



# A Reliable and Standardized Post-Operative Staging System for First Carpometacarpal Arthritis

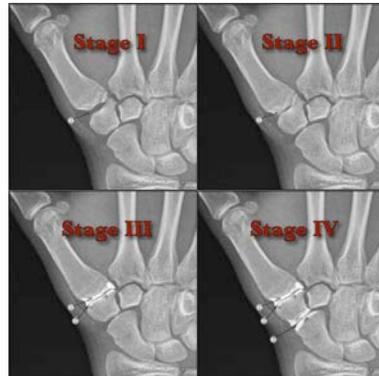
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## Introduction

Thumb CMC osteoarthritis results in:

- ❖ weakening of the palmar beak ligament
- ❖ increased metacarpal translation on the trapezium
- ❖ shear stress forces damage the articular cartilage
- ❖ progresses to degenerative osteoarthritis

The most often used method, the Eaton staging (right), measures the distance between the distal pole of the scaphoid and the base of the first metacarpal – this measurement is fraught with confounding variables.



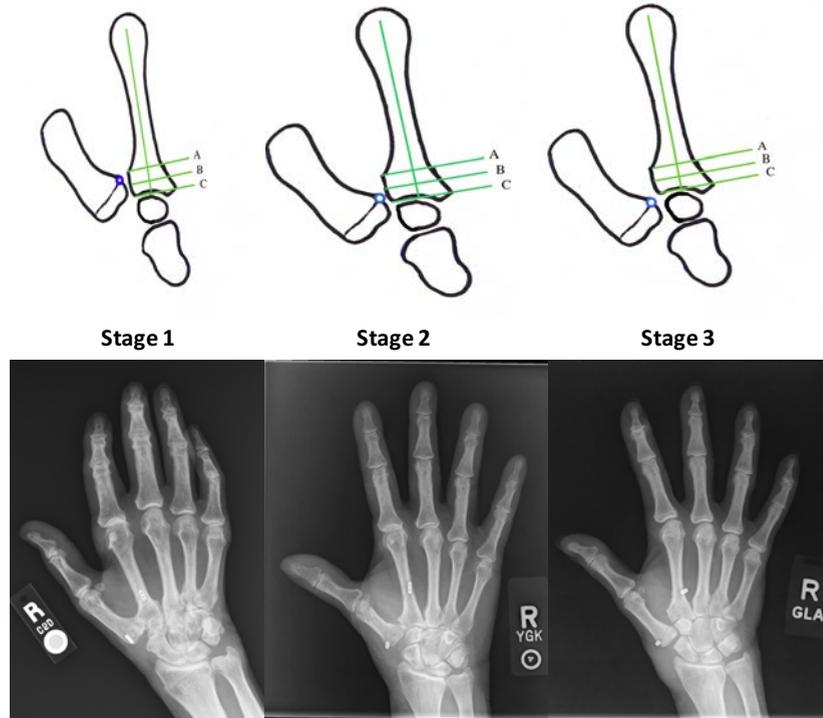
Currently, there is no standard system for measurement of proximal migration after removal of the trapezium when treating first CMC arthritis. Surgical options vary with the stage and nature of the disease.

**We hypothesize that the presented novel post-operative staging system has a high degree of intra- and inter-rater reliability, and can be used to standardize the measurement of proximal migration after surgical treatment for this disease process.**

## Proposed Staging System

A novel staging system was developed based upon the position of thumb metacarpal base flare relative to the index metacarpal base on an AP radiography of the hand. The metacarpal base flare of the thumb was chosen due to its proximity to the center of rotation, thereby lessening the untoward effects of thumb positioning on measurements.

## Methods



Line A is perpendicular to top flare of index metacarpal base  
Line B is half way between lines B & C  
Line C is perpendicular to bottom of metacarpal base

Radiographs of 57 patients status post trapeziectomy and suture button suspension were obtained. Using the novel staging system, the non-blinded senior author categorized each image into its respective stage. The images were then assigned to two different slide decks (the order of images was shuffled). Four blinded reviewers (two residents and two hand fellows) were given a description of the staging system, and the reviewers categorized each image into its respective stage. To evaluate inter- and intra-rater reliability, two-way inter-class correlation (ICC) values were calculated using “R” software and the “irr” package.

## Results

Value of ICC	Strength of agreement
<0.4	Poor
0.4–0.75	Fair to good
>0.75	Excellent

Reviewer	ICC	95% CI
#1	0.878	0.790 - 0.929
#2	0.895	0.821 - 0.938
#3	0.856	0.752 - 0.916
#4	0.901	0.833 - 0.942
<b>Fellows</b>	0.866	0.748 - 0.926
<b>Residents</b>	0.741	0.423 - 0.869
<b>Overall</b>	<b>0.911</b>	<b>0.851 - 0.947</b>

The inter-rater reliability between the 4 raters was excellent (ICC = .911, 95% CI = (.851, .947)). The intra-rater reliability was excellent for all 4 reviewers (ICC range: (.856, .901)). On subgroup analysis, inter-rater agreement for fellows was slightly higher than agreement for residents (fellow ICC: .866, 95% CI: (.748, .926), resident ICC: .741, 95% CI: (.423, .869)).

## Conclusions

Without a standardized method for measurement of proximal migration following trapeziectomy, surgeons are unable to make objective comparisons between the various techniques to treat first carpometacarpal arthritis. We present a novel post-operative staging system that demonstrates a high degree of inter- and intra-observer reliability, and we believe that this system offers a standardized method to measure proximal migration of the metacarpal.