

# Permanent Tunneled Cuffed Catheters in Pediatric Patients under Hemodialysis Should not be the First Option

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## EDITORIAL

There is increase in the frequency of end stage renal disease (ESRD) in pediatric patients (up to 19 years), these patients need replacement therapy that include peritoneal dialysis, hemodialysis and kidney transplant. Peritoneal dialysis is recommended for children under 2 years, for those who needs hemodialysis, a vascular access is the access of life.

There are three principle forms of vascular accesses: tunneled catheters placed in a central vein (central venous lines, CVC), arteriovenous fistulas (AVF), and arteriovenous grafts (AVG) using prosthetic or biological material. Compared with the adult literature, there are few studies in children to provide evidence based guidelines for optimal vascular access type or its management and outcomes in children with ESKD.

The blood flow offered for hemodialysis would be at least 300 ml/min and preferred to reach 500 ml/min relying on the vascular access type to permit adequate hemodialysis analysis of the 2006 Annual result of the North American Pediatric Renal Trials and Collaborative Studies (NAPRTCS) revealed that the mainstream of children (78.9%) starting HD have a central catheter as primary VA, in contrast to arteriovenous fistula (12.3%) and arteriovenous graft (8.5%) (North American Pediatric Renal Trials and Collaborative Studies (NAPRTCS) (2006).

Although the Kidney Disease Outcomes Quality Initiative (K/DOQI) guidelines to select arteriovenous fistula as primary VA, and the proof directing to increased morbidity and mortality of cases with central venous catheters (CVCs), 5 researches have revealed that furthestmost children still starting hemodialysis through a central venous catheter, as a substitute of arteriovenous fistula or synthetic graft (North American Pediatric Renal Trials and Collaborative Studies (NAPRTCS) 2008.

Given the technical challenges of autogenous or prosthetic AV access placement in very small children, the KDOQI guidelines recommend peritoneal dialysis or hemodialysis via a tunneled dialysis catheter for patients weighing less than 20 kg.

The KDOQI guidelines emphasize the importance of matching the length and diameter of the tunneled dialysis catheter to the size of the patient and provide a table for reference. Catheter placement considerations in pediatric patients are similar to those in adults (U.S. Renal Data System, 2012). The principal site for a central venous catheter is the right IJV followed by the left IJV, subclavian and femoral veins as alternate sites. Subclavian and femoral vein central venous catheters have to be used for a restricted time, due to the hazard of central venous occlusive disease or infection.

A prospective descriptive longitudinal non randomized study with analytical component has been conducted on 120 patients (66 males and 54 females) aged 2 – 19 years suffering from chronic renal failure attending to Vascular surgery department at Mansoura university hospital, Egypt between January 2017 to December 2018. They were selected for vascular access creation and gave written and informed consent.

Permanent cuffed tunneled catheter group included 41 cases. All patients were done under sonographic and fluoroscopic guidance (Table 1).

Patency at follow up visits	3 months	6 months	9 months	12 months	18 months	24 months
<b>Permanent catheter n=41 N %</b>	38 (92.7)	35 (85.4)	29 (70.7)	21 (51.2)	10 (24.4)	2 (4.9)

**Table 1:** Primary patency of the access complications: failure, thrombosis, infection, venous hypertension, and access malfunction.

Primary Patency was: Right internal jugular catheter (100%), (92.9%), (78.6%), (64.3%), (50.0%) and (14.3%) at 3, 6, 9, 12, 18 and 24 months respectively.

For Left internal jugular catheter Primary Patency was (92.9%), (85.7%), (64.3%), (42.9%), (14.3%) and (0%) at 3, 6, 9, 12, 18 and 24 months respectively.

For femoral catheter Primary Patency was (84.6%), (76.9%), (69.2%), (46.2%), (7.69%) and (0%) at 3, 6, 9, 12, 18 and 24 months respectively.

Primary Failure in (2.4%) as regard Permanent Catheters. P value was 0.4. Thrombosis and infection was (60.98%) and (34.15%) in Permanent cuffed tunneled Catheters P value was <0.001.

The International Pediatric Hemodialysis Network has been used to afford the biggest hemodialysis research in children up to now concerning VA selection, efficiency, and the result. Only fourth part of the 404 patients starting hemodialysis established arteriovenous fistulas as primary VA, and 73% of patients receiving central venous catheters, and one percent, receiving arteriovenous grafts. Despite the predilection of a central venous catheter in young patients is clarified partially by the procedural troubles related to AVF creation in pediatrics, central venous catheters were the principal VA selection as well in 65% of cases over ten years.

The furthest frequently used VA procedure in pediatrics in North America and Europe is a tunneled cuffed long-term catheter (TCC). The benefits of this catheter are the immediate usage once inserted needles free hemodialysis and no after dialysis waiting to stop bleeding. Ali Mirza Onder et al, in 2018.

## CONCLUSION

Vascular access in the pediatric hemodialysis patients is a challenging, but essential, affair for the practitioners. It calls for proper advanced planning to make sure that the best permanent vascular access is placed, communication involving a multi-disciplinary team of nephrologists, surgeons, and interventional radiologists, nurses and ongoing monitoring to guarantee its long survival.

The preference of central venous catheters is only partially explained by the technical challenge of arteriovenous fistula placement in young patients. Central venous catheters permit less effective hemodialysis and are accompanied by much higher complications and access failure rates in comparison to arteriovenous fistulas, resulting in earlier consumption of the vascular access reserve in a patients facing years of renal replacement therapy. The detected high rate of transient uncuffed central venous catheters used temporarily in patients with arteriovenous fistula proposes frequent suboptimal vascular access planning in these patients.

We recommend an approach to minimize/avoid the prolonged use of central venous catheters due to the high risk of infection and the necessity for vessel preservation. We encourage the physician to use good clinical decision when selecting the proper vascular access in each patient.

Intraoperative supplements formerly reported include loupes, microsutures, and the operating microscope. Actually, some have supported the use of microsurgical techniques to achieve patency rates that parallel those for the adult hemodialysis patients.