



## Background

Distal radius fractures are one of the most common fractures in the upper extremity

Complex anatomy makes identifying fracture fragments difficult to visualize on standard plain radiographs

Computed Tomography (CT) is commonly utilized for advanced imaging to better characterize these fractures

Goldwyn, et. al. recently showed that traction PA and lateral radiographs could increase interobserver reliability of fracture characteristics and treatment (JBJS 2013)

Their limitation was lack of comparison to CT and a gold standard

## Methods

Hypothesis: 5 traction view radiographs compared to CT imaging would yield similar results in fracture fragment identification and agreement with regard to treatment

11 observers (9 orthopedic attendings and 2 residents) evaluated 17 sets of images and asked them to identify the presence or absence of 6 specific fragments and recommend treatment

Fragments included: Radial column, Dorsal Wall, Dorsal Ulnar corner, Volar Ulnar Corner, Volar Rim, Central Impaction

Set 1- five traction radiographs- PA, lateral, articular lateral tilt, 45 degree pronated, and 45 degree supinated

Set 2- axial, sagittal, and coronal CT views

Treatment  
- Non-operative  
- Open reduction and internal fixation (ORIF)  
- External fixation or distraction plating

## Results

- Interobserver reliability- fair to poor agreement for all fragments with traction views and CT
- Intraobserver variability- no significant difference in fragment identification between traction views and CT
- CT significantly better at correctly identifying a radial column fragment versus our CT gold standard
- Traction views significantly better at correctly identifying a volar rim fragment versus our CT gold standard
- Treatment recommendation was the same in 73.8% of opportunities despite imaging modality

Table 1. Intraobserver variability of traction views to CT imaging

View	McNemar Test Statistic	P Value	Degree of Change in Visualization of Fracture Fragments
Radial column	.00008	.99	Increase from 29.8% to 39.3%
Dorsal wall	.00007	.99	Increase from 26% to 70.3%
Dorsal ulnar corner	.0001	.99	Increase from 21.3% to 70.3%
Volar ulnar corner	.0001	.99	Increase from 43.7% to 44.7%
Volar rim	.0003	.99	Increase from 31.6% to 62.6%
Central impaction	.0002	.99	Increase from 31% to 58%

Table 2. Kappa values for interobserver reliability of traction views and CT imaging

Fracture Fragment	Traction Views*	CT Imaging
Radial Column	0.17(.11-.23)	0.26(.20-.32)
Dorsal Wall	0.17(.11-.23)	0.15(.09-.21)
Dorsal Ulnar Corner	0.25(.19-.31)	0.26(.20-.32)
Volar Ulnar Corner	0.14(.08-.20)	0.04(.02-.10)
Volar Rim	0.32(.26-.38)	0.17(.11-.23)
Central Impaction	0.29(.23-.35)	0.32(.26-.38)

\* Kappa coefficient (95% confidence interval)

## Results (cont.)

Table 3. Evaluation of fragment identification averages in groups with and without residents. (p values obtained from Student's two tailed t-test assuming equal variance)

\*CT gold standard- senior hand surgeon's CT read

Surgeon	Radial Column	Dorsal Wall	Dorsal Ulnar Corner	Volar Ulnar Corner	Volar Rim	Central Impaction
Traction Views with residents	65.8	61.5	66.3	55.1	72.7	73.8
CT imaging with residents	71.8	63.5	78.2	58.8	60	74.1
p Value	0.04	0.33	0.19	0.33	<0.01	0.92
Traction Views without residents	68.6	60.1	68	54.9	74.5	76.5
CT imaging without residents	73.5	61.8	69.1	55.2	58.8	76.5
p Value	0.02	0.35	0.83	0.95	< 0.01	0.99

## Conclusions

- Although there were trends towards increased fracture fragment identification on CT imaging, there was no statistical significance differences of intraobserver variability
- Interobserver reliability for all fracture fragments on traction view and CT imaging was fair to poor
- Comparison of correct fracture fragment identification using traction view imaging versus CT imaging demonstrated an increase in identification of the radial column fragment with CT imaging and of the volar rim fragment with traction view imaging
- The information obtained from traction shows very little significant difference with regard to fracture fragment characterization and leads surgeons to consistent treatment recommendations.