Percutaneous Release of the A-1 Pulley: A Cadaver Study

Julie E Adams MD 1, Rohan A. Habbu MS, MBBS 2, Matthew D Putnam MD 1
University of Minnesota, Department of Orthopaedics 1
Institute for Hand & Upper Extremity Surgery, Mumbai, India 2

The objective of the study was to assess the efficacy & safety of percutaneous release of the A-1 pulley in cadaver model.

METHODS

- Landmarks were established for the A1 pulley based upon cutanous features. (see figure 1)
  - A = center of Proximal interphalangeal joint crease
  - B = center of palmar digital crease
  - C = distance AB marked on palm in line with the ray
  - D = midpoint of BC
- Secondly, percutaneous release was performed using a new #15 blade on a scalpel handle inserted at point D. It was inserted at an angle of 45 degrees until a crunch was felt.
- The blade was then moved distal to proximal till there was a loss of crunch.
- Lastly, the specimens were dissected and examined for any tendon or neurovascular injury, and completeness of A1 pulley release was evaluated. (see figure 2)

RESULTS

- There were 39 (72%) complete releases of the A-1 pulley
- Incidence of partial release was 26% (14/54). Of these 14, the proximal part of the pulley was intact in 8 fingers. Distal edge was intact in two, with both edges intact in one finger. The pulley could not be assessed in three fingers. The mean length of unreleased pulley was one mm.
- There was one missed release. The missed release was seen in the small finger.
- There was 22% incidence of release of the proximal edge of A-2 pulley.
- However, there was no case of release of more than 25% of the A-2 pulley length, nor was bowstringing of flexor tendons seen in these specimens.
- Eleven digits showed longitudinal scoring of the flexor tendons while three had partial tendon lacerations. No neurovascular injuries were noted.
- Details of the releases are given in table 1.
- Details of tendon complications are given in table 2.
- There was no injury to neurovascular bundle in any digit.

<table>
<thead>
<tr>
<th>Digit (n)</th>
<th>Complete A1</th>
<th>Partial A1</th>
<th>Missed A1</th>
<th>A2 release</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index (18)</td>
<td>13</td>
<td>5</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Long (11)</td>
<td>8</td>
<td>3</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Ring (7)</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Small (18)</td>
<td>12</td>
<td>5</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Total (54)</td>
<td>39</td>
<td>14</td>
<td>1</td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Digit (n)</th>
<th>None</th>
<th>Longitudinal scoring</th>
<th>Partial laceration</th>
<th>Complete laceration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index (18)</td>
<td>13</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Long (11)</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Ring (7)</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Small (18)</td>
<td>16</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total (54)</td>
<td>40</td>
<td>11</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

LIMITATIONS OF THE STUDY

- The study did not have a clinical comparison to support the findings of the cadaver part.
- Due to pre or post mortem changes in the soft tissues, cadavers may have unequal landmarks or structures.
- Presence of a A1 nodule, commonly seen clinically was not assessed in the present study. This may or may not make the release difficult.

CONCLUSION & CLINICAL RELEVANCE

- Percutaneous release of the A-1 pulley using a #15 blade was associated with a high margin of safety and effectiveness in this series.
- Percutaneous release of trigger digits may assume a greater role in the treatment of patients with trigger finger due to cost containment pressures and desires to limit surgery center or operating room use.
- This study suggests it is both safe and effective.
- With use of proper anatomical guidelines, risk to neurovascular bundle is minimal, though longitudinal scoring of the tendon can occur.