Diagn Interv Radiol 2026; DOI: 10.4274/dir.2026.264098

INTERVENTIONAL RADIOLOGY

TECHNICAL NOTE

©Copyright 2026 Author(s) - Available online at dirjournal.org.
Content of this journal is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

Simple securing suture for the fixation of long-term central venous catheters with a Dacron cuff

Jung Suk Oh
Su Ho Kim
Byung Gil Choi
Ho Jong Chun

Seoul St. Mary's Hospital, College of Medicine, The Catholic University of Korea, Department of Radiology, Seoul, South Korea

ABSTRACT

We describe a simple securing suture designed to prevent the accidental dislodgement of long-term, Dacron-cuffed tunneled central venous catheters during the interval before fibrous ingrowth fixes the cuff. A 3-0 nylon suture is placed at the exit site around the plastic shaft of the tunneler before the catheter is pulled through the subcutaneous tunnel; after the catheter is positioned and the Dacron cuff is seated cranial to the suture loop, the suture is tied around the catheter. The technique was applied in 207 consecutive patients (108 men, 99 women; mean age 42.4 years) over a 15-month period, with a 100% technical success rate, no procedure-related catheter injury, and no dislodgement on follow-up chest radiography at 1 to 2 weeks. The suture is performed before catheter insertion, requires no additional incision, and can be removed at the bedside, providing a safe and efficient adjunct for catheter fixation.

KEYWORDS

Hickman catheter, Dacron cuff, tunneled central venous catheter, catheter fixation, dislodgement

Hickman and Broviac catheters are widely used for the long-term delivery of chemotherapy, parenteral nutrition, and other supportive therapies. These tunneled devices incorporate a Dacron cuff that becomes secured by fibrous ingrowth over several weeks. During this interval, however, accidental dislodgement remains a recognized complication, with reported rates ranging from 2.4% to 24%.[1-3] Several adjunctive fixation techniques have been described, but most require additional skin incisions or carry a risk of catheter injury from the suture needle.[4-7]

We describe a simple securing suture, placed around the tunneler before catheter pull-through, that aims to provide reliable early fixation while avoiding both additional incisions and inadvertent catheter puncture. We report the technique and our institutional experience in 207 consecutive patients.

Technique

This retrospective study was approved by the The Catholic University of Korea, Catholic Medical Center Review Board (protocol number: KC22RISI0626, approved on September 5, 2022), and the requirement for informed consent was waived by the Review Board. Between September 2022 and November 2023, 207 consecutive patients (108 men, 99 women; mean age 42.4 years; range, 1–76 years) underwent placement of a tunneled Hickman catheter with the simple securing suture. Underlying diagnoses were leukemia (n = 185), aplastic anemia (n = 13), lymphoma (n = 5), ovarian cancer (n = 2), breast cancer (n = 1), and factor XIII deficiency (n = 1).

All procedures were performed in the vascular interventional suite by three interventional radiologists, each with more than 7 years of experience in interventional radiology. After the patient was placed in the supine position, the target vein was confirmed using ultrasound. Moderate sedation was achieved with midazolam and fentanyl, with doses based on body

Corresponding author: Su Ho Kim

E-mail: lucidnature@naver.com

Received 30 April 2026; revision requested 5 May 2026; last revision requested 11 May 2026; accepted 13 May 2026.

Epub:05.06.2026

Publication date:

DOI: 10.4274/dir.2026.264098

You may cite this article as: Oh JS, Kim SH, Choi BG, Chun HJ. Simple securing suture for the fixation of long-term central venous catheters with a Dacron cuff. *Diagn Interv Radiol*. 05 June 2026 DOI: 10.4274/dir.2026.264098 [Epub Ahead of Print].

