



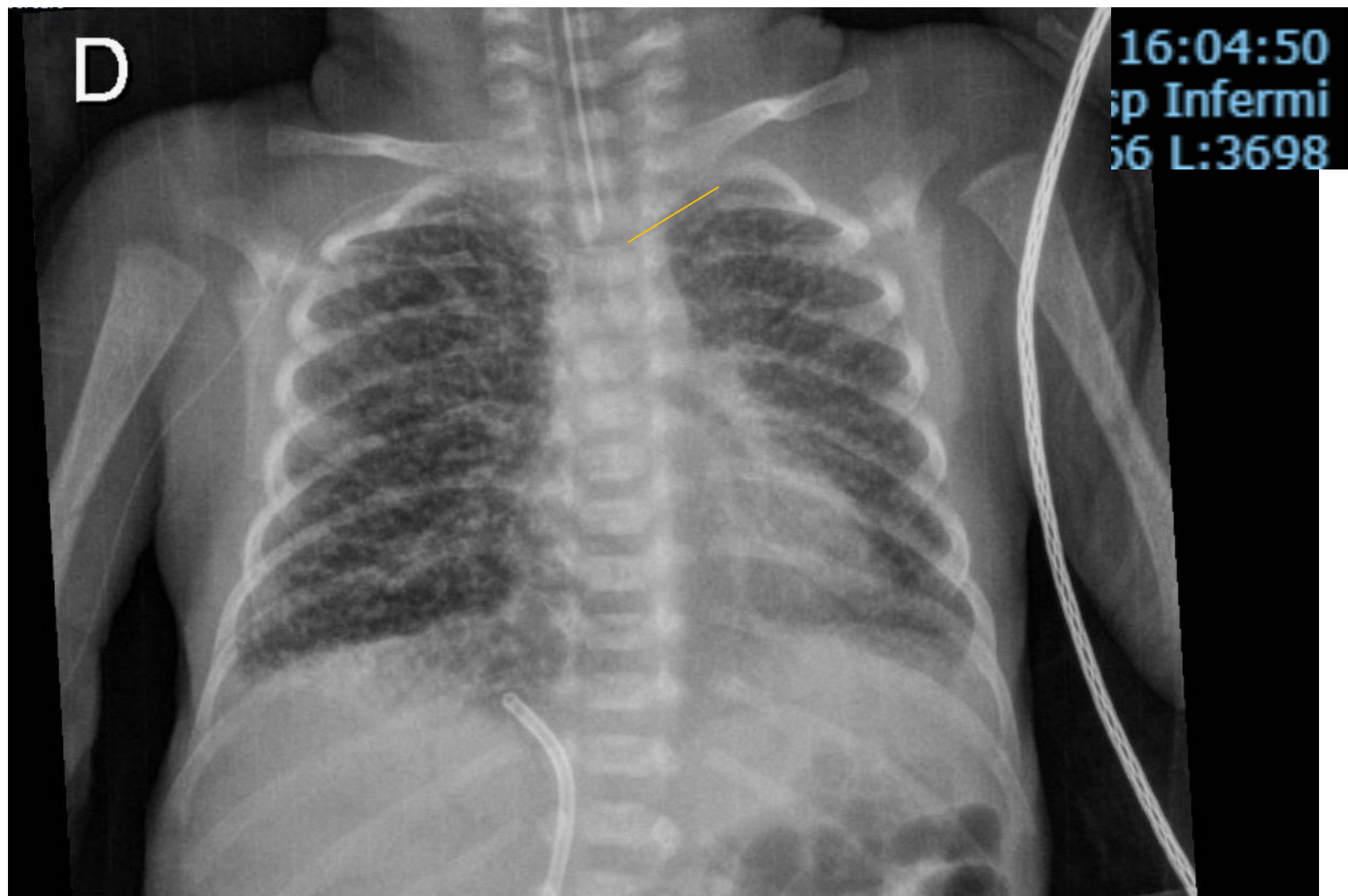
VI Convegno Nazionale **GAVePed** 2024 **BOLOGNA**

