

Off label use of PICC as umbilical arterial catheter: clinical case report.

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1. Background

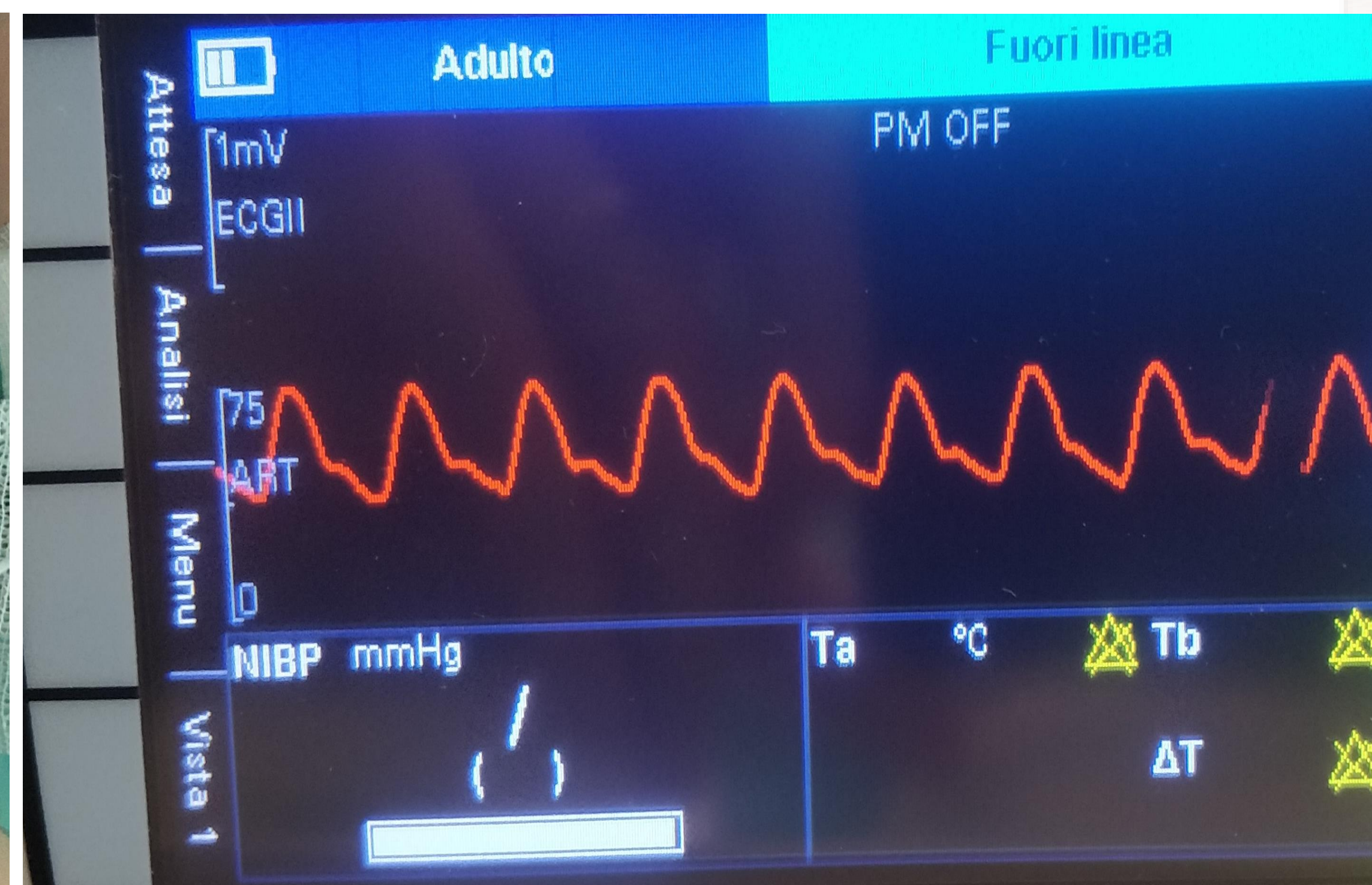
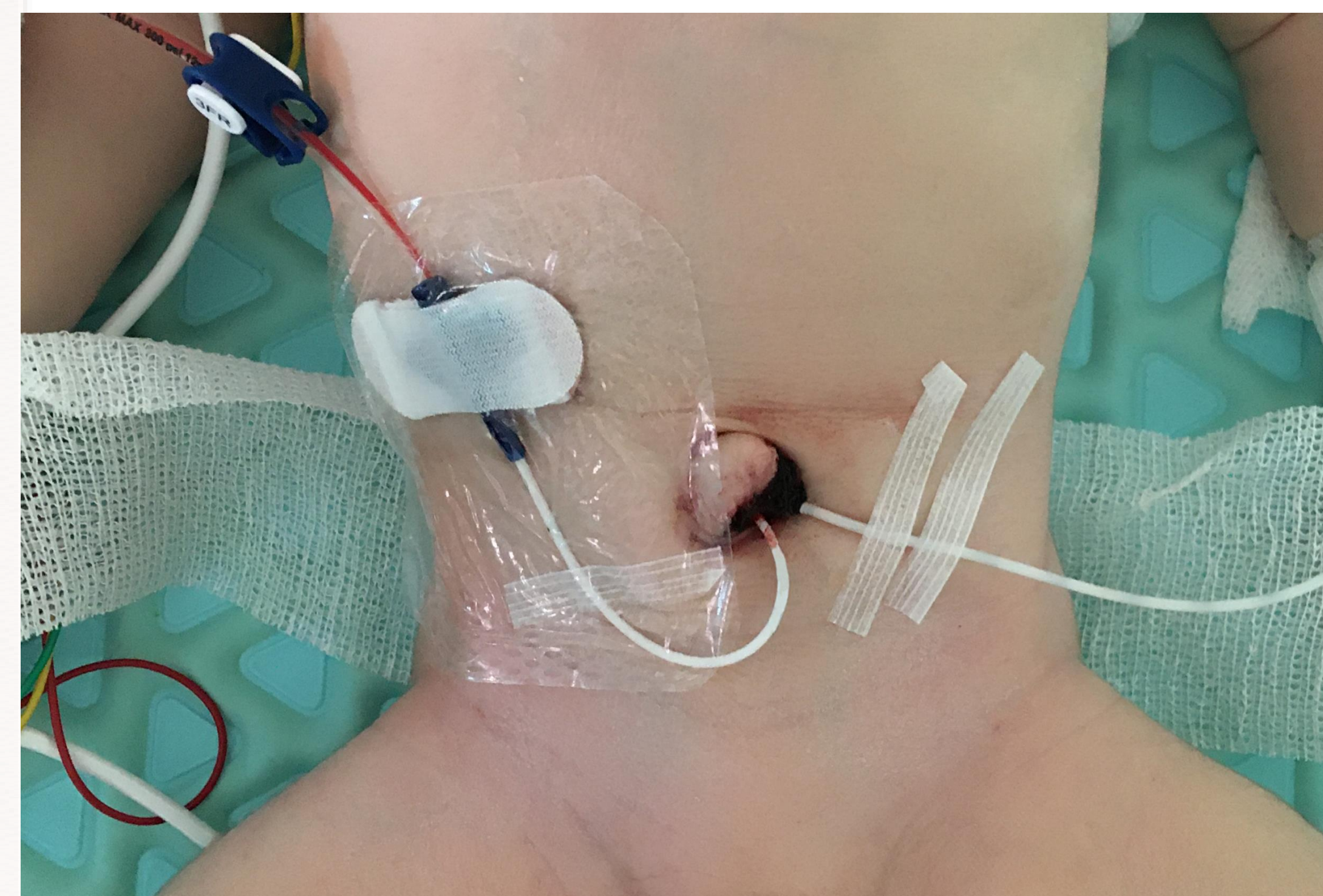
Umbilical arterial catheters (UAC) are often placed at birth in critical ill neonates such as those with hemodynamic instability, congenital diaphragmatic hernia (CDH), persistent pulmonary hypertension, severe/moderate neonatal RDS with high oxygenation index, whole body hypothermia, extremely low preterm birth.