weight. Following sterile draping, the entry site was anesthetized with 2 mL of 2% lidocaine. After a 3-mm skin incision, the target vessel was punctured with a micropuncture needle under ultrasound guidance. A 0.018-inch guidewire and microsheath were inserted sequentially, and the distance from the superior vena cava–right atrium junction to the planned exit site was measured using fluoroscopy. The exit site was set 3 cm below the clavicle. A Hickman catheter (BD, Tempe, AZ, USA) was selected based on the patient's age (9.5 Fr for patients ≤ 13 years and 12.5 Fr for patients > 13 years) and cut to the measured length, the tunneler was attached, and the microsheath was replaced with a 0.035-inch guidewire. Local anesthesia with 3 mL of 2% lidocaine was administered at the exit site, and a 3-mm incision was made. The tunneler was inserted at the exit site so that its tip was located approximately 2 cm from the entry site. A simple securing suture was placed at the exit site around the tunneler with 3-0 nylon (Figure 1). Subsequently, the catheter was pulled through the tunnel using the tunneler, and the Dacron cuff was positioned cranial to the simple securing suture. The catheter was then introduced into the peel-away sheath along the guidewire. After confirming the position of the catheter tip, the simple securing suture was tied (Figure 2). The corresponding intra-procedural photographs of the placement and tied states are shown in Figure 3a and 3b, respectively. The catheter was then pulled gently in the caudal direction to confirm stability, and the procedure was completed. The simple securing suture was not removed on a fixed schedule—it was left in place for as long as the catheter remained in use and was removed at the bedside by an interventional radiologist at the outpatient clinic when the catheter itself was removed at the end of treatment. Technical success was defined as catheter stability on gentle caudal traction immediately after the procedure. Procedure-related complications—in particular, catheter tear caused by the suture needle—were recorded prospectively. Dislodgement was assessed clinically. During routine dressing changes and catheter care, ward nurses were instructed to notify the Interventional Radiology Department if any portion of the Dacron cuff became visible at the exit site or if the external catheter length appeared to have increased. No additional chest radiograph was ordered by the Interventional Radiology Department for the specific purpose of detecting dislodgement; however, because the Hickman catheter is placed primarily to facilitate chemotherapy, most patients underwent chest radiography during routine clinical care by the hematology or oncology departments within 1 to 2 weeks after insertion, and when such an image was available, the catheter tip position was retrospectively compared with the immediate post-procedural radiograph. In our cohort, technical success was achieved in all 207 patients (100%); no catheter tear or other suture-related complication occurred during the procedure. No patient was referred to the interventional radiology department for cuff exposure or suspected dislodgement during routine catheter care, and for the patients in whom such a clinically indicated chest radiograph was available within 1 to 2 weeks after insertion, the catheter tip position was unchanged compared with the immediate post-procedural image (dislodgement rate, 0%).

Main points

- The simple securing suture is placed around the tunneler before the catheter is pulled through the subcutaneous tunnel, eliminating the risk of catheter injury from the suture needle.
- In 207 consecutive patients, this simple securing suture achieved 100% technical success, with no procedure-related catheter injury and 0% dislodgement on follow-up chest radiography.
- Because part of the suture thread remains outside the body, the suture can be easily removed at the bedside without an additional incision once the Dacron cuff has been incorporated into the surrounding tissue.

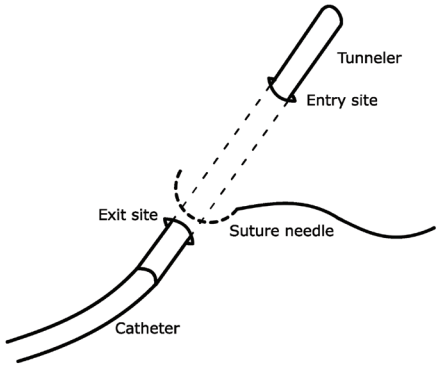

Figure 1. Schematic showing the simple securing suture in its anchored state. A 3-0 nylon suture is placed in the dermis at the exit site, encircling the plastic shaft of the tunneler, before the catheter is pulled through the subcutaneous tunnel.

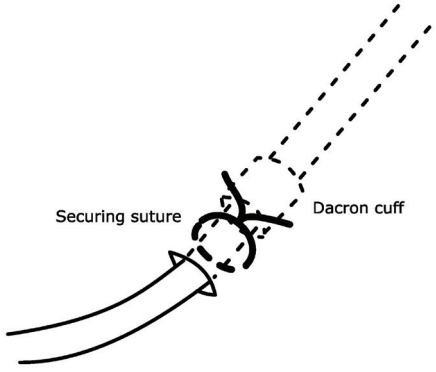

Figure 2. Schematic showing the simple securing suture in its tied state. After the catheter has been advanced through the tunnel, the Dacron cuff is positioned cranial to the suture loop, and the suture is tied around the external segment of the catheter to provide early fixation.

