Journal of Medicine in Scientific Research

Volume 1 | Issue 2 Article 7

Subject Area:

Femoral tunneled hemodialysis catheter as a permanent access for hemodialysis patients

Ahmed A. Morsi
Mataria Teaching Hospital

Assem M. Herzallah
Mataria Teaching Hospital, assemherz010@hotmail.com

Mohamed T. Y. Madkour
Mataria Teaching Hospital

Tarek S. ElShanshoury
Mataria Teaching Hospital

Recommended Citation

Morsi, Ahmed A.; Herzallah, Assem M.; Y. Madkour, Mohamed T.; and ElShanshoury, Tarek S. (2018) "Femoral tunneled hemodialysis catheter as a permanent access for hemodialysis patients," *Journal of Medicine in Scientific Research*: Vol. 1: Iss. 2, Article 7.
DOI: https://doi.org/10.4103/JMISR.JMISR_31_18

Original Article

Femoral tunneled hemodialysis catheter as a permanent access for hemodialysis patients

Assem M. Herzallah, Mohamed T. Y. Madkour, Tarek S. ElShanshoury, Ahmed A. Morsi

Department of Vascular Surgeon, Mataria Teaching Hospital, Cairo, Egypt

Abstract

Background

Vascular access (VA) remains the cornerstone in HD patients. The survival of the patients becomes risky if approaches like arteriovenous fistulae, grafts, and thoracic tunneled central catheters are used with no benefits. The options become limited to transplantation, dialysis through the peritoneum, and catheter insertion translumbarally or femorally, which in some cases is the only available approach.

Methods

We are discussing our experience from Mataria Teaching Hospital with 17 patients; in those patients, all the vascular procedures were used with no benefits. We could not perform other options like transplantation or peritoneal dialysis. Hence, we chose femoral tunneled catheters (FTC) permanent VA. The follow-up period ranged between 2 and 14 months, with a mean period of 10 months. The mean age of the patients was 55 (40–70) years. In 10 patients, a Permcath was inserted, and in the other seven, a Duraflow was inserted. All patients were administered warfarin after bridging with low molecular weight heparin to avoid occurring of catheter thrombosis. Aseptic procedures and personal hygiene were followed.

Result

Two patients died at 5 and 12 months, correspondingly, with a functional catheter, owing to causes other than related to the FTC. In one patient, accidental pulling of the catheter occurred, so the site of the catheter was changed at 5 months. One catheter was altered because fl ow became inadequate after 8 months. No patients presented with deep vein thrombosis or late hemorrhage. In one patient, the catheter functioned for 14 months after insertion. In four patients, the catheter was removed, after 2, 3, 4, and 14 months, correspondingly, as they developed catheter-related septicemia. In two patients, the catheter was removed owing to perforation after 2 months.

Keywords: Catheter, dialysis, vascular access

Introduction

Central venous catheters in patients with hemodialysis (HD) are commonly and seriously complicated with bloodstream infections. During insertion, a technique of tunneling the catheter in the subcutaneous tissue is used to decrease catheter colonization, especially in the internal jugular and subclavian veins, which has proven to be effective [1–3].

Recently, the internal jugular vein is becoming the first choice, as the subclavian vein for catheter placement is associated with a high incidence of vascular stenosis [4,5]. In many patients, repeated attempts at cervical and thoracic vein catheterization have been associated with a significantly high occurrence of serious complications such as injuries, thrombosis, infections, and hemothorax. In these patients, it is advised to use a percutaneous insertion of a femoral tunneled catheters (FTC).

Patients and Methods

In Mataria Teaching Hospital from November 2015 to March 2017, 17 patients with long-term HD (seven males and 10 females) had tunneled femoral vein central venous catheters. The patients' age averaged between 40 and 70 years, with a median age of 55 years.