Come diagnosticare le malposizioni secondarie nel neonato con metodo ecografico

Giovanni Barone
Ospedale Infermi di Rimini

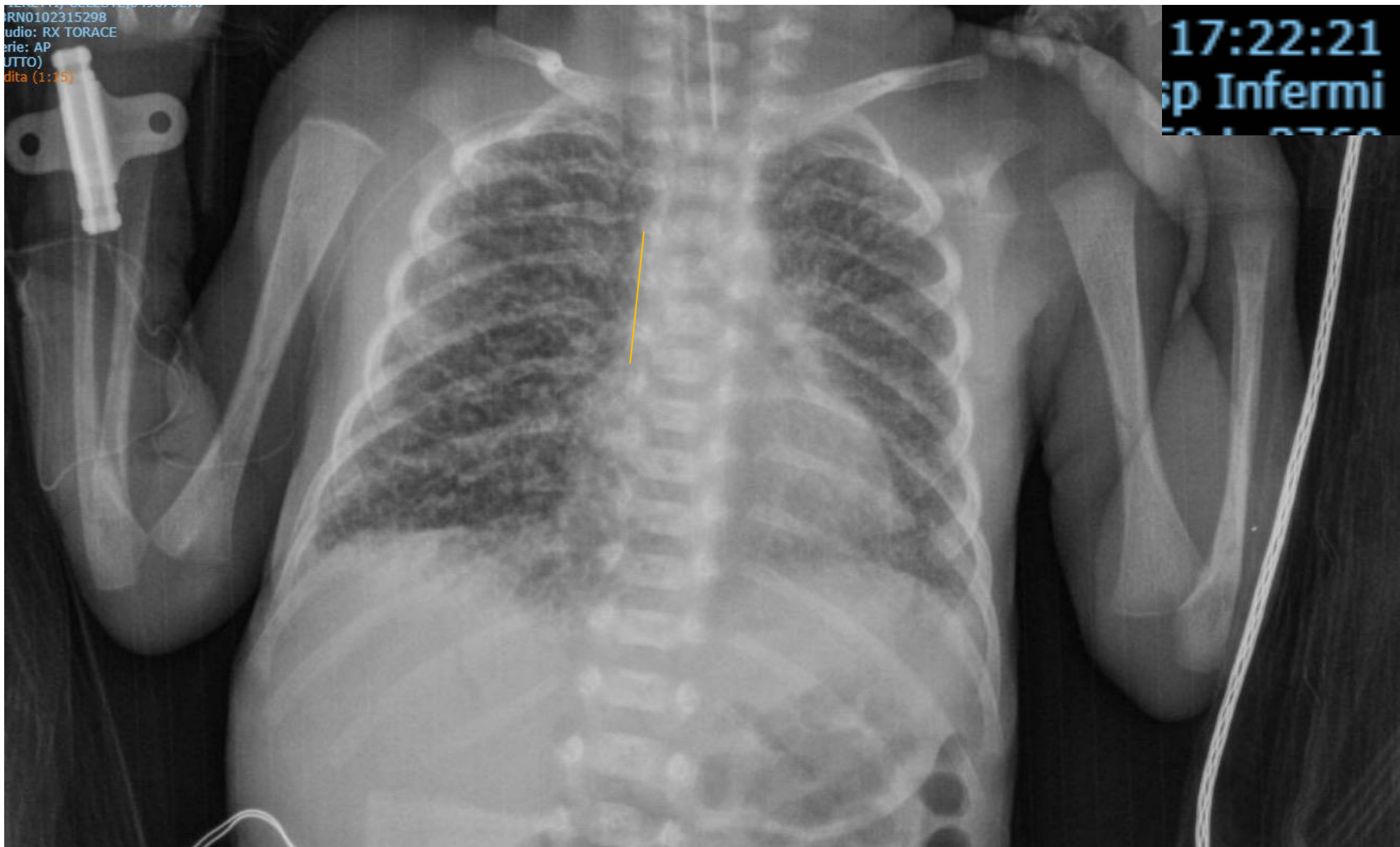


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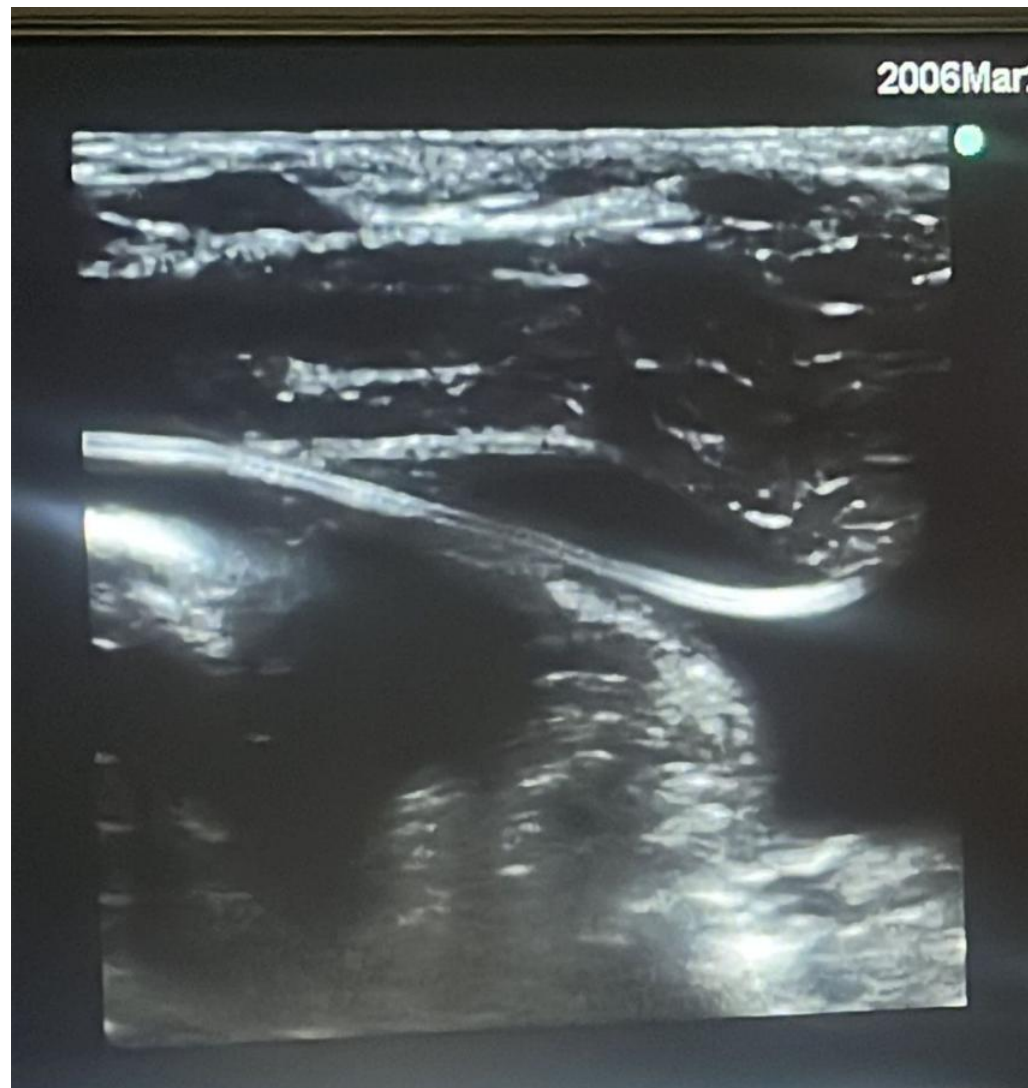
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Una precisazione...

