Posteriorly Tunneled Dialysis Catheters for Permanent Use in Cognitively Impaired Patients Undergoing Hemodialysis

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ABSTRACT

Cognitively impaired patients often pull at their dialysis catheters when the catheters are tunneled over the anterior chest. To potentially circumvent this, a technique was developed that tunnels the catheter posteriorly, over the patient's shoulder. A total of 32 posteriorly tunneled catheters were placed in 12 patients. The mean catheter use interval was 164 days, with a total of 5,248 catheter use days. Indications for nonelective catheter removals were catheter dysfunction (n = 7; 23.3%), removal by the patient (n = 7; 23.3%), infection (n = 5; 16.7%), and inadvertent dislodgment (n = 1; 3.3%). Only six of the 12 patients were able to dislodge their catheters. The procedure described here reduced catheter manipulation and extended catheter viability in these patients.

ABBREVIATIONS

AVF = arteriovenous fistula, EJV = external jugular vein, IJV = internal jugular vein, TDC = tunneled dialysis catheter

Dialysis catheters are essential for patients needing emergent vascular access for renal replacement therapy or patients in whom arteriovenous fistulas (AVFs) or graft access options have been exhausted. A cuffed tunneled dialysis catheter (TDC) remains the standard of care for patients needing venous access for more than 1–2 weeks (1). With the traditional approach, the catheter is inserted into the internal jugular vein (IJV) and a subcutaneous tunnel is created over the anterior chest wall to secure placement (2). This is the standard procedure at our institution, which has been successful for most patients. However, in cognitively impaired patients, this anterior placement offers easy access for the patients to grab at and dislodge or completely remove their catheters. Although this complication is rarely discussed in the literature, there are studies discussing this issue in critically ill patients (3,4).

To address this complication, our institution has adapted the standard approach to TDC insertion in cognitively impaired patients by placing the catheter exit site posteriorly, on the superior aspect of the patient's shoulder. This places the catheter further from the patient's reach, limiting the patient's ability to manipulate or dislodge it. This article describes the technical aspects and clinical outcomes of posterior TDC placement.

MATERIALS AND METHODS

Institutional review board approval was obtained for this retrospective study. Electronic patient health records were reviewed for all tunneled hemodialysis catheter procedures between October 2004 and December 2013. A total of 2,149 TDCs were inserted at our institution, of which 32 were tunneled posteriorly in 12 patients (seven men, five women). Their ages ranged from 43 to 88 years (mean, 73.8 y) at the time of their first posterior catheter insertion. Each patient had a clinical indication for insertion of a hemodialysis catheter and a documented cognitive impairment. The causes of cognitive impairment included dementia (n = 5), Alzheimer dementia (n = 5), psychotic disorder (n = 1), and traumatic brain injury (n = 1). Posterior TDCs were not placed in consecutive patients. Ten patients had previously dislodged one or more anterior TDCs and were subsequently given a posterior catheter. Two patients received posterior catheters before an anterior attempt as a result of the severity of their cognitive impairment. Patients were followed in the hemodialysis unit at our institution.

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Informed consent was obtained from each patient's substitute decision-maker in view of the patient's cognitive impairments. All procedures were performed by an attending interventional radiologist at the hospital under ultrasonographic (US) and fluoroscopic guidance. Before each procedure, the patient's neck was examined with US to ensure patency of the IJV or external jugular vein (EJV) if the IJV was compromised. The patient was positioned in left posterior oblique position with the right side elevated approximately 30° for a right-sided approach (or opposite for a left-sided approach). A wedge was placed under the ipsilateral hip and low chest to expose the upper back and neck (Fig 1a). An out-of-plane lateral approach was used to gain access to the jugular vein. The type of catheter used for the posterior procedure was a PermCath (Coviden, Mansfield, Massachusetts) initially, then a HemoStar (Bard Access Systems Inc., Salt Lake City, Utah) or SplitAsh (Medical Components Inc., Harleysville, Pennsylvania) catheter. SplitAsh catheters were used only if there was inadequate flow with a HemoStar or PermCath catheter.

When the guide wire had been inserted into the vein with the tip in the superior vena cava, the tunnel was created. The origin of the posterior tunnel was at the ipsilateral suprascapular region in the midclavicular line (Fig 1b). The tunnel was made in the subcutaneous tissues, superficial to the trapezius, scalene, and sternocleidomastoid muscles, toward the venous puncture site. The tunnel length was approximately 12–13 cm for a right-sided approach and was kept superficial and medial to the EJV. For a left-sided approach, the length of the subcutaneous tunnel was shortened by approximately 2 cm to ensure adequate length of the catheter. In addition, the Dacron cuff could be placed deeper into the subcutaneous tunnel if extra catheter length was needed.