Correspondence to: Assem M. Herzallah, MD.
Department of Vascular Surgeon, Mataria Teaching Hospital, Cairo, Egypt.
Tel: 01001714960.
E-mail: assemherz010@hotmail.com

Access this article online

Quick Response Code:

Website: www.jmsr.eg.net

DOI: 10.4103/JMISR.JMISR_31_18

How to cite this article: Herzallah AM, Madkour MT, ElShanshoury TS, Morsi AA. Femoral tunneled hemodialysis catheter as a permanent access for hemodialysis patients. J Med Sci Res 2018;1:106-8.

All patients had been with subclavian or internal jugular vein central lines, which accidentally or secondary have been removed owing to obstruction or infection. The conventional access sites had been exhausted in 17 patients because of the inability of placement of new catheter via the internal jugular veins, or the subclavian veins also had suffered from superior vena cava thrombosis or strictures.

In 10 patients, polyurethane dual-lumen tunneled catheters (Hickman; Bard Access Systems, Inc. 605 N. 5600 W. Salt Lake City, UT 84116 United States) were inserted, which were 55 cm in overall length, with tip to cuff 36 cm long, having 13.5-French diameter. In the other seven, Duraflow (AngioDynamics: 14 Plaza Drive Latham, NY 12110) was inserted, which was 55 cm in overall length, with tip to cuff 35-cm long, having 15.5-French diameter. Catheters were inserted under strict aseptic conditions in the major operating room using povidone-iodine at the insertion site. The tip of the catheter was placed in Inferior Vena Cava or in a triocaval junction to ensure maximum blood flow. The tunnel was subcutaneously fashioned by the catheter's retrograde passage through the cannula to preselected site point of exit in the ipsilateral thigh; it was directed laterally to be away from the patients' private area. The distance separating the cutaneous puncture site from the venous entry had to be ~9–12 cm. Every 48–72 h, the dressing was changed. Inspection of the catheter dressings was done at least twice per week for excluding local signs of infection. It was not allowed to take medications or blood samples through the catheter.

At every session of HD, every hour, we recorded systolic and diastolic blood pressures, and also by pump speed, we measured the blood flow rate. We considered greater than or equal to 25% drop in blood flow, below that recommended in the absence of hypotension, hypovolemic episode, or patient/catheter malposition, to be secondary to catheter malfunction.

In all patients, blood flow at 300 ml/min or more was adjusted. A routine intradialytic heparin protocol was used. All patients were administered warfarin after bridging with low molecular weight heparin to prevent catheter thrombosis keeping international normalized ratio at a therapeutic level (2–3).

Results

The duration of functional life of the FTC ranged between 60 and 5 days, with mean time of 153 days. We had functional catheters at 2 months. The mean blood flow was 230 ml/min (200–260 ml/min). Two patients died at 5 and 12 months correspondingly, with a functional catheter, owing to causes not directly related to the FTC. In one patient, the site of the catheter was changed at 5 months owing to accidental pulling of the catheter by the patient during HD. One catheter was altered because flow became inadequate after 8 months. In one patient, the catheter functioned for 14 months after insertion. For four patients, the catheter was removed after 2, 3, 4, and 14 months, correspondingly, as they developed catheter-related septicemia. In Two patients, the catheter was removed owing to perforation after 2 months in each. None of the patients developed late hemorrhage. No catheter-associated thrombosis was detected in any of our cases.

Discussion

Most nephrologists select femoral vein as a temporary access site for HD. The femoral vein is more comfortable to be done, safe and convenient in its catheterization. On the contrary, the subclavian or internal jugular vein access might cause life-threatening complications. The insertion-related complications are a comparatively low risk by accessing the femoral vein [6]. The landmark for the femoral vein is the pulse of the femoral artery. The vessel can be directly compressed in the case of bleeding to be controlled. Lazarus *et al*. [7] showed that tunneled femoral central venous catheters were placed in five adult patients undergoing transplantation of autologous bone marrow, in whom the catheters remained in place for an average of 35 days. Infection events in two catheters was resolved with antibiotic therapy without the need for catheter removal [7]. Another report showed that femoral catheter was successfully used for 3 months for an adult patient with recurrent high-grade non-Hodgkin's lymphoma who received high-dose chemotherapy and allogeneic peripheral blood stem cell transplantation [8].

