Abstract:

HIGHLIGHTS: Ultrasound shows several venous changes in pediatric PIV-containing veins. Changes were visualized by ultrasound in the absence of physical exam findings. Venous luminal narrowing, wall thickening, and thrombosis may explain PIV failure.

BACKGROUND: Peripheral intravenous catheters (PIVs) are routinely used for venous access in hospitalized pediatric patients to administer fluids and medications and to aspirate blood. Unfortunately, PIVs do not remain functional for the entire duration of intravascular need. We hypothesized that PIV malfunction may be related to venous changes that can be visualized with ultrasound (US) imaging. The purpose of this study was to describe and document such changes in pediatric patients.

METHODS: This Institutional Review Board-approved study was performed at a tertiary pediatric medical center. Patients underwent US scans of their PIV-containing veins, documenting venous characteristics such as depth, diameter, wall thickness, blood flow, valves, branch points, and presence of thrombus. Patient demographics and PIV characteristics were also recorded.

RESULTS: Data from 30 patients including 12 males and 18 females with a mean age of 11 years were analyzed. Mean venous depth and diameter were 2.07 ± 0.13 and 2.02 ± 0.18 mm, respectively. Mean PIV dwell time at time of evaluation was 3.3 days. PIV-associated venous changes were seen in 73% of accessed veins and included lumen narrowing (47%), wall thickening (33%), presence of thrombus (20%), and absence of blood flow around the PIV tip (40%).

CONCLUSION: PIV-associated venous changes are seen with US in the majority of pediatric patients with indwelling PIVs but are not necessarily appreciated on physical exam. These changes may help explain the high rate of pediatric PIV device failure. Given the small sample size, further investigation is needed to better characterize PIV-associated venous changes in children.

Reference: