Modified Anterolateral Portals in Elbow Arthroscopy
A Cadaveric Study on Safety

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Disclosures

• Dr. Felix Savoie
  – Exactech, Smith & Nephew, Mitek
• Dr. Michael O’Brien
  – Smith & Nephew, Depuy, Mitek
• Dr. Stephen Thon
• Dr. Lane Rush
• Peter Gold
Anterolateral Portals

- Distal: Andrews and Carson 1985
  - 3cm distal and 1cm anterior to lateral epicondyle

- Mid-Anterolateral: Field et al 1994
  - 1cm directly anterior to lateral epicondyle

- Proximal:
  - Field et al 1994
    - 2cm proximal and 1cm anterior to lateral epicondyle
  - Stothers et al 1995
    - “within 1cm-2cm proximal to the lateral epicondyle and lying directly on the anterior surface of the humerus”

Objective

Introduce 2 new modified anterolateral portals and demonstrate the safety of their use with a cadaveric model
Methods

• 6 matched pairs fresh frozen cadaver

1.) Proximal (modified) – 2cm proximal and 2 cm anterior

2.) Mid (modified) – 2cm directly anterior

3.) Distal (traditional) – 3cm distal and 1 cm anterior

Methods

• Dissection performed to expose Radial N.
Methods

• Photograph and measure

Methods

• Example Inadequate image
Methods

- Measurements were summarized and statistical analysis performed comparing the data.

Results

Table 1 – Summary of all measurements

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Proximal (mm)</th>
<th>Direct (mm)</th>
<th>Distal (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>4</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>6</td>
<td>0 (piercing)</td>
</tr>
<tr>
<td>6</td>
<td>18</td>
<td>16</td>
<td>0 (in contact)</td>
</tr>
<tr>
<td>7</td>
<td>10</td>
<td>21</td>
<td>9</td>
</tr>
<tr>
<td>8</td>
<td>17</td>
<td>17</td>
<td>14</td>
</tr>
<tr>
<td>9</td>
<td>**</td>
<td>12</td>
<td>0 (piercing)</td>
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<td>10</td>
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<td>9</td>
<td>0 (piercing)</td>
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<td>15</td>
<td>22</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>9</td>
<td>9</td>
<td>6</td>
</tr>
</tbody>
</table>

** = Considered inadequate image to use for measurement
Results

- After data summarization T-tests were compared between the different portal sites.

<table>
<thead>
<tr>
<th>Portal</th>
<th>Avg. distance to Radial N.</th>
<th>P</th>
<th>P&lt;0.5?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distal</td>
<td>4.5mm +/- 5.42mm (5mm-18mm)</td>
<td>0.0011</td>
<td>Yes</td>
</tr>
<tr>
<td>Mid</td>
<td>13.8mm +/- 5.25mm (6mm-21mm)</td>
<td>0.0107</td>
<td>Yes</td>
</tr>
<tr>
<td>Proximal</td>
<td>11.1mm +/- 4.51mm (0mm-14mm)</td>
<td>0.2483</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Distal to Mid</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Distal to Proximal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mid to Proximal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Results

• Proximal
  – 9 cadavers
  – Avg: 11.1mm +/- 4.51mm (5mm-18mm)
• Mid
  – 10 cadavers
  – Avg: 13.8mm +/- 5.25mm (6mm-21mm)
• Distal
  – 10 cadavers
  – Avg: 4.5mm +/- 5.42mm (0mm-14mm)
  – 3 Pins pierced, 1 in contact with Radial N.

Distal Anterolateral Portal

– 3 Pins pierced Radial N.
– 1 Pin in contact with Radial N.
Results

• Example of pierced radial nerve

What does this all mean?
Comparison to Prior studies

<table>
<thead>
<tr>
<th></th>
<th>Current Data</th>
<th>Field et al 1994</th>
<th>Stother et al 1995</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distal (mm)</td>
<td>4.5</td>
<td>7.2</td>
<td>4.9</td>
</tr>
<tr>
<td>Mid (mm)</td>
<td>13.8</td>
<td>9.8</td>
<td></td>
</tr>
<tr>
<td>Proximal (mm)</td>
<td>11.1</td>
<td>13.7</td>
<td>9.9</td>
</tr>
</tbody>
</table>

Conclusions

- When compared to previous studies our modified Proximal anterolateral portal is just as safe as previously described portals.
- When compared to previous studies our modified Mid anterolateral portals is also just as safe, may be safer than the previously described portal.
- We believe a more anterior portal provides excellent visualization.
- Distal anterolateral portal unsafe for use.
Sources

7. Papilion JD, Neff RS, Shall LM. Compression neuropathy of the radial nerve as a complication. Arthroscopy. 1988. 4; 284-286
Sources


22. Guhl JF. Arthroscopy and Arthroscopic Surgery of the Elbow. Orthopedics. 1985. 8(10); 1290-1296