Discussion

The simple securing suture described here is intended to provide reliable early catheter fixation while avoiding iatrogenic catheter injury. Previously reported techniques either require an additional skin incision adjacent to the cuff[4-6] or rely on a percutaneous purse-string suture at the exit site,[7] in which the needle passes immediately adjacent to the catheter and may inadvertently breach its wall. In our institutional experience pre-

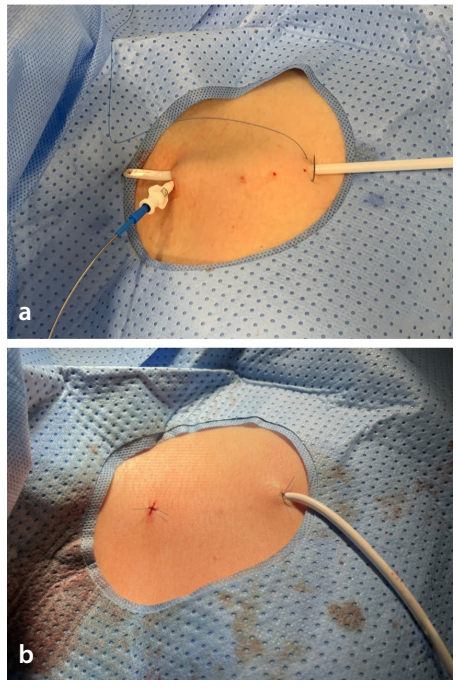

Figure 3. Intra-procedural photographs of the simple securing suture at the skin exit site, corresponding to the schematics shown in Figures 1 and 2. **(a)** Placement of the simple securing suture: The suture needle is passed through the dermis around the plastic shaft of the tunneler, which traverses the subcutaneous tunnel between the entry and exit sites, before the catheter is pulled through. **(b)** Tied state: After the catheter has been advanced through the tunnel and the Dacron cuff positioned cranial to the suture loop, the suture is tied around the external segment of the catheter.

ceding this technique, percutaneous purse-string suturing was occasionally complicated by catheter tear, prompting the modification reported here.

The key feature of the technique is that the suture is placed before the catheter is pulled through the tunnel, with the loop encircling only the plastic tunneler. The catheter itself is therefore never within the path of the needle, eliminating the mechanism of suture-related catheter injury. Because no additional incision is required, the procedure adds only a single suture to the standard insertion sequence, and operative time is minimally affected. The external portion of the suture allows bedside removal once the Dacron cuff has matured, without further skin incision.

The limitations of this report are its retrospective, single-arm design, which precludes direct comparison with alternative fixation techniques, and the relatively short follow-up period. Given the simplicity, reproducibility, and absence of observed complications, the technique is suited to broader prospective and comparative evaluation.

In conclusion, the simple securing suture can prevent dislodgement of Dacron-cuffed tunneled central venous catheters without risking catheter injury by the suture needle.

Footnotes

Conflict of interest disclosure

The authors declared no conflicts of interest.

References

1. Wiener ES, McGuire P, Stolar CJ, et al. The CCSG prospective study of venous access devices: an analysis of insertions and causes for removal. *J Pediatr Surg*. 1992;27(2):155-163; discussion 163-164. [Crossref]
2. Skladal D, Horak E, Maurer K, Simma B. Complications of percutaneous insertion of Hickman catheters in children. *J Pediatr Surg*. 1999;34(10):1510-1513. [Crossref]
3. Bond SJ, Bond BS. Exit site purse-string suture to secure long-term venous catheters. *JPEN J Parenter Enteral Nutr.* 1993;17(6):583-584. [Crossref]
4. Alfieris GM, Wing CW, Hoy GR. Securing broviac catheters in children. *J Pediatr Surg*. 1987;22(9):825-826. [Crossref]
5. Goolishian W, Konefal S. An alternative method of securing broviac catheters in children and infants. *JPEN J Parenter Enteral Nutr.* 1989;13(2):218-219. [Crossref]
6. Sri Paran T, Corbally M, Fitzgerald RI. New technique for fixation of Broviac catheters. *J Pediatr Surg*. 2003;38(1):51-52. [Crossref]
7. Babu R, Spicer RD. "Cuff-stitch" to prevent inadvertent dislodgement of central venous catheters. *Pediatr Surg Int*. 2001;17(2-3):245-246. [Crossref]