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.

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 x-rays 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.

RESULTS

<table>
<thead>
<tr>
<th>Intra-Articular Breach</th>
<th>Views</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>AP</td>
<td>39%</td>
<td>76%</td>
<td></td>
</tr>
<tr>
<td>Extended Tangential</td>
<td>69%</td>
<td>95%</td>
<td></td>
</tr>
<tr>
<td>Sunrise</td>
<td>80%</td>
<td>95%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical Decision Making</th>
<th>Views</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>AP</td>
<td>65%</td>
<td>62%</td>
<td></td>
</tr>
<tr>
<td>Extended Tangential</td>
<td>80%</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>Sunrise</td>
<td>83%</td>
<td>87%</td>
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</tbody>
</table>

• 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 penetration
  • prevent unnecessary screw repositioning and added OR time
  • detect screw protrusion into the extensor compartments

Fig 1: Fluoroscopic views with DRUJ screw breach
Fig 2: Fluoroscopic views without DRUJ screw breach
Fig 3: Intra-op “Extended Tangential View”

Extended Tangential View | Sunrise View
---|---
Extended Tangential View | Sunrise 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°, and placing the forearm in full supination. Titrate for optimal visualization of the sigmoid notch.