

Clinical Outcome of the Tal Palindrome Chronic Hemodialysis Catheter: Single Institution Experience

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PURPOSE: To report the authors' clinical experience with the Tal Palindrome chronic dialysis catheter with a symmetric tip.

MATERIALS AND METHODS: During a 39-month period, 126 Palindrome catheters were placed consecutively in 85 patients. Follow-up was available for 115 catheters. Insertion complications, patency, catheter-related bacteremia, exit site infections, and reasons for catheter removal were recorded. The patient's initial cause of end-stage renal disease, underlying diseases, and site of access were recorded as well.

RESULTS: Patient ranged in age from 35 to 91 years (median, 69 years). Fifty percent of patients had diabetes. One hundred twenty-six Palindrome catheters were placed for a total of 12,046 catheter-days. The technical success rate of catheter placement was 100%. The average catheter indwell time was 105 days (range, 1–673 days). Catheters were inserted via the right ($n = 107$) or left ($n = 19$) jugular vein in all patients without insertional complication. Catheter-related infections occurred in 16 of the 115 catheters (13.9%) during the study period and culture-proved bacteremia occurred in four (3.5%). Seven exit site infections were recorded, and 10 catheters (8.7%) developed fibrin sheaths that necessitated catheter exchanges.

CONCLUSIONS: Clinical experience with the Tal Palindrome hemodialysis catheter demonstrated safe and reliable use with low infection rates.

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Tunneled hemodialysis catheters are an important temporary means of vascular access for patients requiring long-term hemodialysis, those awaiting renal transplantation, and those whose peritoneal or arteriovenous dialysis accesses are currently maturing or nonfunctional (1). Ideally, dialysis catheters should be considered a

bridge to permanent access. However, tunneled hemodialysis catheters often serve as permanent access for patients who have exhausted other access options (2,3).

The National Kidney Foundation–Dialysis Outcomes Quality Initiative Vascular Access Guidelines recommendation is that less than 10% of chronic hemodialysis patients would be dependent of catheters as their permanent chronic dialysis access (4). However, data show that 21% of all chronic dialysis population in the United States is maintained on dialysis catheters as their sole access (5). Hemodialysis catheters are commonly associated with complications that include thrombosis, infection, and fibrin sheath formation (6). These complications have a profound effect on hemodialysis patient's lives.

Commonly used long-term hemodialysis catheters have either a staggered tip design, meaning that the outflow tip extends several centimeters beyond the inflow tip, or the split-tip or dual catheter design. The Tal Palindrome (Covidien, Mansfield, Massachusetts) has a symmetric tip design that allows reversal of the dialysis lines during dialysis with reduced risk of recirculation (Fig 1) (7). The design of the Tal Palindrome catheter is such that the inflow is through the most proximal part of the spiral end hole, about a centimeter proximal to the catheter tip as well as from the side slot about 2 cm proximal to the tip. The outflow jet is directed away from the catheter tip, which prevents mixing with the inflow blood and thus reduces recirculation. In addition, the tip design and the shape of the side

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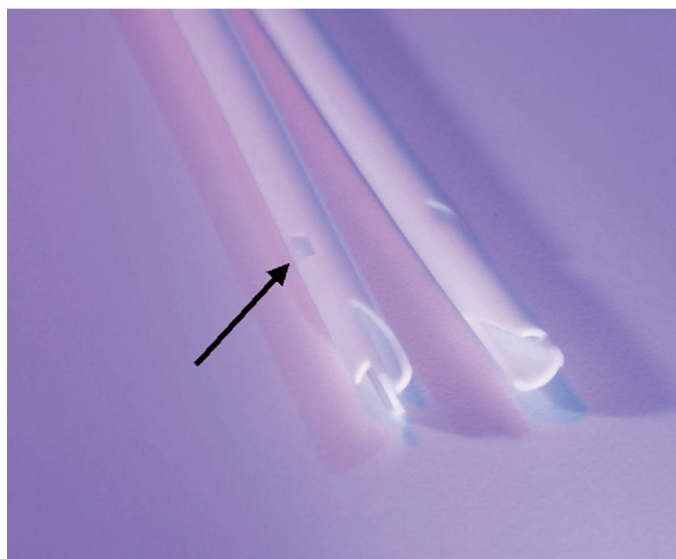


Figure 1. Tip of the Tal Palindrome catheter demonstrates a symmetric tip with a Z-shape design. Notice the side slots (arrow). (Image courtesy of Covidien.) (Available in color online at www.jvir.org.)