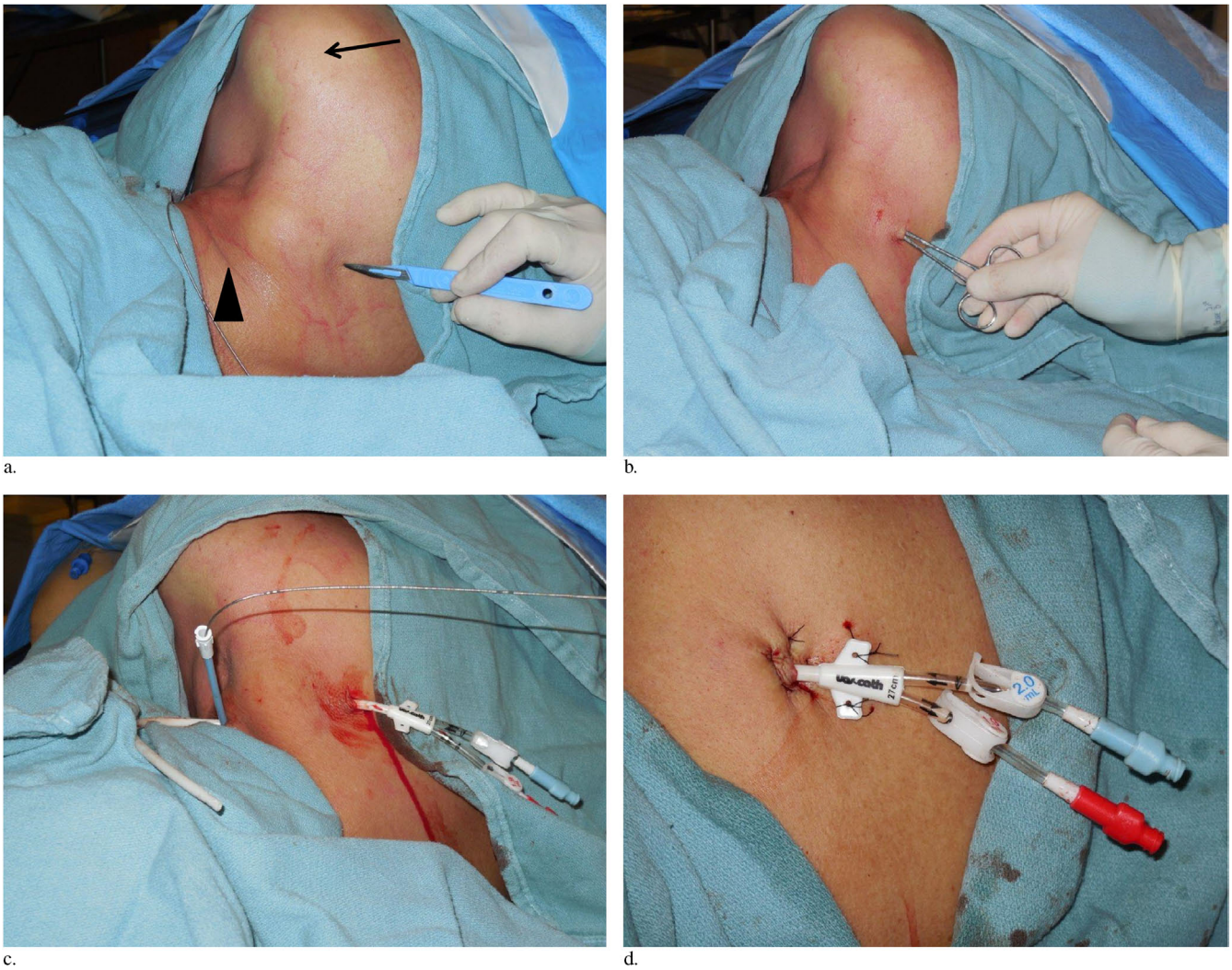

Figure 1. Images of a hemodialysis recipient in the interventional suite receiving a posteriorly tunneled catheter with their right shoulder elevated 30°. **(a)** The patient's right neck (arrowhead) and shoulder (arrow) are sterilized and draped. The scalpel is about to make an incision where the catheter exit site will be placed. **(b)** A snap is dissecting the subcutaneous tunnel toward the venous access site. **(c)** The catheter is through the subcutaneous tunnel, and a dilator is enlarging the venous access site. **(d)** The exit site is securely sutured. (Available in color online at *www.jvir.org*.)

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