- Malposizione secondaria e dislocazione non sono necessariamente associate!
- La dislocazione del tratto esterno del catetere è una forte indicazione a verificare se vi è associata una malposizione della punta del CVC.
- Una malposizione secondaria può avvenire anche in assenza di una dislocazione del tratto esterno (un esempio comune è la malposizione secondaria del CVO).
- Un catetere con una parziale dislocazione del tratto esterno può essere ancora in «zona safe» o possono essere effettuate delle manovre per portarlo in «zona safe»

Agenda

- Quanto ? Incidenza del fenomeno
- Quando? Quando controllare la punta
- Come? Come fare diagnosi di malposizione

Agenda

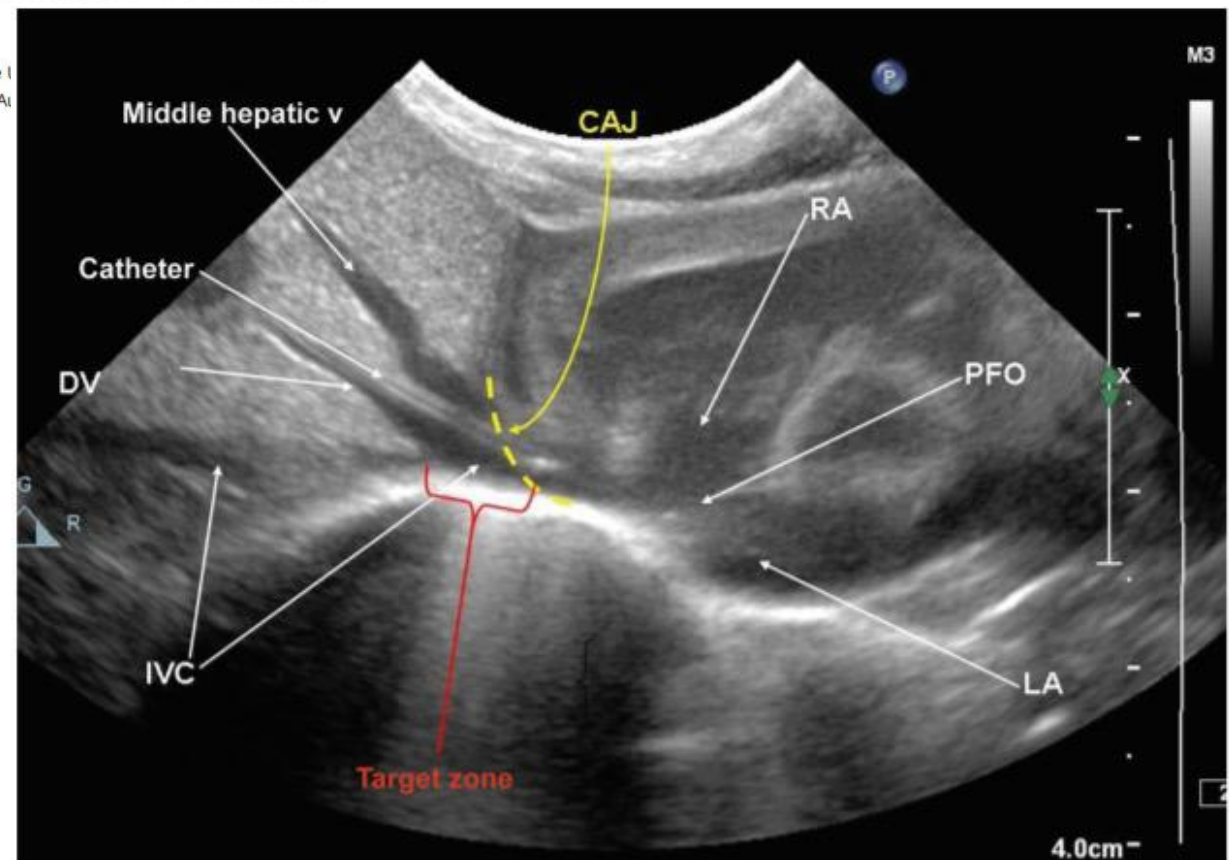
- Quanto ? Incidenza del fenomeno
- Quando? Quando controllare la punta
- Come? Come fare diagnosi di malposizione

