

Breakthrough Initiative - National Coalition Recommendations for the Minimal Use of PICC Lines

Patients with Stage 3-4 chronic kidney disease (CKD) are at risk for progression to kidney failure (ESRD, or Stage 5 CKD). Maintaining vessel integrity is essential to provide a future dialysis vascular access for these patients. Peripherally inserted central catheter (PICC) lines can damage vessels and render them unusable for dialysis. The *AV Fistula First Breakthrough Initiative National Coalition* recommends NOT using PICC lines in patients at risk for, or with known mid-Stage 3 CKD¹, Stage 4 and 5 CKD or ESRD. A small bore central catheter (SBCC) in the internal jugular (IJ) vessels is recommended instead, since SBCCs can last longer than PICC lines, can be easily replaced, and have fewer complications for the period of time needed (Sasadeusz et al, 1999).

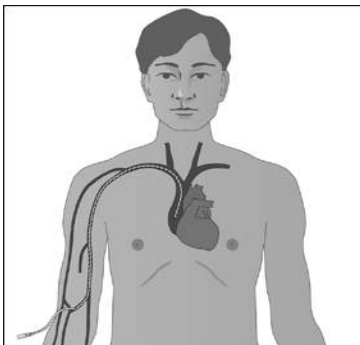
When practitioners are faced with whether or not to use a PICC line in a patient with possible CKD, the *Fistula First Coalition* recommends that you:

- Review each patient's estimated glomerular filtration rate (eGFR) to identify CKD and/or classify the stage
- Obtain a nephrology consult if CKD is present
- Use a small-caliber IJ instead of a PICC line for other treatment purposes
- Consider alternatives to PICC lines whenever possible (Saad & Vesely, 2004)

Discussion

PICC lines are venous access devices often used to deliver chemotherapy or antibiotics. They may have single, double, or triple lumens and are generally inserted using the modified Seldinger technique, or with portable ultrasound units for accurate vein location by a physician or specially trained nurse. A PICC line may remain in place for weeks or months, depending on the medical condition of the patient and the sterility and patency of the catheter.

Figure 1. Location of PICC Lines



While they serve an important medical purpose, PICC lines can damage veins that are needed for safe, long-term, effective arteriovenous hemodialysis access in patients with CKD or ESRD). Use of PICC lines is also associated with central venous stenosis. Instilled medications may cause chemical irritation to the venous endothelium. Coupled with the inherent mechanical irritation of the catheter, it may take only a short time to render a vein useless for hemodialysis access. This point is illustrated by a prospective study by Grove and Pevec (2000), and a retrospective study by Allen et al (2000), both of which assessed venous thrombosis associated with PICC placement. Turcotte, Dube and Beauchamp (2006) provide a comprehensive review of the topic, including a breakdown and results from nine prospective trials. Additionally, in anecdotal reports, contrast injection and duplex vessel mapping studies documented

¹ Stage 3 CKD is a GFR between 30-59 mL/min/1.73m²
Mid-Stage 3 is defined as a GFR \leq 45 mL/min/1.73m²

complete destruction of the involved veins within weeks to months following PICC line placement, ruining vessels that could otherwise have been used to create hemodialysis access.

Summary

Until further data are obtained about the risk of progression to kidney failure, the *Fistula First* recommendation is that PICC lines not be placed in anyone identified as having mid-Stage 3 CKD, Stage 4 and 5 CKD or ESRD. PICC lines have been shown to lead to the loss of usable upper extremity veins as well as central venous stenosis. Points to remember:

- CKD classification is based on National Kidney Foundation KDOQI CKD Guidelines (National Kidney Foundation [NKF], 2002) using estimated glomerular filtration rate (eGFR) (Appendix 1)
- Obtain a GFR estimate² for *all* patients with high serum creatinine levels, and defer a PICC line decision until it is clear that the patient does not have CKD
- Patients at risk for progressive CKD include those with diabetes, hypertension, and other cardiovascular conditions (NKF, 2004)

Appendix 1

Stages of Chronic Kidney Disease		
Stage	Description	GFR (mL/min/1.73m ²)
1	Kidney Damage with normal or ↑GFR	≥ 90
2	Kidney Damage with mild ↓ GFR	60-89
3	Moderate ↓ GFR	30-59
4	Severe ↓ GFR	15-29
5	Kidney failure	<15 (or dialysis)
Chronic Kidney Disease is defined as either kidney damage or GFR<60mL/min/1.73m ² for ≥ 3 months. Kidney damage is defined as pathologic abnormalities in blood or urine tests and imaging studies. (NKF, 2002)		

² GFR calculators can be used and downloaded from: www.kidney.org

References

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