



## Vascular Access: Techniques, Complications, and Advancements

Isabella Rossi\*

Department of Cardiology, University of Milan, Italy

### DESCRIPTION

Vascular access is a critical aspect of modern medicine, particularly in the management of patients who require frequent or long-term Intravenous (IV) treatments. It refers to the techniques and methods used to gain entry into a patient's vascular system, whether for diagnostic, therapeutic, or monitoring purposes. This article explores the various types of vascular access, the techniques used, associated complications, and the latest advancements in the field. There are several methods of vascular access, each tailored to the patient's needs and the intended purpose of the procedure. The choice of method depends on factors such as the duration of therapy, the type of fluid or medication to be delivered, and the condition of the patient's veins. The primary types of vascular access include peripheral venous access, central venous access, and arterial access. Peripheral venous access is the most common form of vascular access and involves the insertion of a catheter into a vein in the hand, arm, or sometimes the foot. This method is widely used for short-term treatments such as fluid administration, medication delivery, or blood draws. The most frequently used device is the peripheral IV catheter, also known as a cannula. Peripheral venous access is easy to perform, minimally invasive, and suitable for short-term use. The veins can become damaged after repeated use, leading to phlebitis (vein inflammation), infiltration, or extravasation (leakage of fluid into surrounding tissue). Central venous access involves the insertion of a catheter into a large vein, such as the internal jugular, subclavian, or femoral vein, with the tip of the catheter positioned near the heart in the superior vena cava. Central Venous Catheters (CVCs) are often used for long-term therapies, such as chemotherapy, hemodialysis, or parenteral nutrition. Peripherally Inserted Central Catheter (PICC) inserted

into a peripheral vein, typically in the arm, and advanced to the central veins near the heart. Surgically inserted under the skin before entering a central vein. These catheters are designed for long-term use. A small reservoir is implanted under the skin and connected to a catheter that enters a central vein. These ports are ideal for patients who require intermittent vascular access over a long period. Central venous access allows for the administration of irritating or concentrated medications, long-term therapies, and the monitoring of central venous pressure. Insertion can be technically challenging and carries risks such as infection, thrombosis, or damage to nearby structures. Arterial access is less common than venous access but is crucial for specific medical procedures such as blood gas analysis or invasive hemodynamic monitoring in critically ill patients. It involves the insertion of a catheter into an artery, usually the radial or femoral artery. Provides accurate, real-time monitoring of blood pressure and oxygenation. Arterial access carries a higher risk of complications, including bleeding, arterial occlusion, and ischemia. From simple hydration to complex chemotherapy, vascular access enables the delivery of life-saving treatments. Patients with kidney failure require repeated vascular access for hemodialysis, which filters waste from the blood. For patients unable to eat or absorb nutrients, parenteral nutrition is delivered directly into the bloodstream. Blood draws and venous sampling are routine aspects of medical diagnostics.

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### CONFLICT OF INTEREST

The author's declared that they have no conflict of interest.

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**Corresponding author** Isabella Rossi, Department of Cardiology, University of Milan, Italy, E-mail: [irossi@heartuni.it](mailto:irossi@heartuni.it)

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