

## Introduction

- Digit and ray resections needed to restore functionality in patients who had traumatic injury to the hand and affect their postoperative ability to return to work (RTW).
- Goals of amputation surgery: Preserve function length, decrease morbidity, decrease complications, early return of patient to work and activities of daily living (ADL).
- The level of amputation affects RTW ability and hand function.
- Our study compares postoperative hand functionality between people who have undergone Ray resections to that of proximal and distal resections.
- Factors Studied: Return to work ability, grip strength.



Image sources:  
Fias AE. The Vikings and Baron Duputren's disease. *Bay Univ Med Cent Proc* (2001). 14(4): 378-384.  
Cross MB, Warner K, Young K, Weiland AJ. Peripheral Sympathectomy as a Novel Treatment Option for Distal Digital Necrosis Following Parenteral Administration of Promethazine. *HSS J* (2012). 8(3): 309-312.  
Blazar PE, Garon MT. Ray Resections of the Fingers: indications, techniques, and outcomes. *J Am Acad Orthop Surg* (2015). 23: 476-484.

## Methods

- Retrospective chart review of 186 patients treated with digit or ray amputations by one of 3 fellowship-trained orthopedic hand surgeons from 2009 to 2015 at the Philadelphia Hand Center.
- Exclusion criteria: Multiple digit amputations, patients with incomplete records, soft tissue only (fingertip, Ishikawa Subzone I), bilateral injuries.
- Grip strength measured using JAMAR dynamometer
  - Setting III for men, setting II for women
- RTW status obtained from patients' clinical files
- Grip strengths and RTW status compared between three amputation groups:
  - Proximal: Proximal to DIP
  - Distal: DIP and distal
  - Ray: Ray resection (metacarpal)
- Postoperative grip strength in affected hand (Measured 2 years post-surgery) compared to that of unaffected contralateral (CL) hand
- Statistics for worker's compensation: Fisher's Exact Test, Level: Chi-Square Testing.
- Statistics for grip strength comparison: ANOVA.

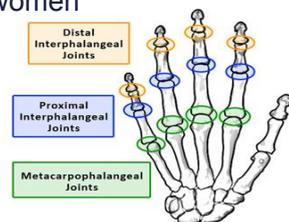


Image source:  
[http://usability.gtri.gatech.edu/eou\\_info/factsheet\\_arthritis.php](http://usability.gtri.gatech.edu/eou_info/factsheet_arthritis.php)

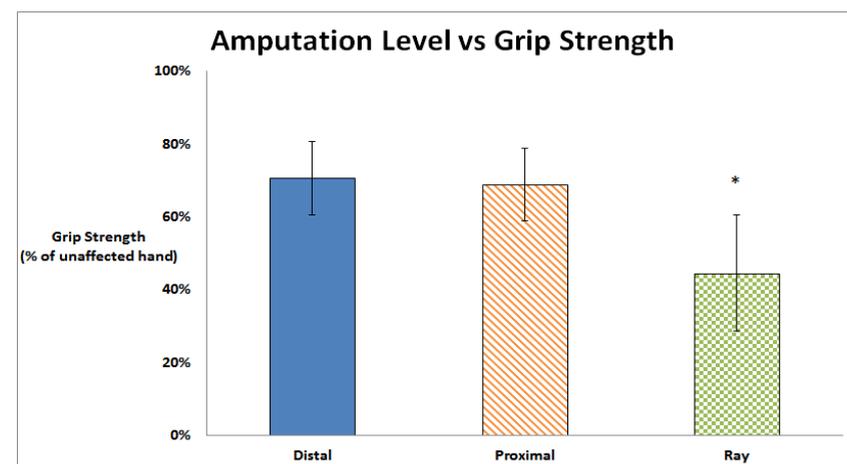
## Results

### Effect of Amputation on Return to Work Ability

Level	Full Duty	Modified Duty	Total	% Return to Full-Duty Work
Distal	34	4	26	89.4
<b>Proximal</b>	<b>16</b>	<b>10</b>	<b>26</b>	<b>61.5</b>
<b>Ray</b>	<b>8</b>	<b>5</b>	<b>13</b>	<b>61.5</b>
All	58	19	77	75.3

- Proximal level (61.5%) and ray resections (61.5%) were less likely to return to full-duty work than distal level amputations (89.4%);  $P=0.018$ .
- Age, sex, dominance and affected digit were not significant.

### Effects of Amputation on Grip Strength



- Both Distal (70.6% CL) and Proximal (68.8% CL) level amputations had significantly higher grip strength than ray resection (44.6% CL);  $P = 0.02$ .
- Age and sex were not significant.

## Discussion

- Proximal and ray resections: Lower RTW and weaker grip strength as they are more disruptive surgeries.
- Ray resections: better cosmetic and functional outcomes than proximal amputations.
- Ray resection cautioned in individuals who need strong grip, key and chuck pinch strengths for work.
- Limitations of study:
  - No pre-trauma grip measurements for injured hand.
  - RTW may be influenced by psychological impact, stiffness, loss of available work, and chronic pain.
  - “Full duty work” may not correlate with previous job type.
  - Proximal amputation group may or may not include intact FDS function.

## Conclusions

- Grip strength similar in distal and proximal amputation groups, but significantly worse in Ray resection group.
- Distal amputations have best results in RTW and grip strength.
- Proximal and ray resections less likely to return to full duty work.
- Proximal and ray resections have trade-offs and surgeons should counsel patients accordingly.

## Sources

- Blazar PE, Garon MT, Ray resections of the fingers: indications techniques, and outcomes. *J Am Acad Orthop Surg* (2015). 23: 476-484.
- Wolfe, Scott W., Hotchkiss Robert N., Pederson William C., and Kozin, Scott H., eds. *Green's Operative Hand Surgery*. 6th Ed. Philadelphia: Elsevier/Churchill Livingstone, 2011. Print.
- Nuzumlali et al., Results of ray resection and amputation for ring avulsion injuries at the proximal interphalangeal joint. *J. Hand Surg Br* (2003). 28(6):578-81.