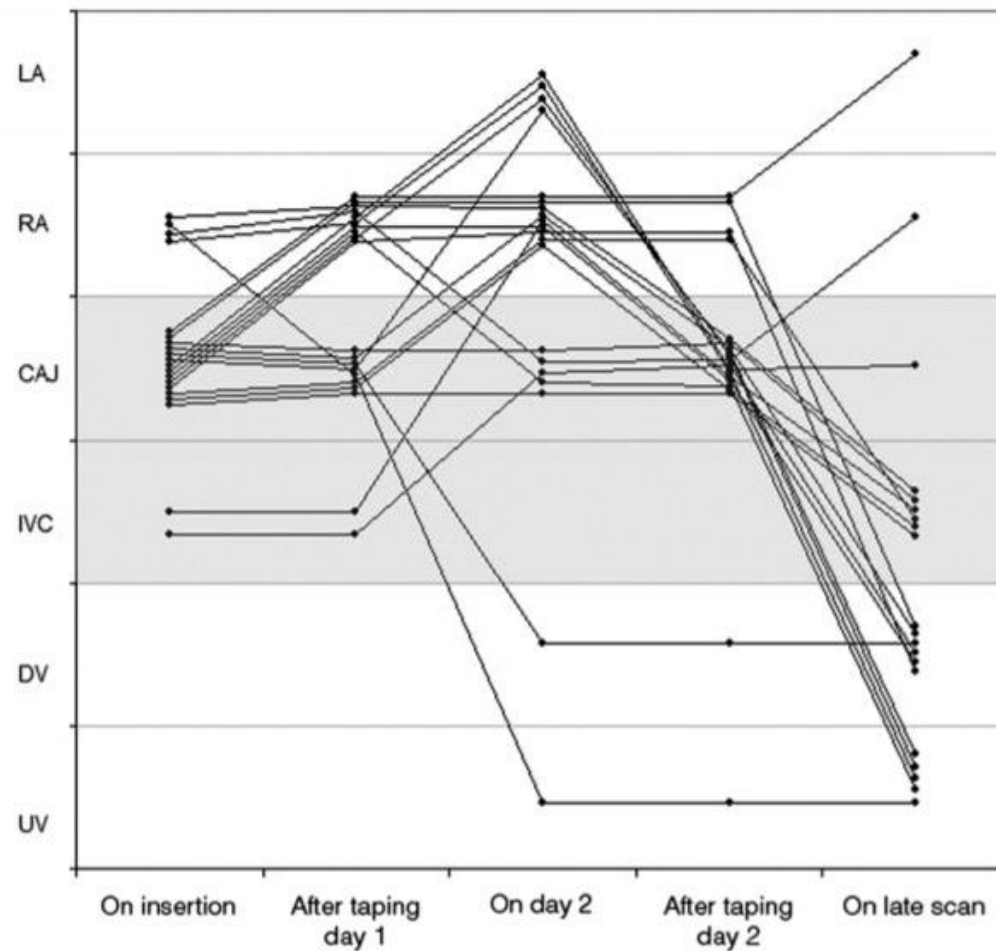
ORIGINAL ARTICLE

Study of movement of umbilical venous catheters over time

Adam Hoellering,¹ Didier Tshamala^{1,2} and Mark W Davies^{1,3}

¹Grantley Stable Neonatal Unit, Royal Brisbane and Women's Hospital, ²Newborn Intensive Care Unit, Royal Brisbane and Women's Hospital, ³Department of Paediatrics and Child Health, University of Queensland, Brisbane, Queensland, Australia





an adjustment in catheter position.²⁰ Despite this, in our study, 65% of catheters were positioned outside of the target zone on the late scan. It would seem prudent, therefore, to regularly assess catheter tip position, with ultrasound if possible. We now recommend that a daily assessment of UVC tip position is made with either an X-ray or an ultrasound scan until it is removed.

Incidenza del fenomeno.. CVO

THE JOURNAL OF PEDIATRICS • www.jpeds.com



ORIGINAL
ARTICLES

Securement of Umbilical Venous Catheter Using Cyanoacrylate Glue: A Randomized Controlled Trial

Vito D'Andrea, MD¹, Giorgia Prontera, MD¹, Giovanni Pinna, MD², Francesco Cota, PhD¹, Simona Fattore, MD¹, Simonetta Costa, PhD¹, Martina Migliorato, MD¹, Giovanni Barone, MD³, Mauro Pittiruti, MD⁴, and Giovanni Vento, MD¹

Objective To evaluate the role of cyanoacrylate glue in reducing dislodgement of umbilical venous catheters (UVCs).

Study design This was a single-center, randomized, controlled, nonblinded trial. All infants requiring an UVC according to our local policy were included in the study. Infants with a UVC with a centrally located tip as verified by real-time ultrasound examination were eligible for the study. Primary outcome was the safety and efficacy of securement by cyanoacrylate glue plus cord-anchored suture (SG group) vs securement by suture alone (S group), as measured by reduction in dislodgment of the external tract of the catheter. Secondary outcomes were tip migration, catheter-related bloodstream infection, and catheter-related thrombosis.

Results In the first 48 hours after UVC insertion, dislodgement was significantly higher in the S group than in the SG group (23.1% vs 1.5%; $P < .001$). The overall dislodgement rate was 24.6% in the S group vs 7.7% in the SG group ($P = .016$). No differences were found in catheter-related bloodstream infection and catheter-related thrombosis. The incidence of tip migration was similar in both groups (S group 12.2% vs SG group 11.7%).

Conclusions In our single-center study, cyanoacrylate glue was safe and effective for securement of UVCs, and particularly effective in decreasing early catheter dislodgments. (*J Pediatr* 2023;260:113517).

Trial registration UMIN-CTR Clinical Trial; Registration number: R000045844.