Fecal contamination was frequently the cause of common femoral vein catheterization infections [9]. The skin catheter junction is the site where infection mainly originates from [10], especially in the short-term catheters [11–13] therefore, subcutaneous tunneling of the catheter is recommended to decrease the passage of organisms by increasing the distance between the skin catheter junction and the vein. As a result, it associated with a threefold decline in catheter-related infection [14]. Timsit *et al*. [15] had shown a similar recommendation but in critically ill patients. On the contrary, reports are conflicting, in HD when using long-term femoral cannulation was believed to carry a higher incidence of infection in comparison with nonfemoral cannulation [16–21]. Although, in a study by Daniel, the rate of femoral catheter-related infections was equal to those with the catheter of jugular veins [22]. This is in contrast with our study, where the incidence of infections and catheter-related bacteremia was only 23%. This significant reduction of the risk of infection can be explained by using of subcutaneous tunneling to remove the exit site of the catheter from the perineal area. The low thrombosis incidence is another explanation [23–25]. The low rate of catheter-related thrombosis in our series was done by keeping therapeutic anticoagulation (international normalized ratio: 2–3) with Marevan, as previous reports [26–28] had shown that thrombosis usually occurs within 7 weeks.

For many years, the primary concern of nephrologist was the inadequate delivery of blood flow for dialysis. It occurs in either acute or chronic phases: acutely diminished flow may be owing to systemic hypotension, catheter malpositioning, or

other mechanical problems, whereas diminished flow occurring later may be owing to mechanical difficulties, thrombosis, or formation of a fibrin sheath. Until lately, we considered rates less than 200 ml/min as inadequate blood flow; however, the DOQI guidelines raised the standard for blood flow rates by suggesting a minimum flow rate of 300 ml/min. We achieved this without difficulty.

