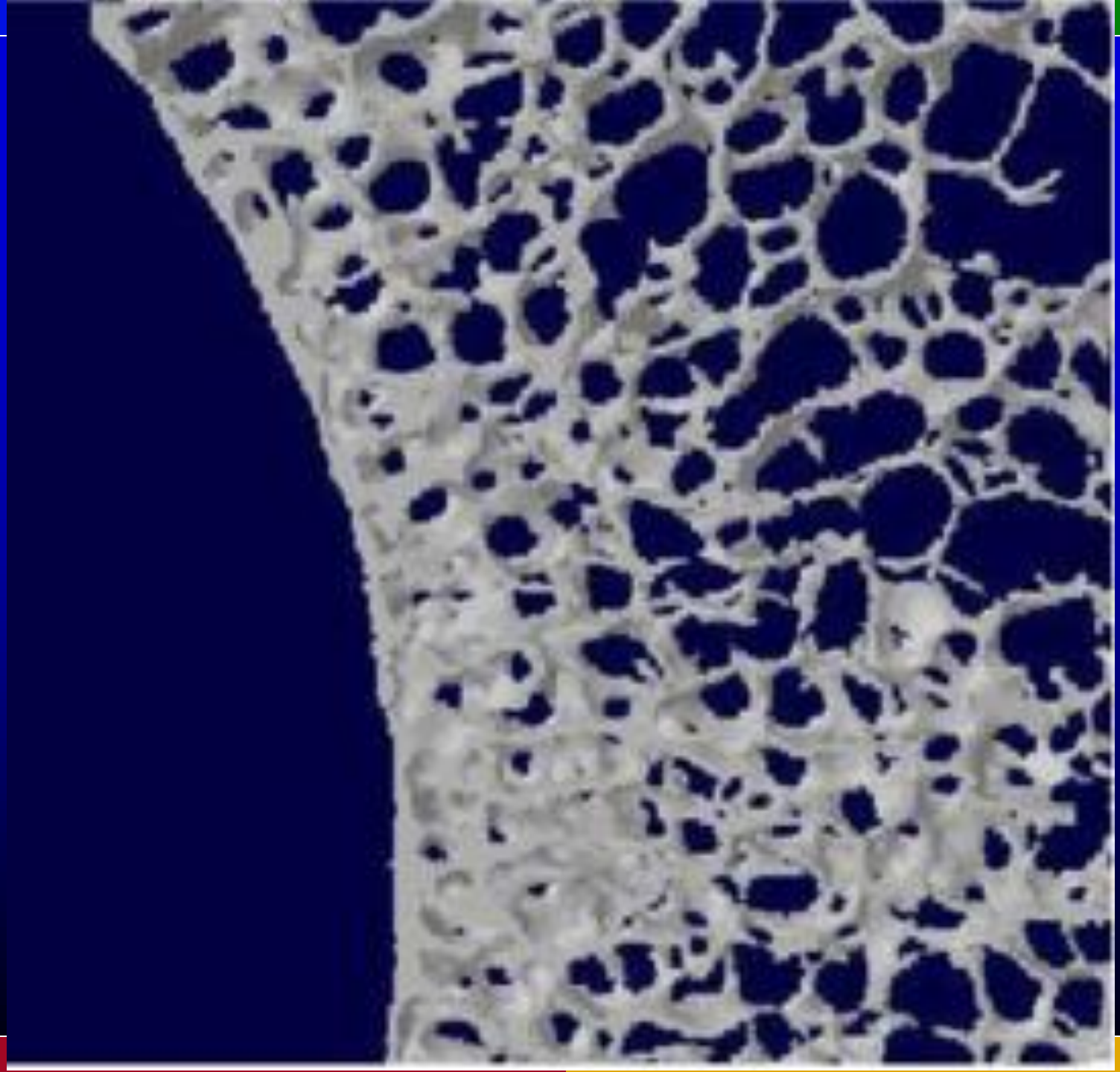


Scaphoid Fossa

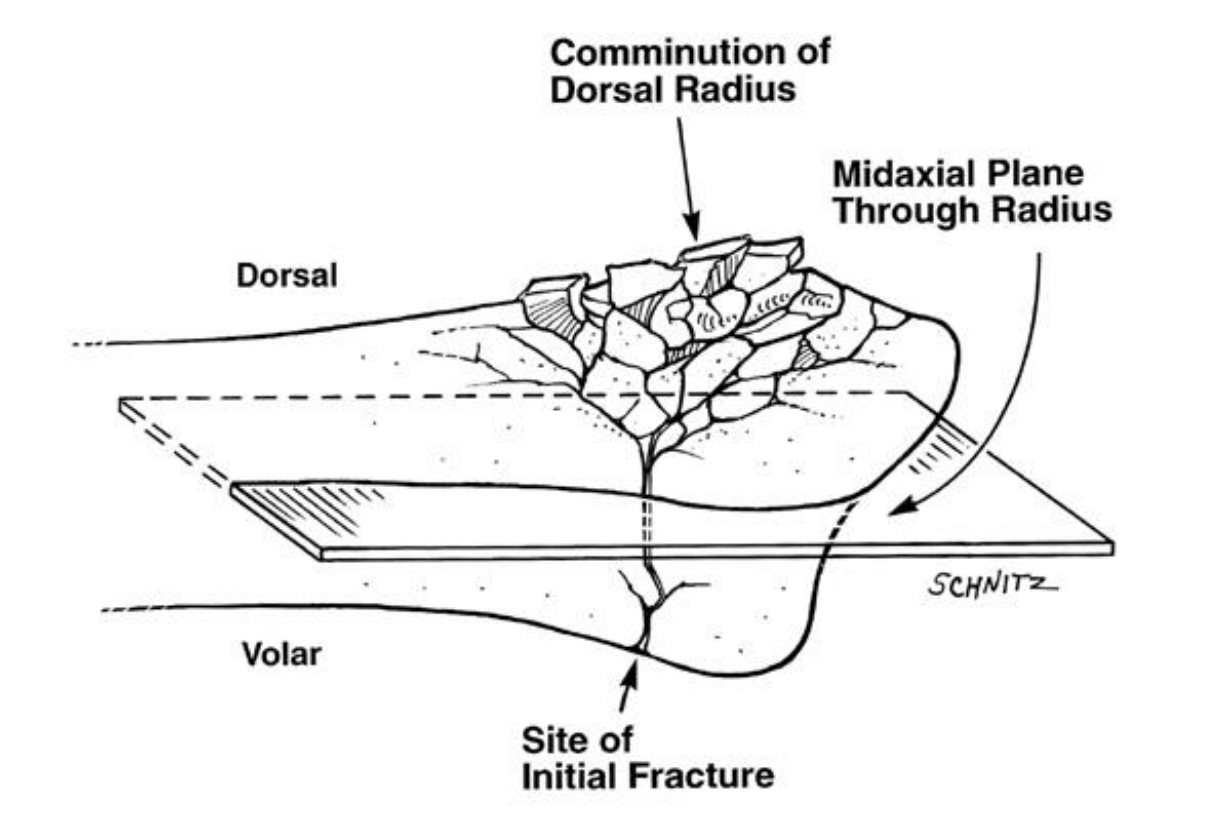
Intermediate Column



Lunate Fossa

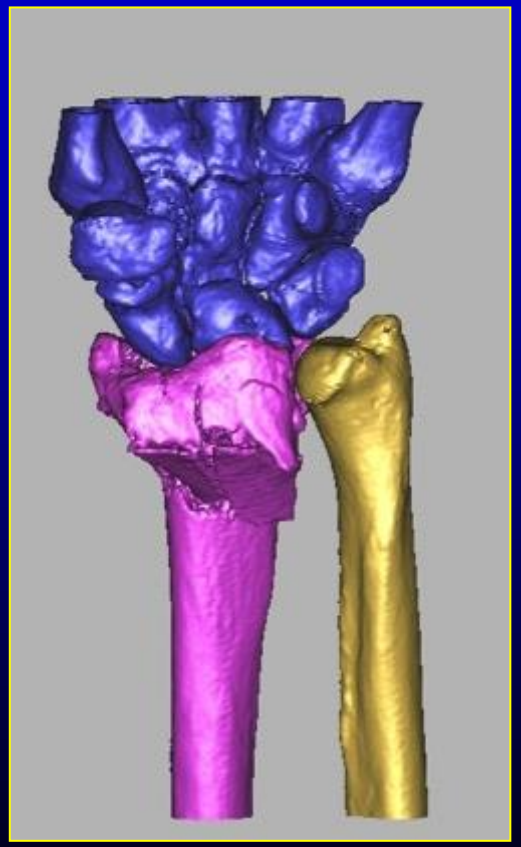


Comminution – aka Fragmentation



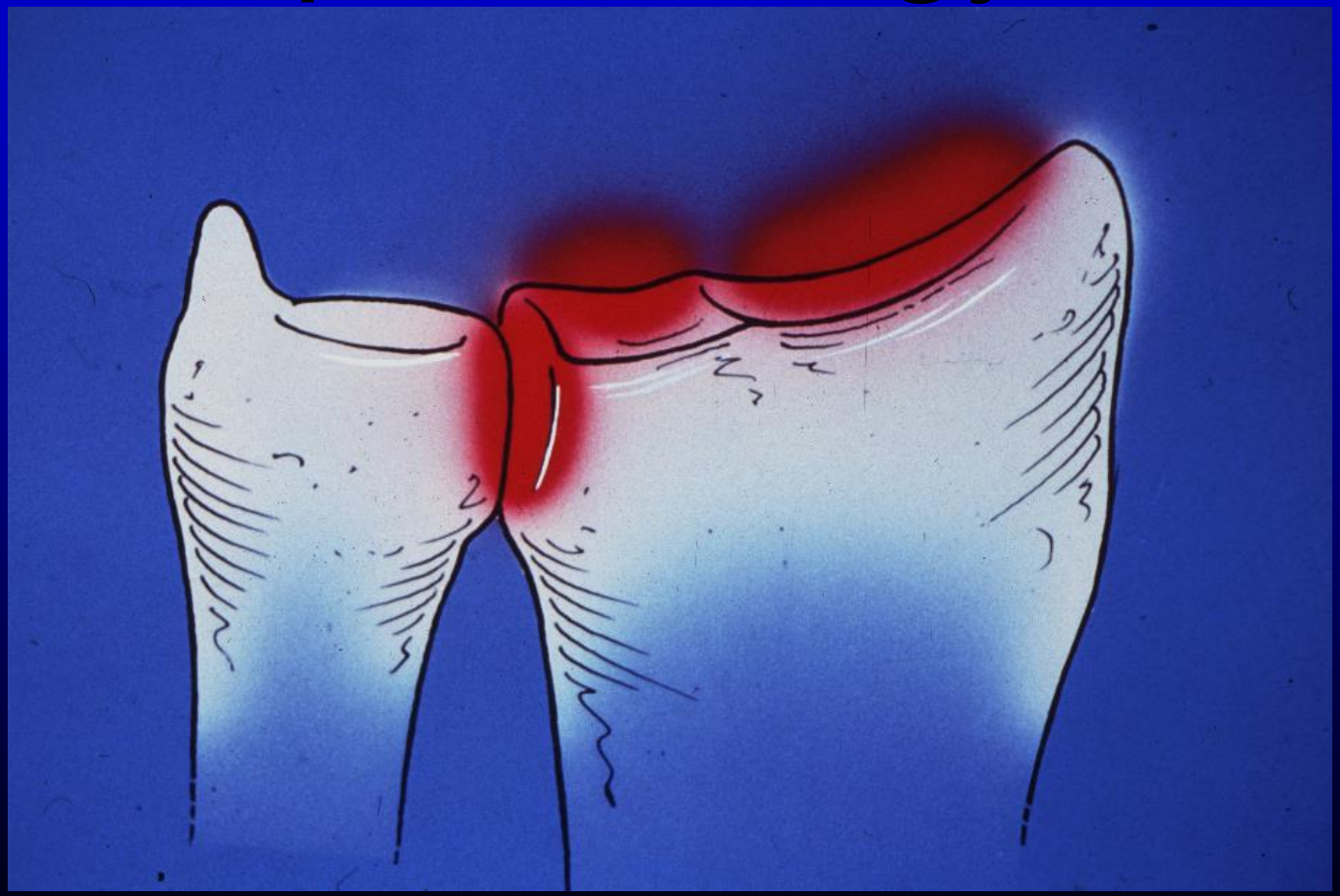
KNOWLEDGE
MAXIMUM INFORMATION ABOUT THE FRACTURE

X-ray …….. CT scan evaluation …… 3-D reconstruction



Volar Locking T-Plate Early 1990's

The Distal Radius Epidemiology



Historical Studies

Calcif Tissue Int 1993

- **Fracture of the distal forearm as a forecaster of subsequent hip fracture: a population-based cohort study with 24 years of follow-up – Uppsala Sweden**

H Mallmin [1], S Ljunghall, I Persson, T Naessén, U B Krusemo, R Bergström

Osteoporos Int 1999

- **Forearm fractures as predictors of subsequent osteoporotic fractures**
- M T Cuddihy [1], S E Gabriel, C S Crowson, W M O'Fallon, L J Melton 3rd

About 1300 pts in each study w 20+ yr f/u

Osteoporosis as a risk factor for distal radial fractures: a case-control study.

