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## **Central vein ultrasonography during preoperative vessel mapping for arteriovenous access creation**

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**Case Study:** Preoperative vessel mapping is a crucial stage for the creation of long-lasting, durable arteriovenous (AV) access in end-stage kidney disease (ESKD) patients about to undergo hemodialysis treatment. Ultrasonography has many advantages over venography in that it can provide morphological information on the patency of the arterial system and the healthiness of the venous wall as well as functional information. Moreover, ultrasound vessel mapping can avoid ionizing radiation and radiocontrast agents, therefore, owing to its merits, ultrasound has become widely adopted as a primary mapping technique replacing venography. However, if patients have risk factors of central vein stenosis such as a history of a central venous catheter or intracardiac device placement, ultrasound has been recognized to have a limitation in the observation of the central vein in the thorax. Recently, the development and popularity of ultrasound technology have increased accessibility for nephrologists to apply vascular ultrasound examination. Application of a convex probe or sector probe through the acoustic window in the supraclavicular fossa or suprasternal notch can provide insights into the patency of the subclavian and brachiocephalic veins (Figure 1). Contrast-enhanced ultrasound with agitated saline infusion can provide fine-quality images of the central vein and enable us to reduce the necessity of central venography (Figure 2). Therefore, central vein ultrasonography during vessel mapping has great value as a screening method for candidates of AV access creation by presenting a functional aspect of flow patterns in the central venous system such as peak systolic velocities and pressure gradient based on the good quality of grayscale images. We were able to reduce the need for central venography by application of ultrasound examination on the central vein of ESRD patients preparing AV access with risk factors of central venous stenosis. We suggest that central vein ultrasonography is a useful ultrasound diagnostic tool for nephrologists.

Figure 1. Normal and occluded left brachiocephalic vein. (A. Ultrasonogram of a normal left brachiocephalic vein (arrow) B. Ultrasonogram of a patient with an occluded left brachiocephalic vein (arrow) C. Venogram of the patient of figure 1B)