Incidenza del fenomeno.. CVO

Table IV. Overall tip migration of UVC as evaluated by ultrasound examination at T1/T2/T3

Characteristics	Total	S group	SG group
Tip migration in UVCs without dislodgment (n = 109)	13/109 (11.9)	6/49 (12.2)	7/60 (11.7)
Tip location by ultrasound examination			
Intracardiac	9 (8.3)	5 (10.2)	4 (6.6)
Intrahepatic	4 (3.7)	1 (2)	3 (5)
Tip migration in all UVCs (n = 130)	31/130 (23.8)	19/65 (29.2)	12/65 (18.5)
Tip location by ultrasound examination			
Intracardiac	12 (9.2)	8 (12.3)	4 (6.2)
Intrahepatic	19 (14.6)	11 (8.5)	8 (12.3)

Incidenza del fenomeno.. ECC

Migration of Central Venous Catheters in Neonates: A Radiographic Assessment

Ruby Gupta, MD¹ Amy L. Drendel, DO, MS² Raymond G. Hoffmann, PhD³ Carla V. Quijano, MD⁴
Michael R. Uhing, MD¹

Line type	N	Migration 1 h	Migration 24 h
		% (n) (95% CI)	% (n) (95% CI)
UVC	41	36% (15) (21–51%)	23% (9) (9–36%)
PICC (total)	63	23% (15) (12–33%)	11% (7) (3–18%)
UE PICC	25	28% (7) (10–46%)	28% (7) (10–46%)
LE PICC	38	21% (8) (7–38%)	0

Incidenza del fenomeno.. ECC

Migration Patterns of Peripherally Inserted Central Venous Catheters at 24 Hours Postinsertion in Neonates

Hari B. Srinivasan, MD¹ Ansel Tjin-A-Tam, MD¹ Rupernina Galang, RN¹ Alan Hecht, MD²
Gopal Srinivasan, MD¹

Table 1 Migration patterns of peripherally inserted central venous catheter at 24 hours after insertion

Insertion site	Number	Inferior medial migration (toward the heart)	Lateral migration (away from the heart)	No migration
Basilic vein	76	27 (35.5%)	11 (14.5%)	38 (50%)
Cephalic vein	19	4 (21.1%)	3 (15.8%)	12 (63.1%)
Saphenous vein	5	0	0	5 (100%)
Total	100	31 (31%)	14 (14%)	55 (55%)

COMITATO ETICO CAMPANIA 3

(Costituito con Delibera della Giunta Regionale Campania n. 224 del 27.04.2023)

SEGRETERIA COMITATO ETICO CAMPANIA 3

TEL. 081.7473312- 081.7462596 / CELL.3312642920

EMAIL: segreteria@comitatoeticofedericoiicardarelli.it

Titolo: *“La tip location ecografica dei cateteri epicutaneo-cavali applicata alla valutazione della migrazione della punta: uno studio multicentrico”*

Promotore: Dipartimento di Scienze Mediche Traslazionali

Sede di Sperimentazione: UOC Neonatologia e Terapia Intensiva Neonatale

Responsabile della Sperimentazione: Prof. Francesco Raimondi

Incidenza del fenomeno.. CICC e FICC

- 345 neonati. **Tutti cateteri stabilizzati con Securacath**
- Nessuna complicanza al momento dell'impianto.
- Rimozione elettiva del dispositivo nel 98% dei casi.
- Incidenza di CRBSI 0.3/1000 giorni catetere.
- Nessun caso di trombosi o **migrazione del catetere.**

SIC-Ped
Safe Insertion of Central
access in Pediatric patient

- Centrally inserted central catheters in preterm neonates with weight below 1500 g by ultrasound-guided access to the brachio-cephalic vein. *JVA* 2021. doi: 10.1177/1129729820940174
- Securement of central venous catheters by subcutaneously anchored suturless devices in neonates. *JMFNM* 2021. doi: 10.1080/14767058.2021.1922377
- The intracavitary ECG method for tip location of ultrasound-guided centrally inserted central catheter in neonates. *JVA* 2022. doi: 10.1177/11297298211068302
- A GAVeCeLT bundle for central venous catheterization in neonates and children: A prospective clinical study on 729 cases. *JVA* 2022. <https://doi.org/10.1177/11297298221074472>



Incidenza del fenomeno

- La malposizione secondaria è un fenomeno comune soprattutto nei CVO e nei cateteri ECC.
- La reale incidenza può essere sottostimata (radiologia vs eco).
- Non esistono dati sulla incidenza post-introduzione dei nuovi standard di stabilizzazione «secure & protect».

Agenda

- Quanto ? Incidenza del fenomeno
- Quando? Quando controllare la punta
- Come? Come fare diagnosi di malposizione

A novel neonatal procedure for the insertion of Umbilical Venous Catheters (SIUVeC): Minimizing malposition and managing complications

Giovanni Barone¹ , Mauro Pittini¹, Gina Ancora¹ and Vito D'Andrea¹

Table 1. The eight steps of the procedure

Pre-procedural evaluation (including ultrasound-guided cannulation).
Adoption of pre-assembled insertion kits.
Appropriate aseptic technique (use of 70% isopropyl alcohol).
Vein cannulation using the smallest possible double lumen UVC.
Real-time tip navigation and tip location confirmation (using ultrasound).
Securement of the catheter and dressing (using transparent membranes).
Post-procedural serial assessment of the catheter tip location.
Early removal of the device (within 48 h).

Post-procedural assessment of tip location

One of the most frequent late complications of UVCs is migration of the catheter tip, which often implies secondary malposition. According to the literature, catheter migration may occur in 50%, 63%, or even in 90% of cases.¹ This event is partly related to the progressive drying of the Wharton jelly, which shortens the umbilical cord dislocating the tip inward; other factors—such as changes in the abdominal or thoracic pressure, inappropriate securement of the catheter, and so on—may also cause secondary malposition.

