March 2023

Differences In Depth Of Soft Tissue At The Proximal Tibia Intraosseous Catheter Insertion Site Based On Sex And BMI

Thomas Sprys-Tellner
Wayne State University, he3841@wayne.edu

John Kulka
Wayne State University, gm7925@wayne.edu

Introduction
Intraosseous (IO) cannulation is commonly used for emergent vascular access in unstable patients treated in the emergency department (ED). However, inappropriate depth of IO insertion may be associated with increased risk of complications associated with IO catheter use, including extravasation and subsequent compartment syndrome. Our objective was to characterize the thickness of soft tissue overlying the proximal tibial IO insertion site according to patient sex, body mass index (BMI), and common medical comorbidities.

Methods
Retrospective chart review was performed for patients who received x-ray imaging of the proximal tibia at the study site. Patients were excluded if they had traumatic injury at the site of insertion, or if data were unavailable regarding BMI or other demographics. X-ray images were reviewed by trained abstractors utilizing a standardized protocol including *a priori* methods for depth measurements. Data were presented utilizing standard techniques, including mean values with standard deviation.

Results
A total of 373 patients were included in the analysis, although five patients were excluded due to lack of BMI data, leaving 368 patients for the final data analysis. Mean age for included patients was 60.0 years (SD 14.0), and 189 (50.7%) patients were male. A total of 201 (54.6%) patients had their left lower extremity imaged. The mean depth of soft tissue overlying the proximal tibial IO insertion site for all patients was 18.2-mm (SD 8.4 mm), including a depth of 14.2 mm (SD 5.8) for genetic males and 22.4 mm (SD 8.6) for females, with a statistically-significant difference seen between sexes ($p < .05$). The BMI for all patients was 31.2 (SD 7.0), including mean BMI 30.8 (SD 6.3) for males and 31.7 (SD 7.8) for females ($p < .05$). Patient BMI did not appear to be significantly associated with depth of IO insertion.

Conclusion
We found that genetic sex appeared to influence the depth of IO insertion at the proximal tibia, with statistically-significant greater depth of IO insertion required for genetic females than with males at the proximal tibia, despite no significant difference in BMI between sex groups. Larger studies are needed with more enrolled subjects to determine if these differences may be explained by other factors.