



# Peripheral Inserted Central Catheter as Vascular Device of Choice in COVID-19 Patient: The Experience of a PICC Team in a Hospital in Southern Italy

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## Abstract

During the COVID-19 pandemic, the management of vascular access in the most critical patients was an emerging problem. Correct management of vascular access according to standards has contributed to improving the outcome especially in patients admitted to the sub-intensive units. The use of PICCs in these patients is certainly a standard of care. In this paper we report the experience in a COVID Hospital in southern Italy in April 2020.

**Keywords:** COVID-19, Vascular Access Management, Peripheral Inserted Central Catheter, PICC, Coronavirus pandemic

## Introduction

In these weeks the world, with the respective National Health Systems, is facing an unprecedented emergency that is gradually leading to the collapse of our care capacity.

The international dimension of the problem can be reliably assessed on the website developed by the Center for Systems Science and Engineering at Johns Hopkins [1]. The Italian situation is monitored on the website of the Ministry of Health, which reports, in April 2020, an incidence of critical patients admitted to the ICU around 10% [2]. The mortality rate today remains undefined and it is exactly incomparable with previous flu epidemics. The National Health Commission of the People's Republic of China publishes a mortality rate of 4% in Wuhan City, 1.4% in Hubei Province and 0.25% in other provinces [3].

Moreover, in Europe the scenario is and will be even more heterogeneous, with a variability that can be attributed not only to a different timing, but also to different healthcare systems, with different capacities to contain the infection, to apply the protocol for PUI (Person under investigation), to draw on healthcare personnel resources and the path to ICUs.

Thus, when compared with SARS-CoV (Severe Acute Respiratory Syndrome) (28% mortality) and MERS-CoV (Middle Eastern Respiratory Syndrome) (65% mortality), COVID-19 appears less lethal. But it must be taken into account that, in the years of the first epidemic, PCR-testing was not easily available while in the second one the numerous comorbidities of patients played the predominant role of confounding factors [4].

COVID-19 (Novel Coronavirus Disease 2019) can occur, according to the recommendations of the World Health Organization (WHO) [5], in 6 different stages (Uncomplicated Disease- Moderate pneumonia- ARDS- Sepsis- Septic shock), and the resuscitator anesthesiologist is called to manage the hypoxemic respiratory failure, rapidly fattening. About 80% of patients present in the first two stages, 13.8% have severe forms and 6.1% are critical. Patients at greater risk for severe form and mortality have: age > 60 years, systemic high blood pressure, diabetes mellitus, cardiovascular disease, chronic respiratory disease, oncologic disease [6].

In the treatment of patients with Coronavirus (COVID-19), the choice of adequate vascular access, especially in the immediate post-acute period, is of utmost importance.

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## Clinical Experience

We observed the records of 65 patients (46 M, 19 F; age 26-86) who underwent PICC placement from 1<sup>st</sup> April, 2020 to 30<sup>th</sup> April, 2020 at AO "Ospedale dei Colli" - Naples during COVID-19 emergency period 18 patients were treated in medical units, 37 patients in sub-intensive care unit (SICU) and 10 patients in intensive care unit (ICU).

In medical unit, patients performed oxygen therapy by nasal CPAP or Venturi mask; in SICU they performed CPAP by Helmet; all patients in ICU were intubated. All patients needed central venous catheter.

In medical unit, PICC was implanted between 2<sup>nd</sup> and 5<sup>th</sup> day, in SICU between 3<sup>rd</sup> and 6<sup>th</sup> day, while in ICU between 6<sup>th</sup> and 9<sup>th</sup> day.

The proceedings were carried at bedside while the patient was in a supine or semi supine position with abducted arms. Vein puncture was performed with ultrasound guidance. A tourniquet was applied around the upper arm of the patient. Typically, the basilic vein was selected. Alternatively, if the basilic vein was not available, the brachial or cephalic veins were selected.

PICC were implanted according to all principles of asepsis and operator dressed personal biological protective sterile equipment. For all patients a single lumen 5-Fr Groshong PICC catheter (CR Bard, Salt Lake City, UT, USA) was placed. Certified methods of TIP navigation and TIP location allowed the correct position of the device. Chest X - ray was avoided to reduce contact between patients and some health care professionals.

PICC were used daily for in bolus or continuous drug administrations. Every 72 hours, chlorhexidine medications were replaced; No acute or long term complications occurred. PICC were removed in 59 healed patients before the hospital discharge.

## Discussion

From an operational and management point of view, the most appropriate vascular access, after clinical evaluation, seems to be the PICC. A large Chinese study since the spread of the virus, shows that COVID-19 positive patients risk complications requiring assisted ventilation (5.1%), or respiratory assistance through intubation (2.3%), or even a tracheostomy [7]. In this context, the PICC meets the operational and management requirements of the case.