Though the prevention of this complication may be difficult or impossible, its early diagnosis is strongly recommended. This can be achieved by repeated post-procedural assessment of the position of the tip using US. Early diagnosis is crucial for preventing the severe complications due to secondary malposition (such as cardiac tamponade, hepatic lesions, venous thrombosis, and so on).

At present, the timing of such post-procedural US assessment is not well defined. Though, on the basis of the timing and incidence of catheter migration reported in several studies, we suggest a first US assessment 24–48 h after insertion and a second assessment at 72–96 h.^{1,23}

chlorhexidine in 70%

dely between single versus

e glue, semipermeable

The SIECC protocol bundle to minimize complications related to epicutaneous catheter placement in neonates

Vito D'Andrea¹ , Mauro Pittini²,
Gianni Vento¹ and Giovanni Bazzani¹

Table 1. The seven steps of the SIECC protocol

1. Pre-procedural evaluation of the patient
2. Adoption of pre-assembled catheter
3. Appropriate aseptic technique (hand hygiene, isopropyl alcohol)
4. Intra-procedural assessment of catheter placement
5. Securement of the catheter
6. Post-procedural serial assessment of catheter placement
7. Removal of the device within 24–48 h

Post-procedural serial assessments of tip location by ultrasound

Secondary malposition due to migration of the tip is a common problem within the first 24–48 h after placement of an ECC, and its incidence may be as high as 35%–47%.³¹ This phenomenon is often attributed to micro-movements during dressing changes or to spontaneous movements of the limbs. While prevention is difficult, early diagnosis of tip migration is feasible and easy, by checking regularly the position of the tip in the post-procedural days, with serial ultrasound scans. This proactive assessment should include a complete ultrasound study of the cava veins, and of the pericardial sac, and it may be crucial to prevent serious complications associated with secondary malposition, such as cardiac tamponade,³² thrombosis, etc.

At present, the timing of such post-procedural US assessment is not well defined. Though, on the basis of the timing and incidence of catheter migration reported in several studies, we suggest a first US assessment 24–48 h after insertion and a second assessment after 1 week.³³ Post-procedural assessment of tip location should also be considered after any dressing change. Regular monitoring and proactive assessments through ultrasound scans play a crucial role in preventing complications related to catheter migration.

chlorhexidine in 70%

(HOTIP protocol)

Agenda

- Quanto ? Incidenza del fenomeno
- Quando? Quando controllare la punta
- Come? Come fare diagnosi di malposizione

Neo Echo Tip protocol

Table I. Summary of Neo-ECHO tip.

Catheter	Protocol	Probe	Windows
UVC	Tip navigation	Small sectorial probe, 7–8 MHz	Low subcostal longitudinal view
	Tip location	Small sectorial probe, 7–8 MHz	Subcostal longitudinal view
ECCs inserted via veins of the scalp or of the upper limbs	Tip navigation	Linear “hockey stick” probe, 10–14 MHz	Acoustic windows of RaCeVA and RaPeVA
	Tip location	Small sectorial probe, 7–8 MHz	Bi-caval view; four-chamber apical view; long axis view of SVC
ECCs inserted via veins of the lower limbs	Tip navigation	Linear “hockey stick” probe, 10–14 MHz	Short and long axis view of the femoral vein
	Tip location	Small sectorial probe, 7–8 MHz	Subcostal longitudinal view
CICC	Tip navigation	Linear “hockey stick” probe, 10–14 MHz	Acoustic windows of RaCeVA
	Tip location	Small sectorial probe, 7–8 MHz	Bi-caval view; four-chamber apical view; long axis view of SVC
FICC	Tip navigation	Linear “hockey stick” probe, 10–14 MHz and small sectorial probe	Short and long axis view of the femoral vein and subcostal longitudinal view
	Tip location	Small sectorial probe, 7–8 MHz	Subcostal longitudinal view

UVC: umbilical venous catheter; ECC: epicutaneo-caval catheter; RaCeVA: rapid central vein assessment; RaPeVA: rapid peripheral vein assessment; CICC: centrally inserted central catheter; FICC: femoral inserted central catheter.



Neo Echo Tip protocol per la malposizione secondaria del CVO

Table I. Summary of Neo-ECHO tip.

Catheter	Protocol	Probe	Windows
UVC	Tip navigation	Small sectorial probe, 7–8 MHz	Low subcostal longitudinal view
	Tip location	Small sectorial probe, 7–8 MHz	Subcostal longitudinal view

Procedura:

