

## Ultrasound Is a New and Reliable Technique for Central Venous Cannulation

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Central venous catheters (CVCs) are applied by many groups of clinicians including anesthesiologists, radiologists, oncologists, nephrologists, surgeons, interventionalists, pediatricians and general physicians (1). Indications of CVCs placement including hemodynamic monitoring, intravascular fluid infusion, vasoactive medications, parenteral nutrition, access of intravenous in cardiopulmonary arrest, peripheral intravenous (IV) difficult access and long-standing intravenous access are used for medications (e.g. antibiotics) (2). However, this technique may be lifesaving, and could also associate with major hazards. A number of factors such as cachexia, morbid obesity, local scarring from surgery or radiotherapy mechanical ventilation, cardiac arrest and coagulopathy can increase these risks (3, 4). The percutaneous insertion method is often blind and based on anatomic landmarks. In the U.S. more than five million CVCs are located every year. They are associated with a complication rate of about 15% (4, 5). The complications such as pneumothorax, hematoma and arterial puncture are seen in about 21%, and more than 35% of placing efforts are unsuccessful (5, 6).

In the modern anesthesiology practice a newer technology such as portable sonography procedure is available bedside imaging of the central venous catheter placement and has become a fundamental instrument for the daily practice of anesthesiologists and other specialists (2). There are some advantages coupled with ultrasound guidance central venous catheters insertion such as finding anatomic variation and accurate vessel site, real-time ultrasound guidance improving the safety of CVCs insertion, decrease of complication rate and number of attempts required for successful access (7). Real-time ultrasound guided CVC placement was described in two types: audio-guided Doppler ultrasound guidance, and two-dimensional (2-D) imaging ultrasound guidance. Two-dimensional imaging ultrasonographic is used more frequently than audio-guided Doppler ultrasonographic guidance. The transportable sonographic equip-

ment can be applied in operating rooms, disaster and urgent situation departments, cardiac catheterization and electrophysiology laboratories, and in the other hospital wards. A novel randomized, multicenter clinical trial by point-of-care ultrasonography help of CVC cannulation, reported that ultrasonographic guidance increases the probability of achievement of cannulation more than landmark-based method (5). The typical number of efforts and the typical time for catheter insertion were also extensively lower in the ultrasonographic guidance group (7).

In 2010, Ortega et al. detailed the approach to use ultrasound for placing the internal jugular vein (IJV), emphasized the wellbeing and evenness of the procedure (8). Ortega et al. also presented a comprehensive review on the intra-operative employment of disinfected ultrasound (8, 9). In 2011, the center of disease control (CDC) recommended the application of ultrasound guidance to CVC to decrease the sum of cannulation efforts and complications (10). The American institute of ultrasound in medicine (AIUM) in collaboration with some American associations and societies in the fields of cardiovascular, ultrasound and anesthesiology and nursing (11), built a guideline for using ultrasound guided central venous catheters placement. Policies and procedures associated with patient education, quality control, infection control and protection should be in the line of improvement and employment in friendship with the AIUM Standards and guidelines for the authorization of ultrasound practices. This guideline also suggests the use of real-time ultrasound for the catheterization of the IJV and femoral vein (FV) in pediatric patients (11, 12).

Therefore, major studies have indicated the application of sonographic guided cannulation for central venous catheterization (14). Some evidence-based studies suggested good clinical outcomes for central venous catheterization for vascular access in neonates, infants and for arterial catheterization. The studies recommended

the use of optimal ultrasound technique by practitioners to decrease and discover life threatening complications. There are some issues that need to be considered including education, training, teaching and certification; additional research is also needed to explain the function of ultrasound in infectious hazard decrease. In conclusion, regarding the evidences achieved from literature and experience, ultrasound guided cannulation should be recommended as the technique of choice for every type of vascular catheterization, considering its higher safety and efficacy (13-15).

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