Advantages of UAC include continuous blood pressure monitoring, accurate blood gas, frequent blood samplings and access for blood exchange. Eventually, the use of UAC avoids interpretation errors in complex care of critically ill neonates. On the other side there is an increased risk of infectious and thrombotic complications. Specific single lumen polyurethane catheter ranging from 3.5 Fr to 5 Fr designed for neonatal population are commonly used for this purpose.

In the present paper we describe the off-label use of a 3rd generation polyurethane power injectable 3 Fr single lumen peripheral inserted central catheter (PICC) as UAC in a term baby .

2. Clinical case report

Baby C.G. was born at term (40 gestational age weeks) with an antenatal diagnosis of CDH. She was intubated in delivery room. On the admission in neonatal intensive care unit (NICU) a double lumen umbilical venous catheter (UVC) and a UAC were placed. A 3 Fr single lumen power injectable PICC (Health PICC; Polymed) was cut at 22 cm and was placed in the umbilical artery. The catheter was safely secured with steri-streeps, cyanoacrylate glue, semipermeable transparent membrane and a sutureless device. Blood pressure was successfully monitored achieving a good arterial pressure waveform. The baby underwent surgery on the second day of life due to its condition. The catheter was used for hemodynamic monitoring and frequent blood sampling and then removed at 96 hours of life without any side effects. The baby fully recovered and was discharged at 14 days of life.



3. Discussion

UACs offer several advantages in the management of critically ill infants including continuous blood pressure monitoring, accurate blood gas, frequent blood samplings and access for blood exchange. We developed a NICU bundle for insertion of UVC/UAC.

- 1.Prepackaged UAC/UVC trays.
- 2.Maximal barrier precautions.
- 3.Skin antisepsis with 2% chlorhexidine in 70% isopropilic alcohol.
- 4.Vein/arterial cannulation using the smallest catheter according to the infusion need of the baby (single/double lumen UVC).
- 5.Tip location using point of care ultrasound.
- 6.Securement by sutureless device.
- 7.Cyanoacrylate glue to seal the exit site of UVC and UAC and to prevent the risk of bleeding.
- 8.Coverage of the catheter with semipermeable transparent membrane.

To the best of our knowledge this is the first report about “atypical” (more strictly an off-label use) of PICC catheter as UAC. There are three theoretical advantages for the off label use of PICC as UAC and UVC:

1. The catheter can be trimmed.
2. 3 Fr PICC catheter can achieve a good arterial waveform. UACs are conventionally placed using specific single lumen polyurethane catheter ranging from 3.5Fr to 5 Fr. Smaller catheters (2.5 Fr), even if available, are associated with of a dampening of arterial tracing. Therefore, cannot be used for hemodynamic monitoring. Polyurethane power injectable 3 Fr single lumen PICC achieved an incredibly good arterial waveform. The use of smaller catheter is likely also to reduce the risk of thrombosis since the main risk factor for such complication is the relationship between the external diameter of the catheter and the internal diameter of the vessel.
3. Easier management of occlusion.

4.Conclusion

Our clinical experience opens new scenarios about the off-label use of power injectable PICC in newborns. In the near future it's not so difficult to imagine that this new high-performance catheter can be used also as umbilical vein catheter and umbilical arterial catheter. This could be the very first step towards the design of a new single high-performance neonatal device with multiple purposes: UVC/UAC in the first 4-5 days of life, ultrasound guided central inserted central catheter and femoral inserted central catheter afterwards.