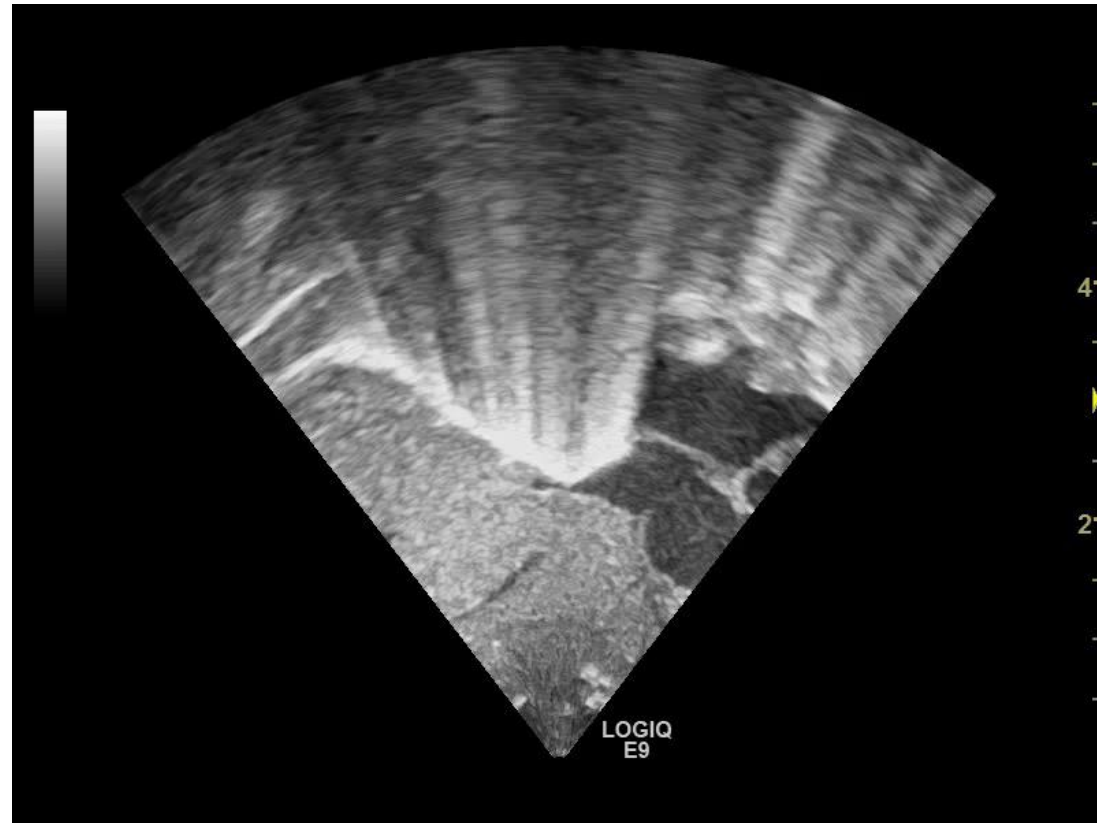
Valutazione della zona target alla giunzione tra VCI e atrio di destra.

In caso di catetere non visibile ruotare la sonda in senso orario per visualizzare meglio la membrana della fossa ovale e l'atrio di sinistra.

In caso di catetere non visibile eseguire un flush rapido di soluzione fisiologica da 0.5-1 ml.

Neo-ECHOTIP TIP-Location





Neo Echo Tip protocol per la malposizione secondaria del CVO

Table I. Summary of Neo-ECHO tip.

Catheter	Protocol	Probe	Windows
UVC	Tip navigation	Small sectorial probe, 7–8 MHz	Low subcostal longitudinal view
	Tip location	Small sectorial probe, 7–8 MHz	Subcostal longitudinal view

Procedura:

Valutazione del percorso intraepatico del CVO in senso inverso.

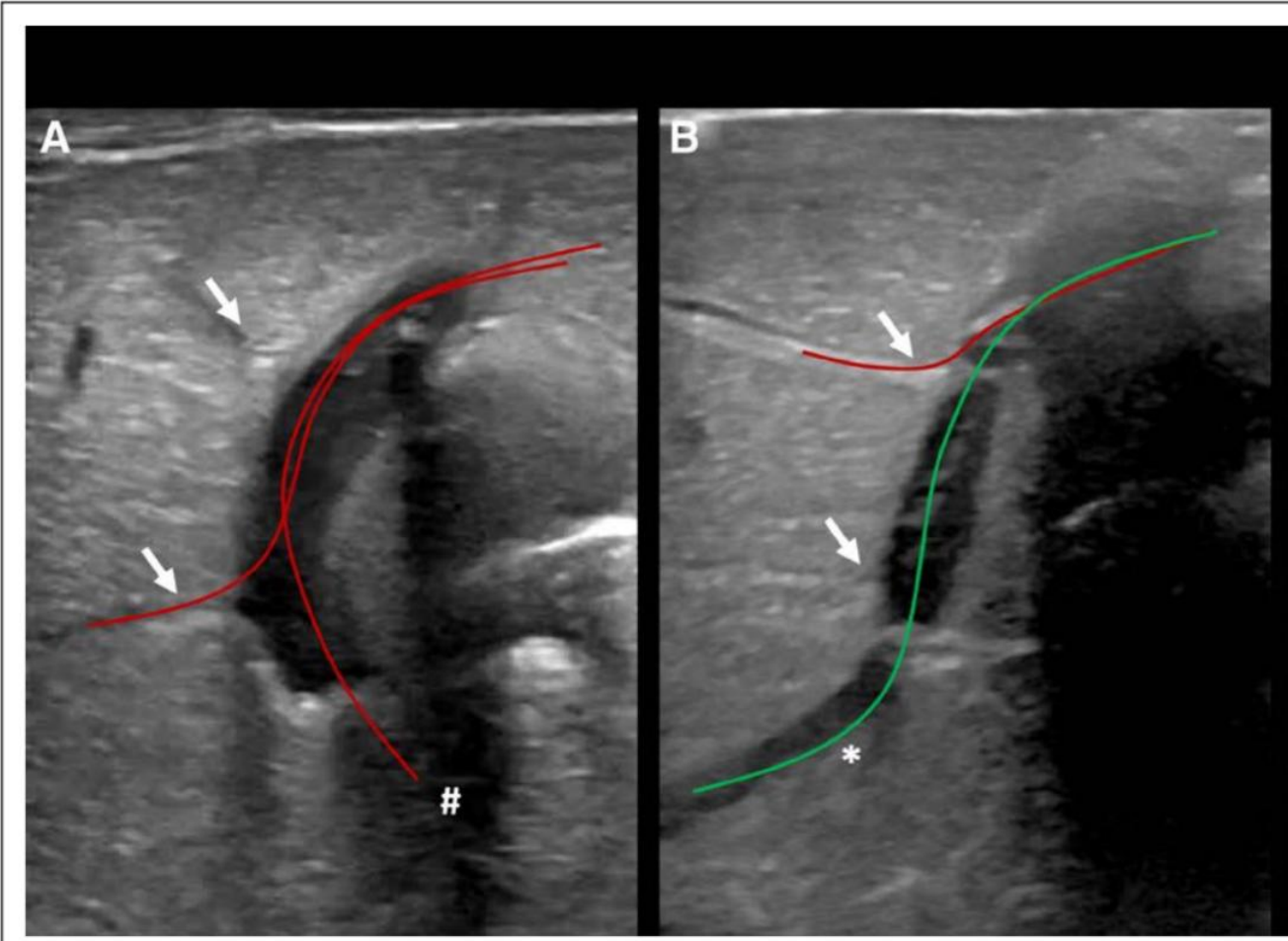
Vena cava inferiore-> Dotto venoso di Aranzio-> Recesso ombelicale-> Rami portalì (destro e sinistra)-> Vena ombelicale.

