

Ultrasound Accurately Measures Presence, Length and Diameter of the Palmaris Longus Tendon

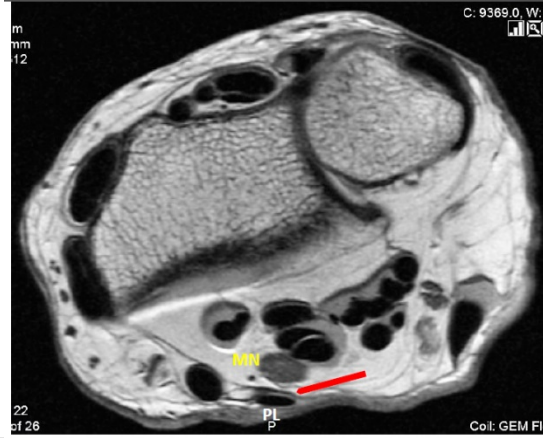
Christine C. Johnson, MD; Emil Stefan Vutescu, MD; Theodore T. Miller, MD; O. Kenechi Nwawka, MD; Steve K. Lee, MD; Scott W. Wolfe, MD
Investigation Performed at Hospital for Special Surgery, New York, NY, USA

BACKGROUND

Palmaris longus (PL) tendon is frequently used as a tendon graft

Assessment of PL presence and dimensions preoperatively would:

- Minimize the risk of inadvertent harvest of the median nerve^{1,2}
- Reduce likelihood of harvest of inadequate donor material³



Proximity of palmaris longus (PL) to median nerve (MN) at the wrist crease. Red arrow represents antibrachial fascia (Reproduced with permission from: Leslie BM, Osterman, AL, Wolfe SW. Inadvertent Harvest of the Median Nerve. *J Bone Joint Surg Am.* 2017;99:1173-1182)

HYPOTHESIS

Ultrasound accurately predicts the presence, length, and diameter of the palmaris longus tendon.

METHODS

- 17 cadaveric upper extremities were studied using a LOGIQ E9 ultrasound system (GE Healthcare, Milwaukee, WI).
- Two fellowship-trained musculoskeletal radiologists assessed PL tendon presence, length and diameter.
- Each wrist was explored through a 2cm transverse wrist incision, and the tendon, when present, was harvested and measured.
- A two-way mixed consistency intraclass correlation coefficient (ICC) was used to assess inter-rater reliability and agreement between surgical and ultrasound measurements.

RESULTS

- Palmaris longus (PL) tendon was present in 13 of 17 specimens
 - Prevalence: 76%

Tendon Presence

- Ultrasound correctly identified tendon presence or absence in all cases
 - Sensitivity: 100%
 - Specificity: 100%

Tendon Dimensions

- Ultrasound assessment of length (mean, 10.9cm) correlated with surgical measurements of tendon length (mean, 12.2cm)
 - [ICC: 0.97, 95%CI 0.92-0.99]
- Ultrasound measurements of tendon diameter (mean, 0.54cm) also correlated with surgical measurements (mean, 0.5cm)
 - [ICC: 0.79, 95%CI 0.32- 0.94]

Specimen	Palmaris Tendon Length (cm)		Palmaris Tendon Diameter (cm)	
	Ultrasound (mean ± SD)	Dissection	Ultrasound (mean ± SD)	Dissection
1	10.1 ± 0.6	10.4	0.5 ± 0.02	0.4
2	11.4 ± 0.3	13.5	0.5 ± 0.11	0.5
3	15.2 ± 0.6	15.1	0.4 ± 0.01	0.5
4	7.7 ± 0.8	7.9	0.4 ± 0.05	0.3
5	13.4 ± 0.4	16.3	0.5 ± 0.0	0.6
6	13.0 ± 0.0	14.1	0.6 ± 0.0	0.5
7	13.1 ± 1.2	15.6	0.7 ± 0.13	0.6
8	4.2 ± 0.7	4.4	0.4 ± 0.01	0.3
9	12.4 ± 1.6	13.3	0.3 ± 0.01	0.4
10	7.1 ± 0.1	7.8	0.4 ± 0.03	0.5
11	10.4 ± 0.2	12.1	0.5 ± 0.05	0.5
12	12.0 ± 0.5	13.5	0.5 ± 0.04	0.7
13	11.7 ± 0.4	14.6	0.5 ± 0.04	0.7

RESULTS (continued)

Inter-Rater Reliability

- Intraclass correlation coefficient between radiologists' measurements of PL tendon dimensions was almost perfect
 - [ICC: 0.97, 95%CI 0.89-0.99]

CONCLUSION

- Ultrasound can determine palmaris longus tendon presence, length, and diameter with excellent accuracy and almost perfect inter-observer reliability.

DISCUSSION

- This information may be useful to the treating surgeon in a number of ways:
 - Accurate assessment of tendon dimensions preoperatively would help ensure the harvest of adequate donor material
 - Confirmation of tendon presence may help minimize the risk of erroneous harvest of the median nerve
 - Assist with preoperative planning (i.e. alternative graft sources)
- Limitations
 - Limited sample size
 - Radiologists with extensive ultrasound experience

REFERENCES

1. Leslie BM, Osterman, AL, Wolfe SW. Inadvertent Harvest of the Median Nerve. *J Bone Joint Surg Am.* 2017;99:1173-1182
2. Woon CY, Gourineni R, Watkins S et al. That Tendon is the Median Nerve: Perils of a Palmaris Longus Deficient Wrist. *J Hand Surg Asian Pac Vol.* 2017;22:160-6.
3. Jakubietz MG, Jakubietz DF, Gruenert JG, Zahn R, Meffert RH, Jakubietz RG. Adequacy of palmaris longus and plantaris tendon for tendon grafting. *J Hand Surg Am.* 2011;36:695-698