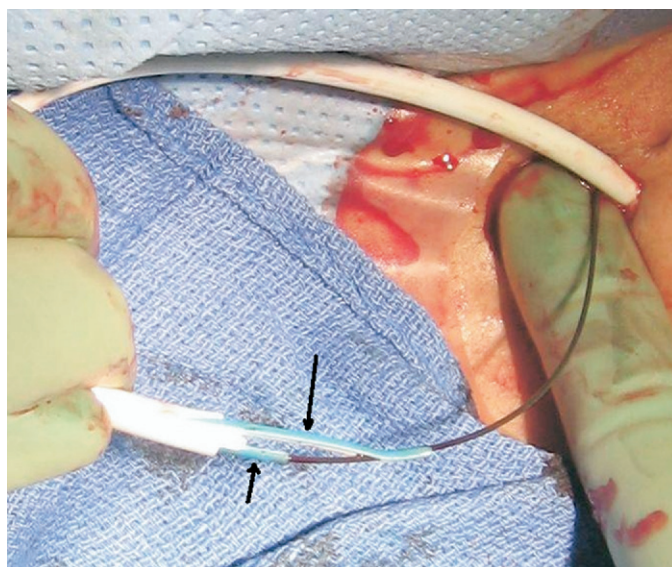


Figure 2. Image of the VenaTrac device. The device allows over-the-wire placement and exchange of the catheter. The VenaTrac consists of two D-shaped, blue stylets (arrows). The wire is passed through the tip of the long stylet (long arrow), into the short stylet (short arrow), and out the back end of the catheter. (Available in color online at www.jvir.org.)

slots allow for continuous self flushing of the catheter tip between treatments, with the intent of reducing thrombosis. The hypothesis behind the development of this catheter was that, in addition to reducing recirculation, it will reduce catheter-related complications (eg, fibrin sheath and infection) by reducing thrombosis. Herein, we describe a single institution's clinical outcome and clinical experience with this symmetric tip dialysis catheter.

MATERIALS AND METHODS

Patient Population

A retrospective review of all Tal Palindrome tunneled hemodialysis catheters that were placed, exchanged, or removed between May 3, 2004, and September 5, 2007 (39 months) was performed. During the study period, Palindrome was the main catheter used in our institution. In addition, 15 staggered-tip catheters and six split-tip catheters were placed during the transition period. The number of these catheters was too small to be included in this analysis. Patient demographics, catheter dwell time, insertion site, complications, and indications for removal were obtained. Institutional review board approval was obtained for this study.

Catheter Placements, Removals, and Exchanges

All procedures were performed by an experienced interventional radiologist (M.S., M.G.T., H.M., J.S.P., E.R., M.A.) in the interventional radiology suite. No antibiotics were administered during catheter placement. The study catheters were placed or exchanged in consecutive patients during the study period.

Access to the internal jugular vein was achieved under ultrasonographic guidance by using a lateral approach. Access was preferably made to the right internal jugular vein. Alternative access sites were used when the right jugular vein was thrombosed. Insertion of the Tal Palindrome catheter was performed either by using the provided valved peel-away sheath or over-the-wire using the VenaTrac device (Fig 2). The VenaTrac device is comprised of two D-shaped stylets that effectively occlude both lumens of the dialysis catheter, thus preventing air embolism or bleeding during over-the-wire catheter insertion or exchange. One stylet of the VenaTrac is longer than the other. The wire is passed through the tip of the longer stylet and into the shorter one. This allows catheter insertion or exchange

over a single wire by providing transition to the catheter tip. The VenaTrac was used for catheter exchanges. For exchanges, the catheters were bluntly dissected from the tunnel and retracted to the brachiocephalic vein. Injection of contrast medium was then performed with digital subtraction imaging over the chest. The presence of a fibrin sheath or thrombus was recorded. A new similar catheter was then inserted over one stiff 0.035-inch hydrophilic guide wire (Terumo Medical, Somerset, New Jersey) with the VenaTrac device. The new catheter was advanced under fluoroscopic guidance. Catheters were placed such that the tip was positioned in the upper right atrium.

Indications for catheter removal or exchange included poor function, infection, cuff exposure, maturation of an arteriovenous fistula or graft, resolution of the acute renal disease, and death. Poor catheter function was defined as a dialysis flow rate of less than 300 mL per minute.

The management of the fibrin sheath was variable and changed over time in our institution. At the beginning of the study, some operators performed fibrin sheath disruption with a 12-mm angioplasty balloon. Over

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