

# 2023 NEHS Annual Meeting Abstract Submission

COMPLETE

NEHS Vice President, Daniel Mastella, M.D., is currently accepting abstract submissions for presentation at our Annual Meeting on December 1, 2023.

This meeting will be held at the Sturbridge Host Hotel in Sturbridge, MA.

Therapists, NPs, and PAs are also encouraged to submit.

THE DEADLINE FOR SUBMISSION IS OCTOBER 15, 2023

RESIDENTS AND FELLOWS ONLY. Please indicate if you want your paper to be considered for the prestigious H.Kirk Watson, M.D. Founder's Award. The abstracts for award consideration will be presented in the morning and the award will be presented in the afternoon.

## CREATED

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## \* ABSTRACT TITLE

Bone Density of the Intact Scaphoid: an Analysis of Six Anatomical Regions

## \* Contact Person Name

Ingmar Legerstee

## \* Contact Person Email

## \* Contact Person Phone Number

**\* Name of who will present abstract at NEHS meeting on December 1, 2023 Please note that the same person cannot present more than one abstract at the meeting.**

Razan Kanaan

## \* Please indicate if the presenter is:

Not currently a resident or fellow

**\* List full names of abstract authors Please note - one of the lead authors must be present at the meeting to answer questions about the paper.**

L. Freundt  
I. Legerstee  
O. Shen  
R. Kanaan  
R. Weiss  
J. Simeone  
C. Mudgal

**\* ABSTRACT - should include background information and a description of methods, programs, or practices.**

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Purpose

Open reduction and internal fixation (ORIF) with a headless compression screw is the preferred technique for scaphoid fractures that are indicated for surgical treatment. Screw placement in the highest bone density area of the scaphoid can facilitate optimal compression of the fracture site. This study aimed to compare the density of six anatomical regions of the intact scaphoid bone to guide surgeons in screw positioning.

Methods

CT scans of intact scaphoids were segmented and divided into six regions using 3D Quantitative Imaging (3DQI) Platform (Department of Radiology Massachusetts General Hospital). The initial plane was established by using the longest point-to-point axis of the scaphoid, followed by two equally distributed planes that ran perpendicular to it. This created a proximal, middle, and distal region, each of which contained an ulnar and radial component. The bone densities of the six regions were calculated using Hounsfield units (HU) and compared using an ANOVA test, followed by a Bonferroni correction for multiple comparisons.

Results

A total of 214 CT-scans were included. The bone density of the proximal regions was the highest (proximal radial 551 HU, standard deviation [SD] 115; proximal ulnar 546 HU, SD 116), followed by the middle region (middle radial 467 HU, SD 107; middle ulnar 476 HU, SD 106), and lastly the distal region (distal radial 412 HU, SD 107; distal ulnar 429 HU, SD 97). The bone density of the proximal region was significantly higher than the middle and distal regions ( $p$ -value  $< 0.001$ ). Within each region, no statistical difference was found between the ulnar and radial components ( $p$ -value  $> 0.99$  proximal radial vs ulnar,  $p$ -value  $> 0.99$  middle radial vs ulnar,  $p$ -value  $> 0.99$  distal radial vs ulnar).

Conclusion

The proximal pole exhibits the greatest bone density of the intact scaphoid, making it an ideal location for screw placement during ORIF. Although screw placement depends on fracture location, this result can aid surgeons in surgical planning.

Level of evidence: Diagnostic III

**Please attach files with diagrams and/or photos to support your abstract (10 MB limit)**

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**\* Please attach the abstract presenter's CV**

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Table 1 Patient Baseline Characteristics	
Mean (SD)	
Age at scan, years	40 (13)
Median (IQR)	
BMI* (kg/m <sup>2</sup> )	25 (17.51 – 27.10)
N (%)	
Male sex	110 (51)
Diabetes Mellitus**	13 (6)
Smoker***	23(11)
Alcohol****	143 (66)
Right hand scan	117 (54)

Table 1: Baseline characteristics of study cohort.

\* BMI = 10 patients with unknown BMI  
 \*\* Diabetes Mellitus = 6 patients with unknown Diabetes Mellitus status  
 \*\*\* Smoker = 5 patients with unknown smoking status  
 \*\*\*\* Alcohol = 6 patients with unknown alcohol consumption

SD, standard deviation; IQR, interquartile range

**Bone density stratified by gender**

