Clinical Paper Session 15: Hand II

Moderators:
Nathan T. Morrell, MD
Steven S. Shin, MD

Session Handouts
Saturday, September 15, 2018

73rd Annual Meeting of the ASSH
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PAPER 84

Clinical Paper Session 14
Nerve II — Saturday, September 15, 2018 • 3:25–3:30 PM
Nerve

Electrodiagnostic Studies in Surgical Cubital Tunnel Syndrome Patients

Level 4 Evidence

Shafc Sraj, MD
Daniel Shubert, MD
Bonhomme Joseph Prudhomme, MD

COI: There is no financial information to disclose.

Hypothesis: Electrodiagnostic studies serve a prominent role in the diagnostic workup of cubital tunnel syndrome (CBTS). EDS typically include nerve conduction studies (NCS) that measure motor nerve conduction velocity (mNCV), among other variables.

The goals of our study were to determine the sensitivity of EDX in the diagnosis of CBTS in a cohort of patients who responded well to surgical cubital tunnel release (CBTR), how many patients were tested based on AANEM criteria, and whether this improved the sensitivity in postoperatively confirmed CBTS.

Methods: We identified a cohort of 98 patients (118 elbows) with clinically evident CBTS who had preoperative EDX and underwent 118 CBTRs between January 2012 and March 2017 as a result of EDX received. We grouped patients based on the EDX report as: CBTS, ulnar neuropathy, and normal ulnar nerve. We then grouped the patients based on whether they had above-elbow stimulation. We calculated the EDX sensitivities based on operative success.

Results: 111 elbows (93.6%) reported to have significant improvement in ulnar nerve symptoms. 13 (11%) of elbows had CBTS and 27 (23%) had ulnar neuropathy. Sensitivity of EDX was 11.7%. No EDX reported across-elbow (XE) mNCV. In 26 patients who had stimulation above the elbow (XE group), we were able to estimate XE mNCV retroactively. The sensitivity in XE group was 33.3% based on the reported EDX and 87.5% based on the estimated XE mNCV. The XE and non-XE group differed regarding gender, bilaterality, concomitant CBTR, and obesity.

Summary Points:
- Postoperative outcome correlated with clinical diagnosis in 93.6% of patients.
- Preoperative EDX sensitivity was 11.7%.
- Adopting AANEM criteria in which above-elbow stimulation was done increased sensitivity from 33.3% to 87.5%.
- EDX should include above-elbow stimulation and XE velocities irrespective of pretest indications/diagnoses.

BIBLIOGRAPHY

PAPER 85

Clinical Paper Session 15
Hand II — Saturday, September 15, 2018 • 2:57–3:02 PM
Hand and Wrist; General Principles; Practice Management

Finger Replantation Optimization Study (FRONT): Update on National Trends

Level 2 Evidence

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Lin Zhong, MD, MPH
Sandra Kotsis, MPH
Kevin C. Chung, MD, MS

COI: There is no financial information to disclose.

Hypothesis: We performed a national-level investigation of patients with traumatic digit amputation to examine (1) the recent trend in digital replantation surgery and (2) the influence of patient and hospital characteristics over 14 years between 2001 and 2014. We hypothesized that despite efforts toward regionalization to improve outcomes, the rate of attempt and successful digit replantation has continued to decrease.

Methods: We used the National Inpatient Sample database under the Healthcare Cost and Utilization Project to select adult patients with a diagnosis of traumatic digit amputation. We calculated the rates of attempted and successful digit replantation per year, subcategorizing for digit type (thumb or finger) and for hospital type (rural, urban non-teaching, and urban teaching) to determine the trend of practice. We also analyzed for case volume distribution to each hospital type each year. We used a multivariable logistic regression model to investigate patient demographic and hospital characteristics associated with the odds of successful revascularization.