- J Bone Joint Surg Am. 2011 Feb 16;93(4):348-56

- Oyen J[1], Brudvik C, Gjesdal CG, Tell GS, Lie SA, Hove LM.
- 1Department of Orthopedic Surgery, Haukeland University Hospital,

- Bergen, Norway. jannike.oyen@kir.uib.no

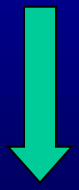
Control vs Fracture Group

• **Fx Group**	**Osteopenia/Osteoporosis**
• Men – N=85	17%
• Women N=664	34%
• **Control Group**	
• Men – N=54	13%
• Women N=554	10%

Colles Fracture and Risk of Hip Fracture in Men and Women-meta-analysis

Haentjens et al J. Bone Joint Surg 2003

- In older men, relative risk of hip fracture after Colles fracture was 3.26
- In postmenopausal women, the relative risk was 1.53



- Fractures of the distal radius increased the risk of hip fracture significantly more in men (p=0.002)

Contemporary Perspectives

- Common injury which is steadily becoming public health issue
  - Among woman > 60 years risk of fracture
    - Distal Radius 17%
    - Hip 14%
  - 4 times greater with lowest quintile of BMD. 2 prospective studies
    - Gardsell Calc Tissue Int., 1989
    - Hui Ann Int Med, 1989

Low-energy distal radius fractures in middle-aged and elderly men and women--the burden of osteoporosis and fracture risk : A study of 1794 consecutive patients.

- Department of Surgical Sciences, Faculty of Medicine and Dentistry, University of Bergen,
- Øyen J[1], Gjesdal CG, Brudvik C, Hove LM, Apalset EM, Gulseth HC, Haugeberg G.

Burden of Osteoporosis/Osteopenia

- In 218 men and 1576 women with distal radius fractures:

56% of men had BMD that required treatment

82% of women had BMD that required treatment

Incidence in DRFx is on the rise

- World wide population of those over 65 will triple from 2015 – 2050
  - 617 Million >>>>>>>> 1.6 Billion
- Distal Forearm Fractures cause less morbidity but show up a decade sooner

