10. Central venous access

Guideline 10.1. Central venous catheters should be inserted as a last resort in patients without a permanent access and the need for acute haemodialysis (Evidence level III).

Guideline 10.2. The percutaneous route should be used for both acute and chronic catheter insertion. Insertion should be guided by ultrasound. A plain X-Ray (chest or abdomen) should be performed before use to locate catheter and detect any complication (Evidence level II).

Guideline 10.3. The right internal jugular vein is the preferred location for insertion (Evidence level II).

Guideline 10.4. Non-tunnelled catheters should only be used in emergency situations and should be exchanged as soon as possible for tunnelled catheters (Evidence level III).

Indications for catheter insertion

Central venous catheter insertion is required in incident CKD-stage 5 patients who need to start dialysis in an acute or emergency situation, and are not equipped with a permanent vascular access [1,2]. Catheter insertion is also indicated in prevalent CKD-stage 5 patients on renal replacement therapy presenting with vascular access failure [3], and waiting for interventional or surgical access salvage or the creation of a new access. In some patients, all surgically created arteriovenous vascular access options may have been exhausted. A central venous catheter may then represent the only access option. Some patients have a contraindication for the creation of an arteriovenous fistula (severe cardiac failure, chronic respiratory insufficiency) [4], because of the risk of heart failure.

Patients with severe pain in the hand due steal syndrome, causing peripheral ischaemia, or with major difficulties in needling [5], may also benefit from a permanent central venous catheter. Catheters offer immediate vascular access for haemodialysis and may be used over several months or years. Long-term catheters also have positive properties: they are easy to use and do not need maturation.

Technique of catheter insertion

Catheter insertion is considered a high-risk intervention which deserves careful attention, must be performed under strict aseptic conditions and should ideally be performed by trained and senior physicians. Percutaneous catheter insertion is the preferred method for catheter insertion. The right internal jugular vein is the first option for insertion, followed by the left internal jugular vein. The femoral route is preferred for short-term catheters (<1 week) since there is no risk for central vein stenosis. Ultrasound-guided insertion technique is mandatory to prevent accidental carotid artery puncture and to ensure successful cannulation [6,7]. In addition, fluoroscopy to follow and locate the position of the guide wire is advisable. In a recent study 60 patients were randomized for ultrasound guided vs 'blind' catheter insertion. First attempt venous cannulation success rate was 56.7% compared with 86.7% in non-guided vs guided insertion technique. The risk of adverse outcome was significantly greater in the blind procedure ($P = 0.020$). The ultrasound-guided procedure for internal jugular vein catheter insertion using an ordinary ultrasound machine was significantly safer and more successful as compared with the blind technique [8]. For patients presenting with acute and/or life-threatening conditions requiring immediate dialysis (pulmonary oedema, hyperkalaemia, respiratory distress) the femoral vein is the most favourable insertion site. Because of the high risk on central venous stenosis (see Guideline 8), the subclavian vein route has been abandoned [9].

Catheter performance and care

Catheter performance (maximum flow rate, blood resistance and recirculation) should comply with delivery of adequate dialysis dose without altering treatment schedule (frequency, dialysis duration) [10,11]. Tunnelled catheter morbidity (dysfunction, thrombosis, infection) is significantly reduced compared with non-tunnelled catheters and tunnelled catheters should be preferred in all patients [12]. Port-catheter devices (Dialock, LifeSite) offer comparable flow performances to long-term catheters while improving patients' aesthetic satisfaction and improving patients comfort [13,14]. Unfortunately, the risk on infection is high with these devices. Catheter care and handling conditions under aseptic manipulation are essential to prevent infection in catheter and venous port devices.

Recommendations for further research

Improvement of catheter design and locking solutions are major subjects for further research.

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