Results: Among the 14,872 adult patients with single-digit amputation from 2001 to 2014, only 1,670 (11.2%) underwent replantation. The rates of replantation attempt trended down over the years for both thumb (slope = 0.4) and fingers (slope = 0.2) at all hospital types (Figure 85-1AB) despite increasing proportions of patients being sent to urban teaching hospitals (56.9% to 81.2%) (Figure 85-2) where they were more likely to undergo replantation. Among the 14,872 adult patients with single-digit amputation from 2001 to 2014, only 1,670 (11.2%) underwent replantation. The rates of replantation attempt trended down over the years for both thumb (slope = 0.4) and fingers (slope = 0.2) at all hospital types (Figure 85-1AB) despite increasing proportions of patients being sent to urban teaching hospitals (56.9% to 81.2%) (Figure 85-2) where they were more likely to undergo replantation. Among the 14,872 adult patients with single-digit amputation from 2001 to 2014, only 1,670 (11.2%) underwent replantation. The rates of replantation attempt trended down over the years for both thumb (slope = 0.4) and fingers (slope = 0.2) at all hospital types (Figure 85-1AB) despite increasing proportions of patients being sent to urban teaching hospitals (56.9% to 81.2%) (Figure 85-2) where they were more likely to undergo replantation. Among the 14,872 adult patients with single-digit amputation from 2001 to 2014, only 1,670 (11.2%) underwent replantation. The rates of replantation attempt trended down over the years for both thumb (slope = 0.4) and fingers (slope = 0.2) at all hospital types (Figure 85-1AB) despite increasing proportions of patients being sent to urban teaching hospitals (56.9% to 81.2%) (Figure 85-2) where they were more likely to undergo replantation.

Summary Points:
- The rate of digit replantation decreased over 14 years for both thumb and fingers, regardless of hospital type, while the rate of success remained relatively stable.
- Although more digit amputations are treated by urban teaching hospitals with higher likelihood to replant, the downward trend in rate of attempt demonstrates a need for a paradigm shift in current pattern of practice.
Methods: All patients of skeletal immaturity who underwent surgical correction of digital clinodactyly and the resultant long-term outcomes. The purpose of this study was to compare the Vickers physiolysis procedure to osteotomy with controversy surrounding the optimal surgical management. The purpose of this study was to compare the Vickers physiolysis procedure to osteotomy with controversy surrounding the optimal surgical management.

**Hypothesis:**

COI: There is no financial information to disclose.

**Results:** There were 21 patients (30 digits) and 6 patients (11 digits) who underwent correction of clinodactyly with the Vickers physiolysis and osteotomy, respectively. The average age at operation was 42.2 and 79.0 months in the Vickers and osteotomy group with an average of 43.6 and 55.3 months’ follow-up, respectively. The average angulation significantly improved from 43.0° to 23.9°, with a mean change of 19.0° and 46.2% correction in the Vickers group. The osteotomy group had a significant decrease from 39.2° to 22.4° angulation, with a mean change of 16.7° and 55.3% correction. There was no difference between groups or when stratified based on age at operation, sex, or family history. There was better correction with isolated clinodactyly versus concomitant syndactyly and better percentage of correction in those patients with lesser deformity in the Vickers group. There were more reoperations in the osteotomy group.

Summary Points:

- Correction of digital angulation in clinodactyly is possible with both a physiolysis and the use of osteotomies.
- The use of osteotomy may lead to more revision cases, while the Vickers procedure has minimal complications and need for revision.
- The Vickers physiolysis procedure is more effective in those with angulation less than 55°.

**PAPER 87**

Clinical Paper Session 15
Hand II – Saturday, September 15, 2018 • 3:11—3:16 PM
Hand and Wrist

**Prognostic Factors for Conservatively Treated Sagittal Band Injuries of the Metacarpophalangeal Joint**

**Level 4 Evidence**

Young Hak Roh, MD
Seok Woo Hong, MD

**COI:** There is no financial information to disclose.

**Hypothesis:** Most sagittal band injuries of the metacarpophalangeal (MP) joint are conservatively treated by extension orthoses, but little information is currently available on unsatisfactory outcomes after the treatment. We asked whether baseline patient characteristics (age, gender, hand dominance, and occupation), injury type and severity, or mode of treatment (time to treatment, duration of orthosis application) would be related to patients’ functional outcomes 6 months after sagittal band injuries.

