

# Novel “Extended Tangential View”: Evaluating the DRUJ Articular Surface and Preventing Intra-articular Screw Breach

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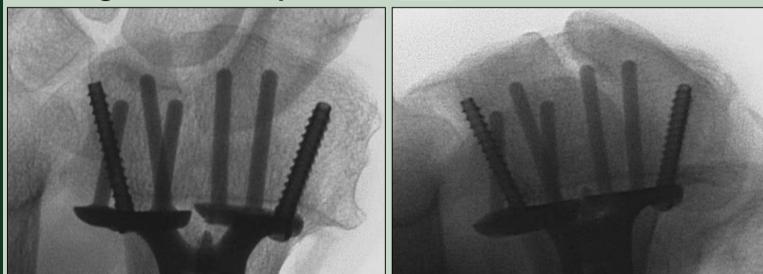
## BACKGROUND

- Understanding distal radius fracture patterns and their articular involvement is essential to guiding treatment pre- and intra-operatively.
- Standard radiographs incompletely evaluate the complex distal radius and distal radio-ulnar joint (DRUJ) articular surfaces.
- Several radiographic views have been described to evaluate for prominent hardware.
- However, very few adequately visualize the sigmoid notch for fracture extension and hardware breach into the DRUJ.

## OBJECTIVE

- The objective is to describe a novel radiographic “extended tangential view” to assess for DRUJ screw penetrance and to direct safer screw placement.

Fig 1: Fluoroscopic views with DRUJ screw breach



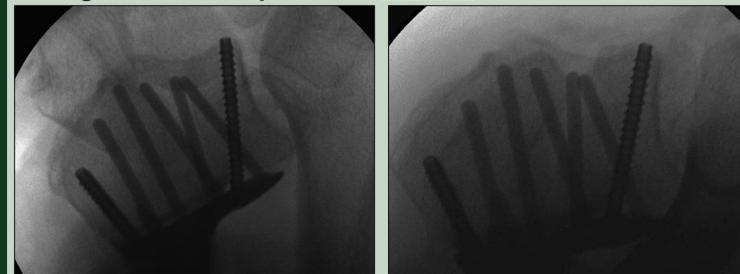
Extended Tangential View

Sunrise View

## METHODS

- Distal radius volar locking plates were applied to 10 cadaver arms
  - 5 arms with / 5 arms without distal ulnar locking screw DRUJ breach
- AP, sunrise, and “extended tangential” views were obtained with fluoroscopy (Fig 3)
- 21 blinded, hand fellowship trained surgeons reviewed the radiographs (representative xrays seen in Figs. 1 and 2) and answered the following questions:
  - Does the screw directed towards the sigmoid notch breach the cortex?
  - How confident are you in your assessment?
  - Would you reposition the screw based on your above interpretation?
- P-values for the comparison of *sensitivities* and *specificities* across views were calculated with generalized linear mixed models assuming a binary distribution and using a logit-link function.

Fig 2: Fluoroscopic views without DRUJ screw breach



Extended Tangential View

Sunrise View

## RESULTS

### Intra-Articular Breach

| Views               | Sensitivity | Specificity |
|---------------------|-------------|-------------|
| AP                  | 39%         | 76%         |
| Extended Tangential | 69%         | 95%         |
| Sunrise             | 80%         | 95%         |

### Clinical Decision Making

| Views               | Sensitivity | Specificity |
|---------------------|-------------|-------------|
| AP                  | 65%         | 62%         |
| Extended Tangential | 80%         | 80%         |
| Sunrise             | 83%         | 87%         |

- There was no statistically significant difference in sensitivity or specificity for clinical decision making screw repositioning between the sunrise and extended tangential views (P=0.21 and P=0.17, respectively).
- The sensitivity for judging screw articular breach on the sunrise view was statistically significantly greater than the extended tangential view (P=.04) although there was no difference in specificities (P>.99).
- Both the sunrise and the extended tangential view were superior to the AP view to identify DRUJ breach and to guide clinical decision-making (P<0.01).
- The intraclass correlation coefficients were 0.31, 0.95, 0.99 for the views, respectively.

## CONCLUSIONS

- Both the extended tangential and sunrise views performed well in identifying DRUJ screw breach and for directing screw repositioning.
- Based on these results, we recommend that either the sunrise view or the extended tangential view (if not both) should be obtained intra-operatively to guide clinical decision-making.
- The novel extended tangential view should be added to the surgeon's armamentarium as a valuable tool to:
  - improve sigmoid notch visualization
  - avoid DRUJ screw penetrance
  - prevent unnecessary screw repositioning and added OR time
  - detect screw protrusion into the extensor compartments

Fig 3. Intra-op “Extended Tangential View”



The image intensifier is positioned below the arm-table to mimic intra-operative conditions. Images were taken 90° to the arm-table. The wrist is brought up to the image intensifier by flexing the elbow 45°, extending the wrist 30-40°, and placing the forearm in full supination. Titrate for optimal visualization of the sigmoid notch.