PICC placement in COVID-19 patients should be performed in the immediate post-acute period. After a confirmed diagnosis and primary stabilization, this type of vascular access can be placed. The PICC, however, must be positioned by an experienced and dedicated team, so as to guarantee firstly a rapid response to the

positioning request (within 24 hours of the request), and then secondly because the success of the system must be guaranteed in the shortest possible time (with adequate protection measures and respecting all the principles of sterility, especially with the use of all-inclusive kits for the system and management of the device) [8]. In addition, verifying the correct positioning of the catheter tip using certified intraprocedural systems with immediate confirmation during implantation, avoids the need for further post-implantation maneuvers, which would expose the patient to an infectious and/or thrombotic risks [9], and healthcare professionals to an unnecessary risk of infection.

As recommended by the INS 2016 with a standardized and certified method of TIP Location and TIP Navigation intraprocedural is avoided, as known, the classic chest X-ray of the catheter tip control by effectively preventing contact between implanted patients and health care professionals such as radiologists, radiology technicians and social workers, making the process really efficient [8].

In patients with not invasive ventilation (NIV) (helmet or ventilation mask) or who are only likely to need this respiratory support, the PICC finds its use because the insertion point is in the middle third of the arm, i.e. away from the neck where the C-PAP helmet rests. Infusions in this way will be guaranteed and will not risk being interrupted by any kinking effect that the ventilator helmet might have on a central venous catheter placed on the patient's neck. The management of the PICC by the staff would also be much less difficult, since the PICC is outside the helmet. Ventilation would therefore be guaranteed continuously, without having to act on the helmet by C-PAP to access the venous access.

In intubated patients, PICC management would be easier because the insertion point is located away from the endotracheal tube and, therefore, less at risk of developing catheter infections correlate. Even if the patient has to be tracheostomized, PICC finds wide use. The insertion point of the PICC is located in an area distant from the tracheostoma, i.e. in a low risk area of contamination [6]. In the treatment of intubated patients, prone position is recommended. There is currently no reason to recommend or otherwise prevent the use of PICC during pronation cycle [9].

In the pharmacological treatment of COVID-19 positive patients, 58% require intravenous administration of antibiotics, 35.8% of antiviral drugs [5]. Prolonged administration of antibiotics and other intravenous therapy (sedation, hydration or emergency drugs), reduces the patient's venous assets, requiring numerous peripheral venous accesses. With a view to implementing a proactive approach in the choice of vascular access, PICC is the best choice.

In addition, the administration of antivirals and immunosuppressive drugs “off label” can lead these patients to the development of an immunodeficiency that would put them at even greater risk of developing over infections. Both the location of the PICC insertion point and the implantation technique and management and treatment protocol make it an ideal vascular access in the immunosuppressed patient [9,10].

It is strongly recommended, however, that both the implantation and the management of these devices respect all the principles and guidelines in this regard [8]. The implantation of PICC in COVID-19 positive patients must be done, as in all patients, respecting the principles of sterility, observing the correct vessel selection criteria and following the INS guidelines 2016 [6].

It is evident that, if there is no need for a central venous catheter type PICC, other types of peripheral venous catheter such as Midline, short peripheral cannulas and long peripheral cannulas should be considered. Always in compliance with the guidelines, where possible, use the maximum barrier devices (possibly integrated in an all-in-one kit with the catheter) when implanting a catheter with the free guide wire Seldinger technique. Alternatively, to reduce the risk of infection and exposure to healthcare workers, use devices with all-in-one technology and/or fully integrated systems.

The handling of these devices must be imperatively accurate. Access to all catheter hubs, washing, locking and dressing must be absolutely guaranteed in accordance

with the INS 2016 guidelines, with a view to reducing the onset of complications which, in these patients, would be extremely harmful and serious [6,7,11,12].

## References

1. COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU).
2. ITALY Ministry of Health. COVID-19 Italian situation.
3. National Health Commission of the People's Republic of China. Report of the WHO-China Joint Commission on COVID-19.
4. [http://www.nhc.gov.cn/xcs/yqtb/list\\_gzbd.shtml](http://www.nhc.gov.cn/xcs/yqtb/list_gzbd.shtml)
5. European Center for Disease Prevention and Control. Outbreak of novel coronavirus disease 2019 (COVID- 19): increased transmission globally- fifth update. 2020, March, 2.
6. World Health Organization. Clinical management of severe acute respiratory infection when novel coronavirus (2019-nCoV) infection is suspected. Interim guidance. 2020, January, 28.
7. ANIAARTI (2020) “Raccomandazione gestione COVID-19 in area critica”.
8. Guan W, Ni Z, Liang W, et al. (2020) Clinical Characteristics of Coronavirus Disease 2019 in China, *The New England Journal of Medicine*.
9. (2016) “Infusion Therapy: Standards of Practice”, *Journal of Infusion Nursing*, 1533-1458.
10. D'Antiga L (2020) Coronaviruses and immunosuppressed patients. The facts during the third epidemic. *Liver Transpl*.
11. SIAARTI (2020) “Raccomandazioni di etica clinica per l'ammissione a trattamenti intensivi e per la loro sospensione, in condizioni eccezionali di squilibrio tra necessità e risorse disponibili”.
12. Dong L, Hu S, Gao J (2020) Discovering Drug to treat Coronavirus Disease 14: 58-60.