

WHICH TYPE OF CENTRAL VENOUS ACCESS DEVICE SHOULD WE CHOOSE IN PATIENTS WITH COVID-19?

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Revision of many decision-making processes and reformulation of protocols and procedures.

Our goals:

- Protect the operator
- Maximize the effectiveness of the maneuver
- Reduce the risk of complications for the patient
- Avoid a waste of resources.

«Smart decisions for maximal safety»

Editorial

Vascular access in COVID-19 patients: Smart decisions for maximal safety

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> Pittiruti and Pinelli *Critical Care* (2020) 24:269 https://doi.org/10.1186/s13054-020-02997-1

COMMENTARY

Recommendations for the use of vascular access in the COVID-19 patients: an Italian perspective

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Critical Care

In COVID patients who do not need ICU, a peripheral venous access is enough

- In the suspected/confirmed COVID-19 patient who does not need ICU, prefer a peripheral VAD
- Consider the full range of options:
 - short cannulas (PIV: < 6cm)</p>
 - long peripheral catheters (LPC = 6-15 cm)
 - midline catheters (> 15 cm)
- **Consider power injectable Midline catheters** rather than PIV or LPC:
 - Longer dwell time: reduction in the number of VAD insertions
 - High flow & easy blood withdrawal
 - Possibility of guidewire replacement with a PICC, if needed

COVID patients in ICU need a central venous access device

COVID patient in ICU need a <u>multi-lumen central line</u>

- Vasopressor drugs, parenteral nutrition, repeated blood samples, etc.
- Hemodynamic monitoring requires a <u>central line with tip in right atrium</u>
 - IC-ECG and echocardio allow accurate tip location in the atrium

The technique of central line placement must be as safe as possible

- Pleura-pulmonary complications may be tragic in COVID patients
- The exit site of the central line must be in a clean, stable, safe area
- Consider the full range of options:
 - *PICC* = *peripherally inserted central catheters*
 - CICC = centrally inserted central catheters
 - FICC = femorally inserted central catheters

What about FICCs ?

- Consider the advantages of FICCs (use double and triple lumen power injectable catheters, and choose veins of appropriate caliber):
 - Exit site is ok, if it is at mid-thigh (approach to the superficial femoral vein at mid-thigh; or, approach to common femoral vein + tunnel to mid-thigh):
 - No risk of pleuropulmonary damage
 - Insertion maneuver is distant from patient's oral, nasal, tracheal secretions
 - No interference with helmet/mask for NIV/CPAP
 - Easier management of exit site (distant from patient's oral, nasal, tracheal secretions)
 - Can be used for CVP monitoring (if the tip is in right atrium)
 - Same risk of thrombosis and infection as CICC, if exit site is at mid-thigh

AVOID THE EXIT SITE AT THE GROIN

Common femoral venipuncture + tunnel to mid-thigh



Superficial femoral venipuncture



Bilateral superficial femoral Venipuncture (courtesy of Matt Ostroff)



What about PICCs ?

- Consider the advantages of PICCs (use double and triple lumen power injectable catheters, and choose veins of appropriate caliber):
 - No risk of pleuropulmonary damage
 - No risk of significant bleeding, even in anticoagulated COVID-19 patients
 - Insertion also in sitting or pronated patients
 - Insertion maneuver is distant from patient's oral, nasal, tracheal secretions
 - No interference with helmet/mask for NIV/CPAP
 - Easier management of exit site (distant from patient's oral, nasal, tracheal secretions)
 - Can be used for hemodynamic monitoring (CVP, CO by thermodilution, etc.)
 - Same risk of thrombosis and infection as CICC

DO NOT BE AFRAID OF PICCs

One recent meta-analysis (2019)

Original research article

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The Journal of Vascular Access

Peripherally inserted central catheter-related thrombosis rate in modern vascular access era-when insertion technique matters: A systematic review and meta-analysis The Journal of Vascular Access 1–10 © The Author(s) 2019 Article reuse guidelines: sagepub.com/journals-permissions DOI: 10.1177/1129729819852203 journals.sagepub.com/home/jva **(S)SAGE**

Paolo Balsorano¹, Gianni Virgili², Gianluca Villa³, Mauro Pittiruti⁴, Stefano Romagnoli¹, Angelo Raffaele De Gaudio³ and Fulvio Pinelli¹

PICC-related thrombosis: 2.2 - 2.4%

Another recent meta-analysis (2020)

Review



The Journal of Vascular Access

Peripherally inserted central catheters inserted with current best practices have low deep vein thrombosis and central line-associated bloodstream infection risk compared with centrally inserted central catheters: A contemporary meta-analysis

Gregory J Schears¹, Nicole Ferko², Imran Syed², John-Michael Arpino² and Kimberly Alsbrooks³

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PICC-related thrombosis = 2.3% vs. CICC-related thrombosis = 3.9%

Non-tunneled PICC



Tunneled PICC



What about CICCs ?

