



WHICH TYPE OF CENTRAL VENOUS ACCESS DEVICE SHOULD WE CHOOSE IN 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

JVA | The Journal of
Vascular Access

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

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The Journal of Vascular Access
1–3

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DOI: 10.1177/1129729820923935

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

Critical Care

COMMENTARY

Open Access

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



Mauro Pittiruti^{1*} , Fulvio Pinelli² on behalf of the GAVeCeLT Working Group for Vascular Access in COVID-19

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)*
 - *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 multi-lumen central line
 - *Vasopressor drugs, parenteral nutrition, repeated blood samples, etc.*
- Hemodynamic monitoring requires a central line with tip in right atrium
 - *IC-ECG and echocardiography 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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Peripherally inserted central catheter–related thrombosis rate in modern vascular access era—when insertion technique matters: A systematic review and meta-analysis

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

The Journal of Vascular Access
1–10

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DOI: 10.1177/1129729819852203

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PICC-related thrombosis: 2.2 - 2.4%


Another recent meta-analysis (2020)

Review

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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

The Journal of Vascular Access
1–17
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DOI: 10.1177/1129729820916113
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PICC-related thrombosis = 2.3% vs. CICC-related thrombosis = 3.9%

Non-tunneled PICC



Tunneled PICC



What about CICC's ?

- If you use CICC's: avoid exit site at the neck
 - *plan exit site in the supra-clavicular area (USG puncture of jugular, subclavian or brachio-cephalic vein) or in the infra-clavicular area (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



Supra-clavicular CICC tunneled to the arm



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*

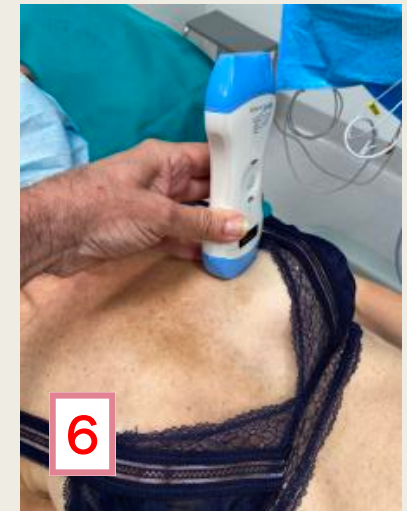
FORGET X-RAYS

GO WIRELESS



LINEAR PROBE

- 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

US-guided FICC



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;
- to abandon the routine use of radiology 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 (subcutaneously anchored securement and cyanoacrylate glue)
- to adopt systematically appropriate techniques of infection prevention 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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