Conclusion

In our study, we conclude that FTCs are favorable vascular access for long-term HD. Additional more extensive studies are needed to confirm our finding.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Pervez A, Zaman F, Aslam A, Petty S, Murphy S, Vachharajani T, *et al*. Port catheter placement by nephrologists in an interventional nephrology training program. Semin Dial 2004;17:61-4.
2. Lund GB, Trerotola SO, Scheel Jr PF, Savader SJ, Mitchell SE, Venbrux AC, Osterman Jr FA. Outcome of tunneled hemodialysis catheters placed by radiologists. Radiology 1996;198:467-72.
3. Mermel LA, Farr BM, Sherertz RJ, Raad II, O'grady N, Harris JS, *et al*. Guidelines for the management of intravascular catheter-related infections. Infection Control & Hospital Epidemiology 2001;22:222-42.
4. Schillinger F, Schillinger D, Montagnac R, Milcent T. Post catheterisation vein stenosis in haemodialysis: comparative angiographic study of 50 subdavian and 50 internal jugular accesses. Nephrol Dial Transplant 1991;6:722-4.
5. Cimochowski GE, Worley E, Rutherford WE, Sartain J, Blondin J, Harter H. Superiority of the internal jugular over the subclavian access for temporary dialysis. Nephron 1990;54:154-61.
6. Kanter RK, Zimmerman JJ, Strauss RH, Stoeckel KA. Central venous catheter insertion by femoral vein: safety and effectiveness for the pediatric patient. Pediatrics 1986;77:842-7.
7. Lazarus HM, Creger RJ, Bloom AD, Shenk R. Percutaneous placement of femoral central venous catheter in patients undergoing transplantation of bone marrow. Surg Gynecol Obstet 1990;170:403-6.
8. Rabitsch W, Kalhs P, Herold C, Jaeger U, Greinix HT. Central venous catheters inserted percutaneously via the femoral vein can be used long-term in recipients of allogeneic peripheral blood stem cell transplants. Bone Marrow Transplant 1999;24:115.
9. Venkataraman ST, Thompson AE, Orr RA. Femoral vascular catheterization in critically ill infants and children. Clinical Pediatrics 1997;36:311-9.
10. Goldmann DA, Pier GB. Pathogenesis of infections related to intravascular catheterization. Clinical microbiology reviews 1993;6:176-92.
11. Fan ST, Teoh-Chan CH, Lau KF, Chu KW, Kwan AK, Wong KK. Predictive value of surveillance skin and hub cultures in central venous catheters sepsis. J Hosp Infect 1988;12:191-8.
12. Liñares JO, Sitges-Serra A, Garau J, Perez JL, Martin R. Pathogenesis of catheter sepsis: a prospective study with quantitative and semiquantitative cultures of catheter hub and segments. J Clin Microbiol 1985;21:357-60.
13. Segura M, Lladó L, Guirao X, Piracés M, Herms R, Alia C, *et al*. A prospective study of a new protocol for 'in situ'diagnosis of central venous catheter related bacteraemia. Clin Nutr 1993;12:103-7.
14. Timsit JF, Sebille V, Farkas JC, Misset B, Martin JB, Chevret S, *et al*. Effect of subcutaneous tunneling on internal jugular catheter-related sepsis in critically III patients: a prospective randomized multicenter study. JAMA 1996;276:1416-20.
15. Timsit JF, Bruneel F, Cheval C, Mamzer MF, Garrouste-Orgeas M, Wolff M, *et al*. Use of tunneled femoral catheters to prevent catheter-related infection: a randomized, controlled trial. Ann Intern Med 1999;130:729-35.
16. Marschall J, Mermel LA, Classen D, Arias KM, Podgorny K, Anderson DJ, *et al*. Strategies to prevent central line–associated bloodstream infections in acute care hospitals. Infection Control & Hospital Epidemiology 2008;29(S1):S22-30.
17. Collignon P, Soni N, Pearson I, Sorrell T, Woods P. Sepsis associated with central vein catheters in critically ill patients. Intensive Care Med 1988;14:227-31.
18. Oliver MJ, Callery SM, Thorpe KE, Schwab SJ, Churchill DN. Risk of bacteremia from temporary hemodialysis catheters by site of insertion and duration of use: prospective study. Kidney Int 2000;58:2543-5.
19. Goetz AM, Wagener MM, Miller JM, Muder RR. Risk of infection due to central venous catheters: effect of site of placement and catheter type. Infect Control Hosp Epidemiol 1998;19:842-5.
20. Murr MM, Rosenquist MD, Lewis RW, Heinle JA, Kealey GP. A prospective safety study of femoral vein versus nonfemoral vein catheterization in patients with burns. J Burn Care Rehabil 1991;12:576-8.
21. Llewelyn M, Cohen J. Diagnosis of infection in sepsis. Intensive Care Medicine 2001;27:S10-32.
22. Maki DG, Kluger DM, Crnich CJ. The risk of bloodstream infection in adults with different intravascular devices: a systematic review of 200 published prospective studies. Elsevier: InMayo Clinic Proceedings 2006;81:1159-71.
23. Pierce CM, Wade A, Mok Q. Heparin-bonded central venous lines reduce thrombotic and infective complications in critically ill children. Intensive Care Med 2000;26:967-72.
24. Stillman RM, Soliman F, Garcia L, Sawyer PN. Etiology of catheter-associated sepsis: correlation with thrombogenicity. Arch Surg 1977;112:1497-9.
25. Krafte-Jacobs B, Sivit CT, Mejia R, *et al*. Catheter-related thrombosis in critically ill children: comparison of catheters with and without heparin bonding. J Pediatr 1995;126:50-54.
26. Marsh D, Wilkerson SA, Cook LN, Pietsch JB. Right atrial thrombus formation screening using two-dimensional echocardiograms in neonates with central venous catheters. Pediatrics 1988;81:284-6.
27. Mehta S, Connors AF, Danish EH, Grisoni E. Incidence of thrombosis during central venous catheterization of newborns: a prospective study. J Pediatr Surg 1992;27:18-22.
28. Joynt GM, Kew J, Gomersall CD, Leung VY, Liu EK. Deep venous thrombosis caused by femoral venous catheters in critically ill adult patients. Chest 2000;117:178-83.