Background

- Percutaneous pinning is a commonly used technique for stabilization of fifth metacarpal fractures, lunotriquetral (LT) joint instability, ulnar styloid fractures, or distal radioulnar joint (DRUJ) instability.
- The dorsal branch of the ulnar nerve (DBUN) may be at risk for injury.

Objective

- The purpose of this study was to directly assess the proximity pinning sites of ulnar sided structures of the hand and wrist to the DBUN using a cadaver model.
- We hypothesized that pinning of the ulnar styloid and LT joints posed the greatest risk of injury to this nerve.

Methods

- Eleven fresh Frozen Cadaveric specimens were pinned with 0.045 mm Kirschner wires.
- The DRUJ, ulnar styloid, LT joint, base of the 5th metacarpal, and the 5th metacarpal neck were pinned under fluoroscopic guidance.
- Specimens were carefully dissected and the skin and subcutaneous fat excised.
- The distance from each pin site to the DBUN was measured using digital calipers.
- Secondary data points included:
  - Direct penetration of the DBUN
  - Pin sites adjacent to the DBUN
  - Overall risk of nerve injury (DBUN penetration + pin sites adjacent to DBUN)
- Comparisons between fixation locations were performed using Kruskal-Wallis/Mann-Whitney U tests and Fisher’s Exact Test to analyze continuous and categorical data, respectively. LOS was p < 0.05 for all data points.

Results

- Eleven specimens underwent pinning of the DRUJ, ulnar styloid, LT joint, 5th metacarpal base, and 5th metacarpal neck pins
- Both ulnar styloid and LT joint pins were within 2 mm of the DBUN on average.
- Ulnar styloid and LT joint pins were significantly closer to DBUN than 5th metacarpal neck (P<0.001, P < 0.001) and DRUJ pins (P=0.001, P = 0.004)

Table 1. Data summary of DBUN injury by pinning location. N = 11.

<table>
<thead>
<tr>
<th>Pin Location</th>
<th>Mean distance to DBUN ± SD</th>
<th>Direct DBUN Injury N (%)</th>
<th>Pin adjacent to DBUN N (%)</th>
<th>Overall Risk of DBUN Injury N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th Metacarpal Neck</td>
<td>4.97 ± 1.47 mm</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>5th Metacarpal Base</td>
<td>2.33 ± 2.16 mm</td>
<td>0 (0)</td>
<td>2 (27)</td>
<td>3 (27)</td>
</tr>
<tr>
<td>Lunotriquetral Joint</td>
<td>1.82 ± 1.61 mm</td>
<td>1 (9)</td>
<td>2 (18)</td>
<td>3 (27)</td>
</tr>
<tr>
<td>Ulnar Styloid</td>
<td>0.84 ± 1.05 mm</td>
<td>2 (18)</td>
<td>4 (36)</td>
<td>6 (54)</td>
</tr>
<tr>
<td>DRUJ</td>
<td>2.96 ± 0.88 mm</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

Conclusions

- Close proximity (< 2 mm) of ulnar styloid and LT joint pin sites to the DBUN were observed.
- Overall risk of nerve injury was significantly higher in pins to the ulnar styloid compared the 5th metacarpal base and neck.
- We recommend mini-dissection and protection of underlying structures to mitigate the risk of iatrogenic nerve injury.

References: