

Intramuscular Compartment Pressures Do Not Correlate with Tissue Physiology After Tibia Fracture

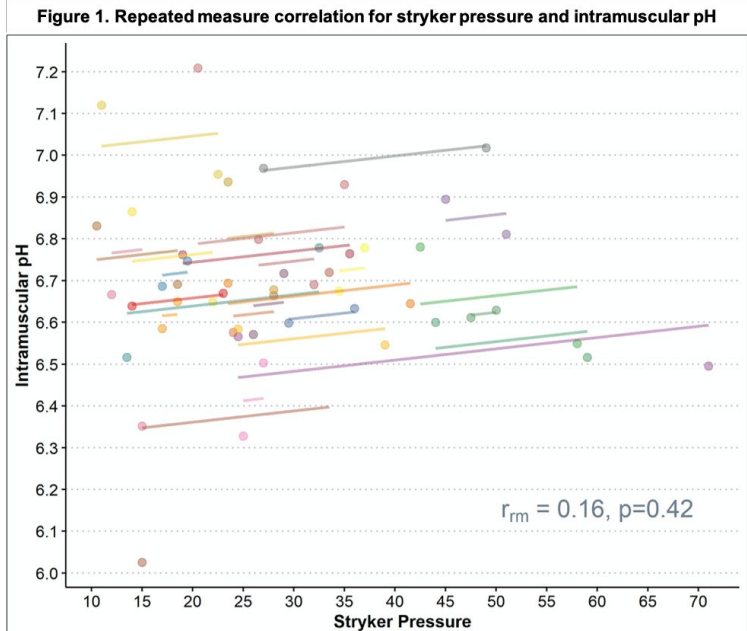
Loren O. Black MD; Megan Catherine Rushkin, MPH; Emelia Soddors, MS;
Jeffrey Samuel Cheesman, MD; James E.W. Meeker, MD; Jung U. Yoo, MD;
Darin M. Friess, MD; Zachary Mark Working, MD
OHSU, Portland, OR, United States

Purpose: Transcutaneous intramuscular pressure (TIMP) measurements are unreliable and prone to sentinel errors. Volumetrically intramuscular compartments are mostly filled with solids, making pressure measurements curious. Our purpose was to study the in vivo relationship between TIMP and intramuscular pH (IpH), a direct measure of muscular health.

Methods: Adults with acute tibia shaft and plateau fractures (Level I, academic, 2019-2021) were offered enrollment in an observational cohort. During operative stabilization (nailing/framing) a sterile validated IpH probe was placed into the anterior tibialis for 48 hours (continuous sampling). TIMP was measured at surgery start and end. TIMP and IpH were compared using a repeated measures correlation analysis; IpH values were extracted at 1-min averages matching TIMP timing. After informed consent patients received standard of care (independent research team; no study data available to treating surgeon).

Results: 25 patients with tibia fractures (9 plateau, 16 shaft) were observed. Starting and ending TIMP averaged 30.5 mm Hg (standard deviation [SD] 14.9) and 28.8 mm Hg (SD 12.4), respectively. 4 patients were clinically diagnosed with acute compartment syndrome (ACS) and fasciotomized. The average time from injury to surgery was 38.2 hours (SD 30.5). Starting and ending IpH was acidic and averaged 6.64 (SD 0.21) and 6.74 (SD 0.17), respectively. There was no correlation between TIMP and IpH ($r_{rm} = 0.16$, bootstrap 95% confidence interval [-0.05, 0.53], $P = 0.42$).

Conclusion: No correlation exists between TIMP measurements and direct measures of intramuscular physiology in the form of in vivo IpH; improvements in diagnostic modalities for muscular diagnoses such as compartment syndrome remain valuable.



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