



Ossification of the Proximal and Middle Phalangeal Condyles: A Tool to Aid in Phalangeal Neck Fracture Reduction

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INTRODUCTION

- Phalangeal Neck Fractures
 - Occur in the distal portion of the proximal and middle phalanges
 - Slow remodeling due to distant location from the physis
 - Malunion results in decreased range of motion and strength, stiffness, and decreased stability at the interphalangeal joint
 - Surgical treatment often necessary for displaced fractures
- Anatomical alignment is difficult to assess due to incomplete ossification in children

OBJECTIVE

- To determine a temporal course for development of the retrocondylar recess to aid in management, reduction, and fixation of phalangeal neck fractures

PATIENTS AND METHODS

DATA SET

- Retrospective review of all lateral radiographs of the hand for patients ages 1 to 18 years who presented to a University of Maryland Medical System hospital
- 1061 radiographs were included with multiple phalynxes obtained per x-ray with approximately even distribution of samples across all ages
- Proximal and middle phalynx of each digit assessed excluding the thumb
- Exclusions:
 - Fractures on digit
 - Rotation or poor demarcation of the volar cortex or phalangeal neck

Methods, Examples, and Results

PROCEDURE

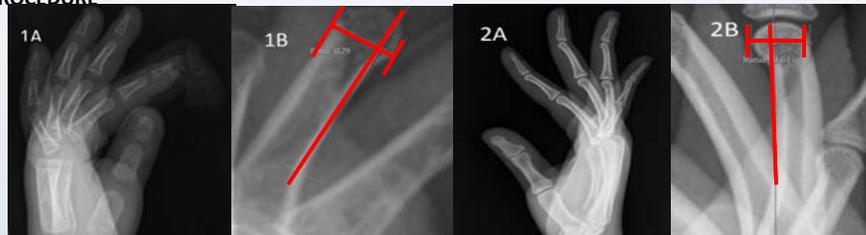


Figure 1. A) Lateral radiograph of the left hand of a 1 year old patient with no noted injury to any digit B) Zoomed in view of the long proximal phalynx. A line was drawn anteriorly along the volar cortex. A perpendicular line was drawn at the phalangeal neck. A ratio of the anterior to posterior aspects of the line was noted. The 0.29 ratio of the lengths denotes that the line is 22% anteriorly or in the anterior 1/3rd of the finger
Figure 2. A) Lateral radiograph of the right hand of an 18 year patient with no noted injury to any digit B) Zoomed in view of the long proximal phalynx. A line was drawn anteriorly along the volar cortex. A perpendicular line was drawn at the phalangeal neck. A ratio of the anterior to posterior aspects of the line was noted. The 0.61 ratio of the lengths denotes that the line is 38% anteriorly or in the middle 1/3rd of the finger

RESULTS

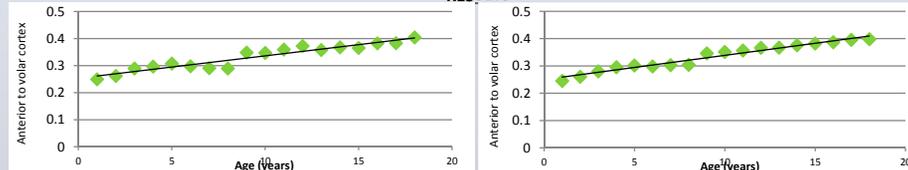


Figure 3. Average portion of the phalynx anterior to the volar cortex line at the phalangeal neck for all proximal (right) and all middle (left) phalanges

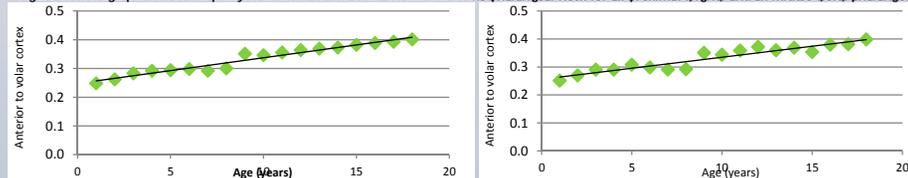


Figure 4. The average portion of the phalynx anterior to the volar cortex line at the phalangeal neck for males for all proximal (right) and all middle (left) phalanges

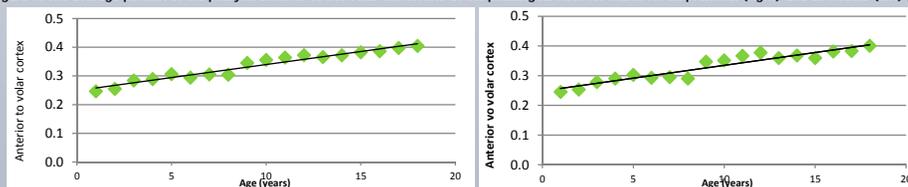


Figure 5. The average portion of the phalynx anterior to the volar cortex line at the phalangeal neck for females for all proximal (right) and all middle (left) phalanges

DISCUSSION

- A linear model fits the temporal course of development of the retrocondylar recess
- No significant difference in time course of development between the proximal and middle phalanges
- An increase in development was seen between 8 and 9 year old patients, likely correlating with a rapid growth period
- No significant differences were noted at any age between males and females in both the proximal and middle phalynx
- The anterior volar cortex line crosses over from the anterior 1/3 to the middle 1/3 of the phalynx between 8 and 9 years of age

CONCLUSION

- A predictive model has been established to determine ossification of the phalangeal condyles to aid in evaluation and management of phalangeal neck fractures

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