The Epidemiology of Distal Radius Fractures

- Hand Clin. 2012 May; 28(2): 113–125.
- Nellans, Kowalski, Chung

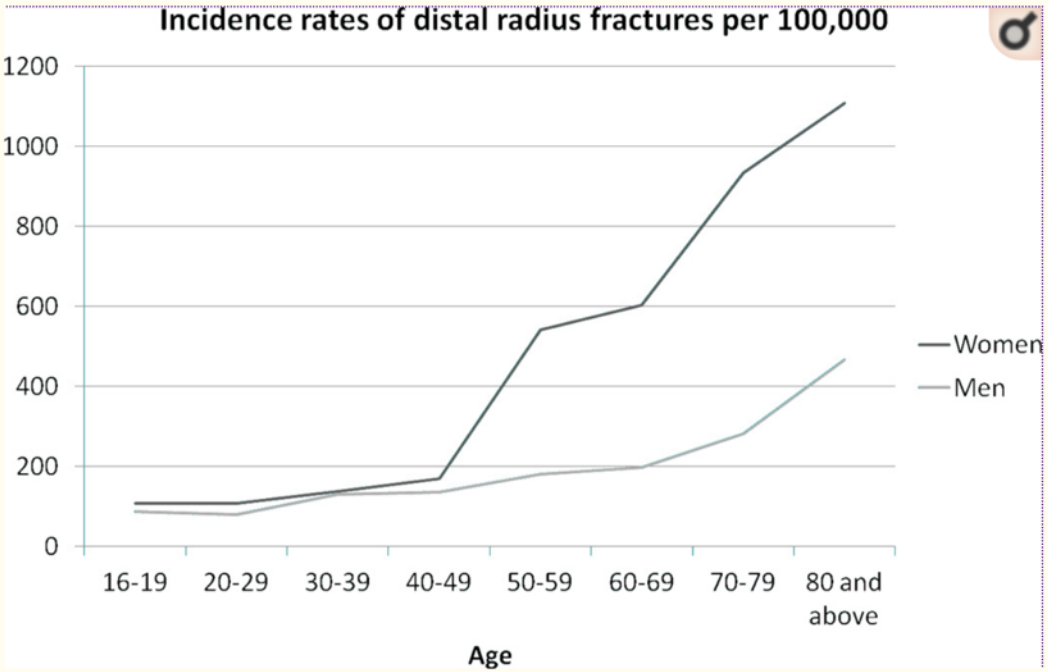


Figure 5

Incidence rate of distal radius fractures per 100,000 people in men and women aged 16 to 80. A statistically significant difference was documented between the overall incidence of men and women, with women having a higher rate of fracture.

Data from Flinkkila et al., Epidemiology and Seasonal Variation of Distal Radius Fractures in Oulu, Finland. Ref. 37

What are we supposed to do?

- **CMS/NQF (National Quality Forum)**
- **NQF 0045 Osteoporosis: Communication with the Physician Managing Ongoing Care Post-Fracture**
- **All patients aged 50 years and older treated for hip, spine or distal radial fracture**

What are we doing? –April 2021

EDITOR'S CHOICE

Rate of Bone Mineral Density Testing and Subsequent Fracture-Free Interval After Distal Forearm Fracture in the Medicare Population

Kisan Parikh, MD,* Daniel Reinhardt, MD,* Kimberly Templeton, MD,* Bruce Toby, MD,* Jacob Brubacher, MD*

Purpose Distal forearm fractures are prevalent among the Medicare population. Many patients who sustain these fractures have poor bone health and are at increased risk for subsequent fractures. We sought to determine the rate of bone mineral density (BMD) testing and subsequent fragility fracture-free interval after distal forearm fractures in the Medicare population.

Methods We examined the 5% Medicare Standard Analytic File dataset using the PearlDiver Application from 2005 to 2014 to identify patients with distal forearm fractures based on International Classification of Diseases–Ninth Revision and Current Procedural Terminology codes. We queried these records to determine the incidence and timing of BMD testing after fracture and the number of patients who went on to hip or vertebral fractures. Kaplan-Meier analysis with hip or vertebral fracture

Large Kansas Med Ctr

- 37,500 distal forearm fx pts who did not have BMD testing within 2Y prior to fx.
- Comprehensive CPT eval of both fx and BMD testing and subsequent hip or spine fx.
- 20% went on to hip or spine fx
- Only 26% had BMD testing post DRFx
- Interval much shorter 580d vs 820d

Who orders the BMD test post fx?

- 2014 Rozental et al , controlled randomized study demonstrated that the **ORTHOPEDIC SURGEON** who treated the patient gets better results on testing compliance than a referral letter

Summary – What can I do?

- Refer for metabolic bone health workup
- Find a therapist for Balance training to for fall prevention
- Promote Use of walking or hiking sticks for balance and load bearing, sensible shoes.
- Learn how to fall

Own the Bone10 Prevention Measures

Nutrition Counseling	1	Improving calcium intake
	2	Increasing vitamin D intake
Physical Activity Counseling	3	Weight-bearing and muscle strengthening exercise
	4	Fall prevention education
Lifestyle Counseling	5	Smoke cessation
	6	Limiting excessive alcohol intake
Pharmacotherapy	7	Pharmacotherapy
Testing	8	Testing bone mineral density: DXA (Dual Energy X-Ray Absorptiometry)
Communication	9	Physician referral letter to report the patient's fragility fracture, risk factors, and recommendations for treatment
	10	Patient education letter to explain bone health risk factors and recommendations for treatment

Volar Shear - Fragmentation

Summary – What we learned

- The nature of distal radius fractures
- Distal radius fractures occur earlier and more often than hip and spine
- Early identification of patients with Osteopathy can be had out of the distal radius population we treat
- More work needs to be done to detect those at risk

Summary – What I tell my patients

- Its easier to walk to the DXA scanner with a distal radius fracture than with a spine, hip or periprosthetic fracture