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Point-of-Care Ultrasound for Nephrologists: from Access to Volume

Eun Jung Kim

Dongtan Sacred Heart Hospital, Republic of Korea

Point-of-care ultrasound (POCUS) is not simply a technical skill for performing ultrasound at the bedside. Rather, it is a clinical decision-making tool that allows clinicians to answer focused questions in real time and immediately apply the findings to patient management. In nephrology, POCUS was traditionally used mainly for procedural guidance, such as dialysis catheter placement, kidney ultrasound, and kidney biopsy guidance. More recently, its role has expanded to include vascular access assessment, lung ultrasound, focused cardiac ultrasound, IVC/IJV assessment, and venous congestion evaluation using VExUS. This lecture will focus on two practical domains of POCUS in patients undergoing hemodialysis: vascular access POCUS and volume assessment. Both parts will be presented through patient cases to highlight practical bedside decision-making. Vascular access POCUS is an extension of the physical examination of the dialysis access. It allows clinicians to evaluate the cannulation segment, including vessel depth, diameter, tortuosity, and side branches, and to identify access-related complications such as infiltration, hematoma, pseudoaneurysm, thrombus, and infection. It can also support safer cannulation and real-time troubleshooting in difficult access cases. Volume assessment is a crucial but challenging clinical skill, particularly in emergency departments, intensive care units, and dialysis units, where accurate intravascular and hemodynamic assessment is essential for appropriate fluid management. This lecture will provide a practical approach to lung ultrasound and VExUS, including measurement of IVC size and Doppler assessment of the hepatic and portal veins. These tools provide real-time insight into pulmonary and systemic venous congestion and can help guide ultrafiltration, diuretic therapy, and other therapeutic interventions. Potential pitfalls and troubleshooting strategies will also be discussed to improve accurate interpretation and bedside application.

Keywords: Hemodialysis, POCUS, Vascular access , Volume, VExUS