If you use CICCs: avoid exit site at the neck

- plan <u>exit site in the supra-clavicular area</u> (USG puncture of jugular, subclavian or brachio-cephalic vein) or <u>in the infra-clavicular area</u> (USG puncture of axillary vein)
- In most patients, the latter option is the best (USG axillary vein puncture in the infra-clavicular area): less interference with helmet/mask for NIV/CPAP
- Consider to tunnel the catheter, so to obtain an ideal exit site
 - Tunnel from supra-clavicular to infra-clavicular area (after jugular or subclavian or innominate venipuncture)
 - Tunnel from infra-clavicular area to low pectoral area (after axillary venipuncture)

DO NOT USE THE NECK

Non-tunneled CICC

Supra-clavicular CICC tunneled to the infra-clavicular area



With any CVAD, choose wisely the insertion technique

Use ultrasound guided venipuncture - ALWAYS

- Make it faster, make it easier, make it safer
- Please avoid radiology ALWAYS (Fluoroscopy and chest-x-ray = waste of time and resources, risk of contamination, less safety, less accuracy)
 - use ULTRASOUND
 - for tip navigation (linear probe)
 - for tip location (trans-thoracic echocardiography with convex or sector probe)
 - for ruling out pleura-pulmonary damage (linear probe)
 - use INTRACAVITARY ECG for tip location
- Use wireless devices for reducing the risk of contamination ALWAYS
 - Wireless ultrasound probes: linear, convex, sector
 - Wireless ECG monitors for intracavitary ECG



FORGET X-RAYS



ONE WIRELESS PROBE FOR ALL USES:

- 1) PICC venipuncture
- 2) CICC venipuncture
- 3) r/o pneumothorax (pleural scan)
- 4) Tip navigation (supraclavicular scan)
- 5) Tip location (subcostal scan)
- 6) Tip location (apical scan)



CONVEX or SECTOR PROBE

After CVAD insertion, secure the catheter and protect the exit site

• Optimize the securement of the catheter and the protection of the exit site:

Prevent dislocation by SUBCUTANEOUSLY ANCHORED SECUREMENT

- COVID-19 patients in ICU = high risk of catheter dislocation
- Do any effort to prevent unneeded replacement of the line!
- Do not use stitches they bring infection and they are less effective than subcutaneously anchorage

Prevent local bleeding by CYANOACRYLATE GLUE

- COVID-19 patients are on anticoagulants = high risk of local bleeding
- Do any effort to prevent unscheduled dressing change!

SECURE & PROTECT

US-guided PICC



Ideal exit site

Ideal securement subcutaneously anchored

Ideal protection cyanoacrylate glue





In any CVAD insertion, please adoption proper precautions for avoiding contamination

Protect the patient

- Hand hygiene before the maneuver
- Skin antisepsis with 2% chlorhexidine in 70% IPA
- Maximal barrier precautions (cap, surgical mask, sterile gloves, sterile gown, large sterile drape, long cover for the probe)

Protect the operator

- FFP2 or FFP3 (N94-N99) underneath the surgical mask
- Proper eyes protection
- After the maneuver :
 - appropriate disposal of the attire and of all materials
 - appropriate cleaning of ultrasound device and/or ECG monitor
 - hand hygiene

The positive side effect of this experience can take the form of **a new awareness of the need to save resources and increase safety** even outside of health emergency situations, adopting a few winning strategies:

- to consider the full range of peripheral and central VADs, adopting the device most appropriate for each clinical situation;
- <u>to abandon the routine use of radiology</u> for checking the tip location and ruling out pneumothorax after central venous access insertion, in favor of faster, more accurate, safer and cheaper methods such as intracavitary electrocardiography and echocardiography;
- to adopt strategies that maximize the securement and the protection of the exit site of central venous catheters (<u>subcutaneously anchored securement</u> and <u>cyanoacrylate glue</u>)
- to adopt systematically <u>appropriate techniques of infection prevention</u> in order to maximize both patient and operator safety during insertion of vascular access devices.

UPDATE YOUR VENOUS ACCESS STRATEGIES





The GAVeCeLT document on vascular access in COVID-19 patients is available (In seven languages) on the GAVeCeLT website



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