ULTRASOUND-GUIDED AXILLARY AND FEMORAL VEIN CANNULATION AS AN ALTERNATIVE FOR HIGH-FLOW ACCESS IN NEONATES: An Observational and Retrospective Study

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INTRODUCTION

Safe and durable vascular access in neonates represents one of the greatest challenges in clinical practice, especially in those requiring prolonged intravenous therapies, infusion of blood products, and frequent laboratory sampling. Repeated peripheral punctures are associated with pain, stress, progressive depletion of venous capital, and an increased risk of complications, often culminating in the need for venous cutdown, an invasive procedure associated with higher morbidity. In this context, the use of peripherally inserted central catheters (PICC), particularly the PowerPICC®, emerges as an essential strategy to ensure reliable vascular access, reduce repeated interventions, and promote greater safety for the neonate, especially when combined with advanced insertion techniques such as ultrasound-guided puncture. Traditionally, upper limb veins are prioritized for PICC insertion; however, in neonates with limited peripheral venous access, the axillary and femoral veins emerge as safe and viable alternatives, particularly for the insertion of larger-caliber catheters. The incorporation of ultrasound-guided puncture plays a central role in this setting by allowing better anatomical visualization, higher first-attempt success rates, and reduced complications associated with blind puncture. Evidence demonstrates that the use of ultrasound for vascular access in neonatology enhances procedural safety, enables the use of deep veins, and contributes to reducing multiple punctures and venous cutdowns, aligning with international recommendations for best practices in intravenous therapy and neonatal vascular access.

OBJECTIVE

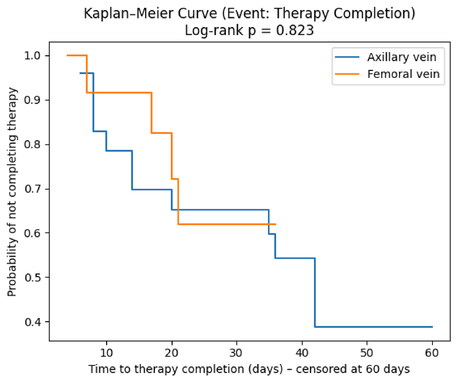
To report the use of high-flow PICC catheters in the neonatal population, considering only insertions in axillary and superficial femoral veins, evaluating dwell time and reasons for catheter removal.

METHODS

An observational, prospective study conducted using an institutional database. A total of 128 neonates admitted to the intensive care unit who underwent high-flow PICC catheter insertion were included, with 38 in the axillary vein and 19 in the femoral vein

RESULTS

Variable	Description
Total sample	128 neonates
Analyzed sample	57 neonates
PICC insertion site	Femoral vein: 19 (33.3%) Axillary vein: 38 (66.7%)
Age (days of life)	Median: 3 days (IQR: 3 – 173)
Weight (kg)	Median: 3.275 kg (IQR: 1.020 – 6.030)
Vessel diameter (mm)	Median: 3.0 mm (IQR: 2.7 – 4.0)
Vessel diameter occupancy (%)	Median: 33% (IQR: 33 – 45)



Kaplan–Meier analysis, considering therapy completion as the event of interest, demonstrated similar catheter survival patterns between catheters inserted in the femoral vein and those inserted in the axillary vein (Log-rank test $\chi^2 = 0.05$; $p = 0.82$).

Correlation analysis demonstrated a strong positive association between procedure time and DIVA score (Spearman's $\rho = 0.89$; $p < 0.001$), indicating that higher difficulty scores were associated with longer procedure duration.

Similarly, vessel depth showed a strong positive correlation with procedure time (Spearman's $\rho = 0.84$; $p < 0.001$), suggesting that deeper vessels required longer time for successful catheter insertion.

Figure 3. Correlation between Vessel Depth and Procedure Time

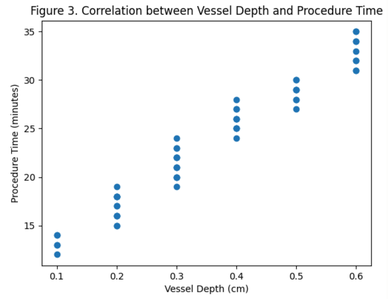
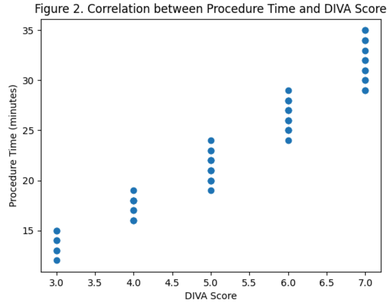
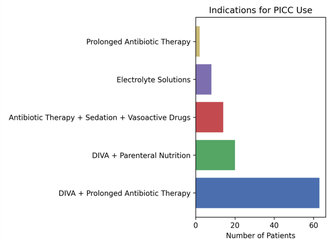


Figure 2. Correlation between Procedure Time and DIVA Score





Main indications for catheter use in neonates

The first-attempt success rate was 17 (44.7%) for the axillary vein and 5 (26.3%) for the femoral vein.

Ultrasound-guided puncture was performed using a GE Versana ultrasound device with a linear transducer in the transverse plane.

CONCLUSION

The high-flow PICC proved to be a safe and effective strategy in the neonatal population when inserted into the axillary and femoral veins using ultrasound-guided puncture. In addition to allowing adequate dwell time, its use significantly contributes to reducing multiple venous punctures, reinforcing its role as the central access of choice in neonates requiring intravenous therapies and frequent blood sampling