**Methods:** A total of 94 patients who had been diagnosed with closed sagittal band injury and initially treated with 4 weeks of MP joint blocking orthosis were enrolled (Table 87-1). The response to treatment, including finger range of motion (ROM), extensor tendon instability, and functional outcome measured as Quick-Disability of the Arm, Shoulder, and Hand score were assessed at 24-week follow-up. The factors that were assessed for their influence on the outcomes were age, sex, occupation, type of injury, injury severity, time to treatment, and the duration of orthosis use.

**Results:** After 24 weeks’ follow-up, 67 (71%) patients had achieving good to excellent outcomes with 78% recovery of grip strength, 90% recovery in ROM, and mean QuickDASH scores of 15. However, 27 (29%) patients had undergone surgical repair owing to persistently symptomatic tendon subluxation (Table 87-2). There were significantly more manual laborers in the failure group than in the success group (P = .02). Subjects in the treatment failure group were older (P = .06), had longer symptom durations (P = .01), and were more likely to have grade III injuries (P = .02) than were those in the success group. Multivariable analysis revealed that manual labor (odds ratio [OR], 3.4), longer symptom duration (OR, 3.9), and grade III injury (OR, 2.4) were associated with a higher likelihood of conservative treatment failure for sagittal band injuries.
**Summary Points:**
- MP joint blocking orthosis for sagittal band injury led to mostly satisfactory results, with 71% of patients achieving good to excellent outcomes.
- Manual labor, longer symptom duration, and grade III injury were associated with a higher likelihood of treatment failure.

### Table 87-1: Demographic and clinical characteristics of participants.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Number or Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>94</td>
</tr>
<tr>
<td>Mean age (y)</td>
<td>36 ± 15</td>
</tr>
<tr>
<td>Male/female</td>
<td>65 (69%): 29 (31%)</td>
</tr>
<tr>
<td>Heavy manual labor/clerical with repetitive work/others (including unemployed)</td>
<td>23 / 34 / 37</td>
</tr>
<tr>
<td>Injured side (dominant/non-dominant)</td>
<td>58 (62%): 36 (38%)</td>
</tr>
<tr>
<td>Location (index/middle/ring/little finger)</td>
<td>9 / 50 / 24 / 11</td>
</tr>
<tr>
<td>Injury severity (III)</td>
<td>38 (40%): 56 (60%)</td>
</tr>
<tr>
<td>Sports-related/not sport-related</td>
<td>29 (31%): 65 (69%)</td>
</tr>
<tr>
<td>Time to diagnosis and treatment (wks)</td>
<td>2.0 ± 1.1</td>
</tr>
<tr>
<td>Duration of use of orthosis (wks)</td>
<td>4.0 ± 1.7</td>
</tr>
</tbody>
</table>

Values expressed with mean ± SDs or number of cases (proportion [%]). *Injury severity was evaluated using Rayan and Murray’s classification.

