

# Ultrasound imaging of acute biceps tendon changes after wheelchair sports

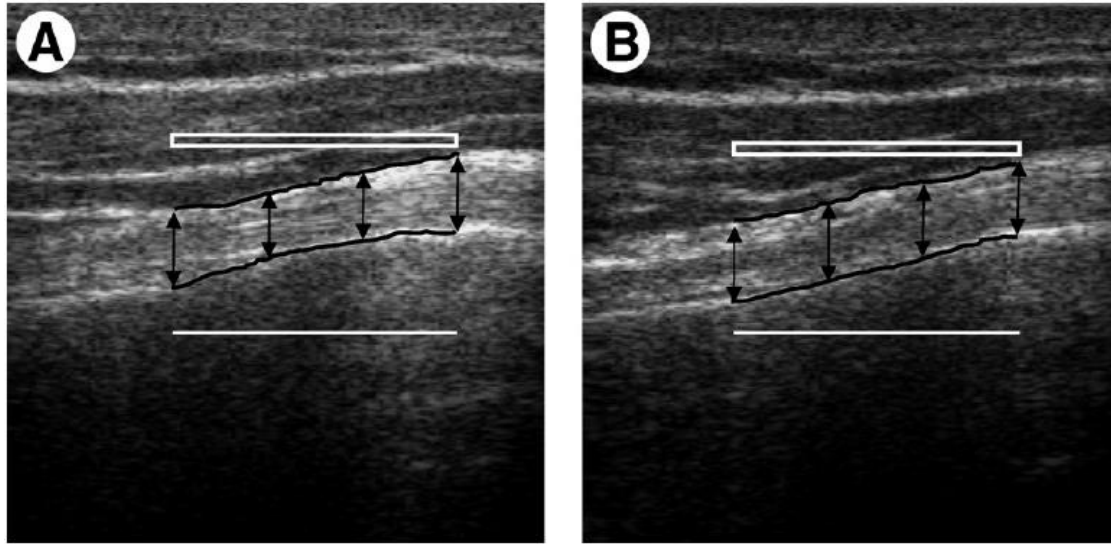


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- Objectives: To investigate acute changes in the biceps tendon after a high-intensity wheelchair propulsion activity and to determine whether these changes are related to body mass.
- Method: The biceps tendon was imaged with ultrasound before and after wheelchair basketball or quad rugby.
- Participants: 42 subjects who participated in wheelchair basketball or quad rugby - aged 18 – 65 yrs.
- Main Outcome Measures:
  - ✓ Biceps tendon diameter
  - ✓ Biceps echogenicity



# Introduction



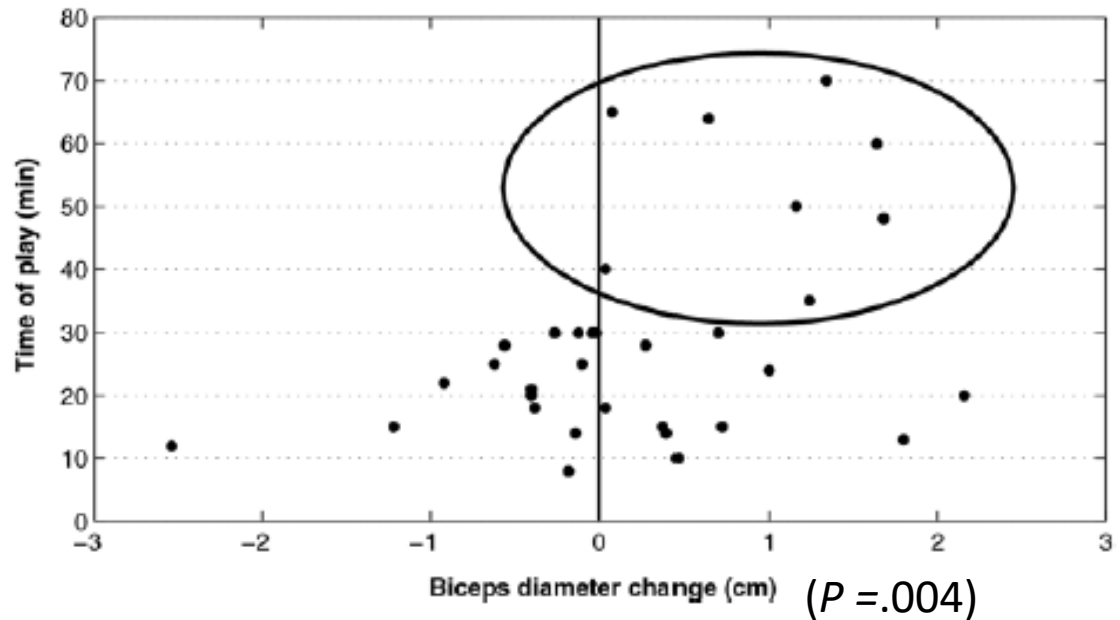
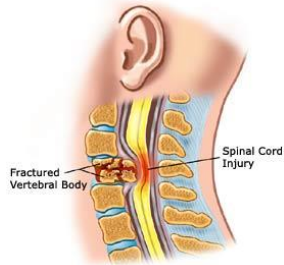
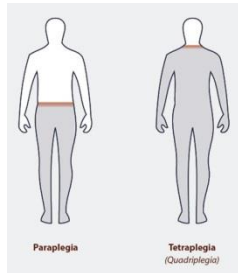
Pregame & Postgame image of Biceps tendon

When using ultrasound to diagnose shoulder pathology, structures containing more fluid appear darker : less echogenic (ability to return a signal) hypothesized that because of increased edema, the biceps tendon would become less echogenic and increase in size after participation in an intense physical activity – higher changes in subjects with larger body mass.

The echogenicity of the tendon was determined by calculating the average pixel intensity value (0 - black and 255 - white) throughout the selected area.

# Results

Subjects	Diameter Before	Diameter After	Echogenicity Before	Echogenicity After
Subjects with tetraplegia (n=11)	$4.19 \pm 0.61$	$4.42 \pm 0.79$	$2.01 \pm 0.68$	$1.80 \pm 0.56$
Subjects with paraplegia (n=21)	$4.77 \pm 0.99$	$4.98 \pm 0.93$	$1.95 \pm 0.82$	$1.66 \pm 0.56$
Non-SCI subjects (n=2)	$4.97 \pm 1.32$	$5.27 \pm 0.75$	$1.96 \pm 0.16$	$2.02 \pm 0.69$
Mean (n=34)	$4.60 \pm 0.92$	$4.82 \pm 0.90$	$1.97 \pm 0.74$	$1.73 \pm 0.56$
	$(P = .178)$		$(P = .038)$	



# Results

- Echogenicity (tendon/reference) ratio of the pregame images was negatively correlated with weight ( $P = .035$ ).
- The biceps, diameter trended toward being larger in subjects with a higher body mass ( $P = .087$ ).

## Note:

- In the acute phase of tendon pathology, increased fluid content leads to swelling of the tendon.
- Specific joint forces and moments during wheelchair propulsion are directly related to shoulder pathology.

# Conclusions

- Acute changes in biceps tendon properties after exercise.
- This likely represent edema, a first sign of overuse injury.
- The significance of continuous activity was shown by the fact that subjects who had more playing time showed a larger increase in tendon diameter.

# Reference

Stefan van Drongelen, PhD, Michael L. Boninger, MD, Bradley G. Impink, Tagreed Khalaf, MD. **Ultrasound Imaging of Acute Biceps Tendon Changes After Wheelchair Sports. (March 2007) Arch Phys Med Rehabil Vol 88.**

