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Abbreviations

PICC	Peripherally inserted central catheter
TPN	Total parental nutrition

INTRODUCTION

Image-guided peripherally inserted central catheters (PICC), which are inserted through a peripheral vein, are well tolerated by patients and have relatively low rate of complications. The access vein can be selected based on the operator's preference and presence of sufficiently distended patent vein. Some operators will choose the largest vein in the upper nondependent arm above the elbow as their access vein, whereas others will routinely select the basilic vein located away from brachial artery to avoid the risk of inadvertent arterial puncture. The cephalic vein which is prone to spasm and thrombosis, and the brachial vein which is located in close proximity to the artery, can also be catheterized. PICC lines can be used from 1 to 12 weeks for continuous or

intermittent infusions, as well as frequent blood sampling. Multi-lumen catheters facilitate the infusion of incompatible agents, whereas catheters with a large internal lumen are optimal for infusion of viscous liquids or when rapid infusion of blood products is indicated.

COMMON INDICATIONS [1–4]

- Continuous or frequent administration of intravenous medications or fluids
- Rapid infusion of viscous liquids or blood products
- Administration of cytotoxic medications or chemotherapy that cause venous inflammation in the peripheral veins
- Total parental nutrition (TPN)
- Contraindications for the placement of a permanent venous access (e.g., *coagulopathy, active infection*)
- Infusion of hypertonic agents
- Frequent blood sampling (*rarely a separate indication*)

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COMMON CONTRAINDICATIONS

[1, 2, 4, 5]

- Past history of allergic contrast material reaction and impaired renal function (*the procedure can be performed without contrast media injection*)
- Central venous thrombosis or occlusion
- Difficulty identifying suitable patent peripheral vein
- Focal cellulitis, radiation-induced injury, or burn (*different site can be selected for insertion*)
- Previous mastectomy or axillary lymph node dissection (*different side can be selected for insertion*)
- Patients on hemodialysis (*significant rate of peripheral venous thrombosis*)
- Patients in whom hemodialysis is anticipated (e.g., *renal transplant, chronic renal disease*)

POSSIBLE COMPLICATIONS [1–4]

- Access-site related (e.g., *hematoma, inadvertent arterial injury*).
- Cardiac arrhythmias
- Venous thrombosis
- Catheter site infection and bacteremia
- Malposition when inserted without fluoroscopy guidance
- Catheter dislodgment
- Catheter malfunction due to thrombosis or fibrin sheath formation
- Catheter fracture and embolization of fragments

PREPROCEDURAL ASSESSMENT AND PLANNING [2, 6–8]

- History, indications, and physical examination (*Appendix 1* in Chap. 149)
- Evaluation of diagnostic imaging studies to determine the relevant vascular anatomy, and presence of normal variants and venous

thrombosis. This will assure adequate planning of the procedure and proper access vein selection.

- Periprocedural management of coagulation status (*Appendices 2* in Chap. 150 and *3* in Chap. 151)
- Antibiotic prophylaxis: Not routinely recommended [2, 6] (*Appendices 4* in Chap. 152 and *5* in Chap. 153)
- Imaging modality for guidance: Ultrasound, fluoroscopy, combined ultrasound/fluoroscopy
- Positioning: Supine
- Venous access: Peripheral vein, preferably in the upper extremity

PROCEDURE NOTE

Procedure: Single-/double-lumen peripherally inserted central catheter placement

Staff: []

Fellow: []

Resident: []

Clinical History and Indications: Describe history and list indications

Allergies: None known/Allergic to [specify/type of allergy]

Anesthesia: Local anesthesia/conscious sedation

Medications: List any relevant medications used

Contrast Material: None/(_) mL of [type] contrast material was used for venography

Field: Sterile

Procedure classification: Clean

Position: Supine

Monitoring: Intravenous access line was secured and vital signs were continuously monitored by nursing staff/anesthesia team throughout the procedure

Total fluoroscopy time: () minutes

Cumulative radiation dose: () mGy

Description of Procedure:

The risks, benefits, alternatives and procedure itself were explained to the patient/patient's Power of Attorney/patient's legal guardian, and

informed written/verbal consent was obtained. Time out was performed to confirm the correct patient and procedure.

The right/left upper extremity was prepped and draped in the usual sterile fashion. A tourniquet was placed to distend the veins. Ultrasound examination was performed to locate an adequately distended patent peripheral vein and determine the site of venous puncture. The [name the vein] vein was selected for puncture. Local anesthesia was administered. Venous access was obtained using a ()-gauge [type] needle, under direct ultrasound visualization/by palpation. Once good venous flow was detected, a ()-inch [type] guidewire was advanced through the needle under direct fluoroscopic visualization and its tip was placed at the cavoatrial junction/[specify location if the wire could not be advanced centrally]. The required catheter length was measured using the guidewire/estimated (bedside procedure) and the catheter was cut to the required length. A small skin incision was made and a ()-French [peel away/type] sheath was placed into the access vein over the guidewire.

The stiffener of the sheath was removed and the catheter was advanced through the sheath using a stiffening stylet/guidewire to the desired position. After confirming adequate position of the catheter tip at the cavoatrial junction [specify location if otherwise] by imaging, the sheath was removed, the catheter was anchored to the skin and sterile dressing was applied. The catheter was flushed with normal saline and loaded with () mL of (10–100) IU/mL heparin solution. Spot fluoroscopy image/chest radiograph was obtained to document catheter tip position for future reference.

The patient was transferred to the floor/recovery room/discharged home following the procedure in a stable condition. Staff was present for the entire procedure.

Intra-Procedure Findings: List all relevant findings.

Immediate Complications: None encountered during or directly after the procedure. List complications if any.

Post-Procedure Plan [1, 2]:

- Always aspirate and discard contents of lumen prior to each use to avoid flushing the intraluminal heparin into the systemic circulation.
- After each use and before capping the lumen, flush the lumen with 10 mL of normal saline followed by instillation of heparin solution (10–100 IU/mL) based on the specific luminal volume of the catheter to maintain patency.
- When not in use, flush the lumen with normal saline followed by instillation of heparin solution 2–3 times per week.
- Apply sterile dressing after disinfecting the skin with chlorhexidine-based preparation twice weekly.
- Check for signs of catheter-related infection regularly and take the appropriate measures when observed.

Impression:

- ()-French single-/double- lumen peripherally inserted central catheter placement through [specify peripheral vein] as described above.
- The patient tolerated the procedure well and left the interventional unit in stable condition.
- Document the maximum injection rate of power injectable catheters.
- The patient was unstable/unable to tolerate the procedure and the procedure was canceled/terminated prematurely.
- List any other relevant or important information/finding.

References

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