### Table 87-2: Clinical and radiologic differences between treatment success and failure groups.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Success Group</th>
<th>Failure Group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>34 ± 14</td>
<td>40 ± 14</td>
<td>&lt;.06</td>
</tr>
<tr>
<td>Sex (male/female)</td>
<td>46/21</td>
<td>19/8</td>
<td>.87</td>
</tr>
<tr>
<td>Manual labor</td>
<td>12 (18%)</td>
<td>11 (41%)</td>
<td>.02</td>
</tr>
<tr>
<td>Dominant side</td>
<td>41 (61%)</td>
<td>17 (63%)</td>
<td>.57</td>
</tr>
<tr>
<td>Injury severity (III)</td>
<td>37 (55%)</td>
<td>19 (70%)</td>
<td>.02</td>
</tr>
<tr>
<td>Injury type (sports-related)</td>
<td>18 (27%)</td>
<td>11 (41%)</td>
<td>.19</td>
</tr>
<tr>
<td>Duration of symptom (wks)</td>
<td>1.7 ± 1.1</td>
<td>2.8 ± 1.4</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Duration of use of orthosis (wks)</td>
<td>4.2 ± 1.8</td>
<td>3.6 ± 1.6</td>
<td>.11</td>
</tr>
</tbody>
</table>

Values expressed with mean ± SDs or number of cases (proportion [%]). *Injury severity was evaluated using Rayan and Murray’s classification.

**BIBLIOGRAPHY**


**PAPER 88**

Clinical Paper Session 15
Hand II — Saturday, September 15, 2018 • 3:18–3:23 PM
Hand and Wrist; General Principles

**Biomechanical Testing of a Novel Micropatterned 3-Dimensional Printed Tendon Fixation Device**

N/A – not a clinical study

Constantinos Ketonis, MD, PhD
Kenneth R. Means, MD

Grant support received from: Raymond M. Curtis Research Foundation, The Curtis National Hand Center, Baltimore, Maryland

**PAPER 89**

Clinical Paper Session 15
Hand II — Saturday, September 15, 2018 • 3:25–3:30 PM
Hand and Wrist; Nerve; General Principles

**The Effectiveness of a Noninvasive Shot Blocking Device in Reducing Pain of In-Office Injections in Hand Surgery**

Level 1 Evidence
Hypothesis: The gate control theory of pain asserts that nonpainful stimuli can prevent the transit of pain sensation to the brain. The ShotBlocker device is a soft plastic disk with multiple blunt projections that rests on the skin during the administration of an injection, and there is some evidence that it is effective in reducing pain in pediatric vaccinations (Figures 89-1, 89-2). We hypothesized that this device will reduce pain from common hand injections in the office setting.

Methods: This was a prospective randomized trial of 110 consecutive patients undergoing injections for common inflammatory hand conditions. Patients were randomized into 3 groups: shot blocking device, modified device, and control. The modified device consisted of the plastic disk with the projections removed, and it was held over, but not in contact with, the skin during injection. Age, gender, diagnosis, and pain medication history were recorded. Patients were asked to record on a Likert scale their perception of pain from their most recent tetanus shot. After the injection they scored the pain perception on the same scale. A normalized pain score was obtained from the difference between the injection pain score and the tetanus shot pain score for each subject. The mean nonnormalized and normalized scores for each treatment group were compared with the control group using Student t test.

Results: There were 84 women and 26 men in the study group, median age 52 years. Common diagnoses included trigger finger (n = 48), de Quervain tenosynovitis (n = 32), and basal joint arthritis (n = 20). The 3 groups did not differ significantly in age or pain medication history. The mean pain score in the device group was 5.01 of 10, compared with 5.72 for the control group, P = .34. The normalized pain score in the device group was 1.26, compared with 3.03 for the control group. This difference was statistically significant (P = .02). Normalized and nonnormalized pain scores for the modified device were not significantly lower than for the control group.

Summary Points:
- The ShotBlocker device effectively reduced pain of injection versus controls when pain scores were normalized to account for pain tolerance.
- When the device was modified by removing the projections, it was not shown to reduce the pain of injection, suggesting that regulating gate control, rather than distraction or placebo, may be the mechanism of action.
- The ShotBlocker device may reduce the pain of in-office injections for common inflammatory hand conditions.

Figure 89-1: The ShotBlocker device is a soft plastic disk with multiple blunt projections that rests on the skin during the administration of an injection, and there is some evidence that it is effective in reducing pain in pediatric vaccinations.

BIBLIOGRAPHY