Straight to the Point: Techniques, Feasibility, and Safety of Single-Stick Tunneled Central Venous Catheter Insertion in Adults

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OBJECTIVES

Tunneled central venous catheter (CVC) insertion—frequently required for chemotherapy, hemodialysis, and long-term intravenous therapies—is a common interventional procedure performed by Interventional Radiologist (IR). The traditional technique typically requires separate sites: one for initial venous access and a secondary site or incision for creating the subcutaneous tunnel. While the single-stick technique has gained popularity in pediatric populations for offering lower infection rates, improved cosmetic outcomes, and shorter procedure times, its feasibility and safety in adult patients remain less well-established.

This study describes the techniques and assesses the safety and feasibility of tunneled internal jugular central venous catheter placement using a single-stick technique in adult patients.

TECHNICAL DESCRIPTION

Anatomical Assessment: Perform a comprehensive pre-procedural ultrasound evaluation to map local vascular and soft tissue anatomy.

Entry Site & Target: Designate the cutaneous entry site approximately **5 cm below the right mid-clavicle**. Target venous access at the lateral wall of the **right internal jugular vein (IJV)**.

Needle Shaping: Utilize a micropuncture set. Create **two distinct bends** on the needle shaft: a primary curve located **1 cm** from the needle tip, and a secondary curve located **2 cm** from the tip. **Subcutaneous Traversal:** Advance the needle percutaneously from the entry site with the primary and secondary curves oriented **upward**. Navigate the needle subcutaneously **above the clavicle** under real-time ultrasound guidance.

Vascular Targeting: Upon clearing the clavicle, rotate the needle **clockwise** to orient the tip toward the right IJV. Under ultrasound visualization, puncture the **lateral wall** of the vein.

Position Verification: Confirm free venous aspiration. Advance a 0.018” wire to a position below the diaphragm to verify correct intravascular positioning, then use the wire to measure the required subcutaneous tract length.

Wire Exchange: Exchange the micropuncture sheath over the wire for a stiff **0.035-inch guidewire** (e.g., Amplatz Super Stiff).

Dilation & Catheter Insertion: Perform serial tissue dilation over the guidewire. Insert a peel-away sheath, followed by final placement of the tunneled central venous catheter under fluoroscopic guidance.

MATERIALS AND METHODS

A retrospective search of the Radiology Information System (RIS) and Picture Archiving and Communication System (PACS) was conducted over a 6 months period (March 2026 to August 2026). Technical details of tunnelled central venous catheter insertions, technical/ clinical success rates, and safety profiles were retrospectively analyzed.

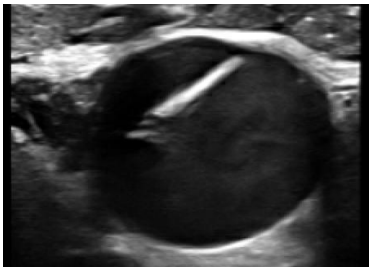
RESULTS

A total of 51 tunneled central venous catheters were inserted during the study period, comprising 48 cases utilizing the traditional double-stick technique and 3 cases utilizing the single-stick technique (including 2 Hickman catheters and 1 hemodialysis catheter). The overall technical success rate for the single-stick cohort was 100% (3/3). No procedural complications were observed.

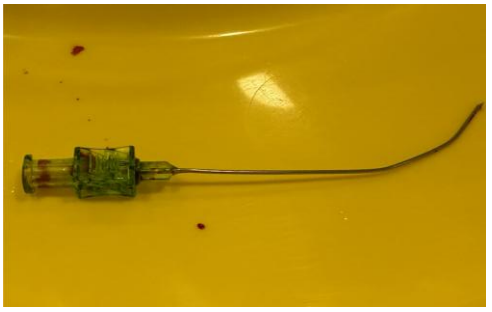
CONCLUSION

The single-stick technique is a safe and feasible approach for tunneled central venous catheter placement in adult patients, with the potential to reduce infection rates and shorten procedure times. Further large-scale studies are warranted to validate its broader clinical utility.

Ultrasound of needle in situ



Modified needles



Post procedural CXR



Single puncture site