In caso di catetere non visibile eseguire un flush rapido di soluzione fisiologica da 0.5-1 ml.

Neo-ECHOTIP TIP-Navigation







4a4k.1L hEZdbslHn4XMi0hc

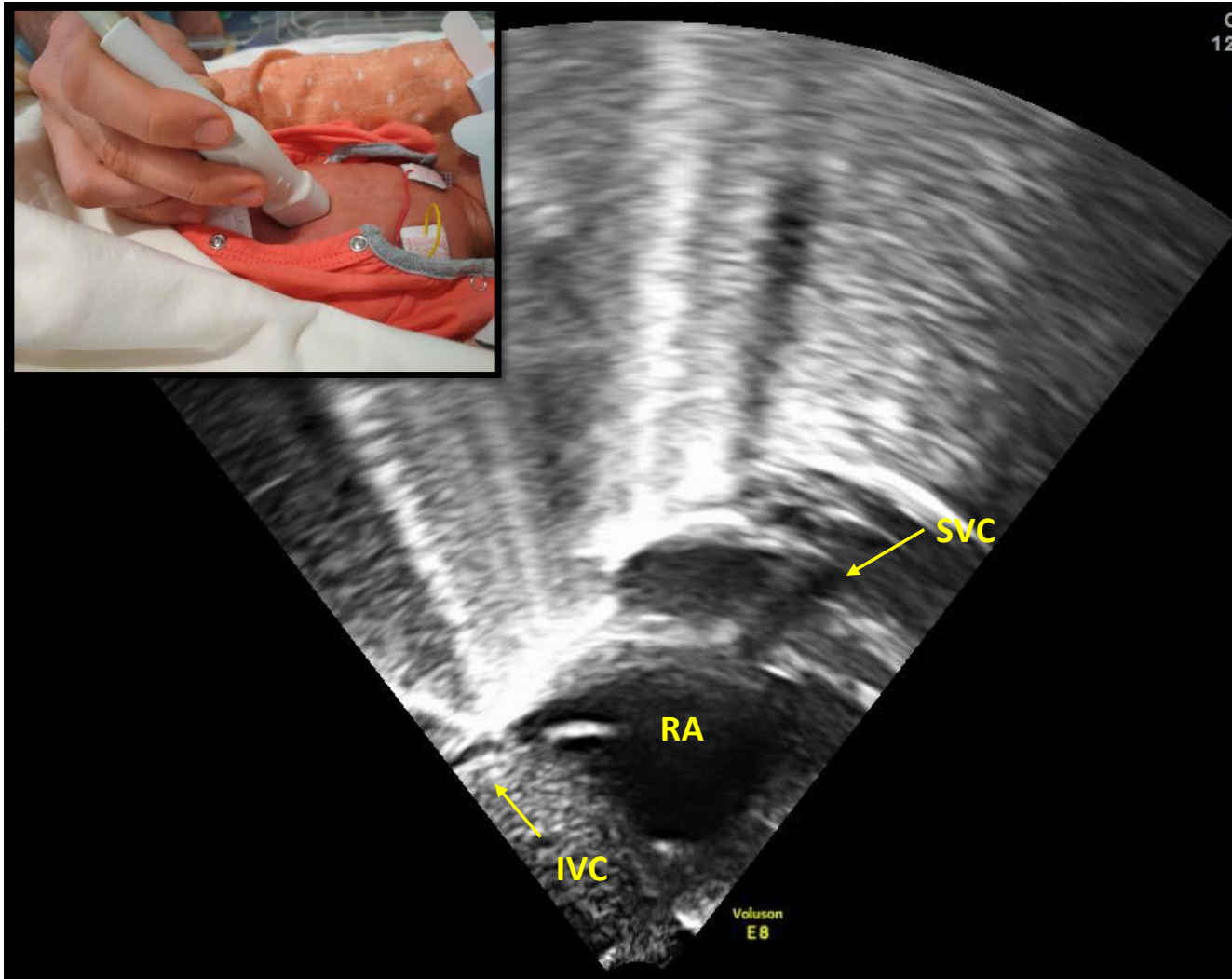
Neo Echo Tip protocol per la malposizione secondaria dell'ECC proveniente dagli arti superiori

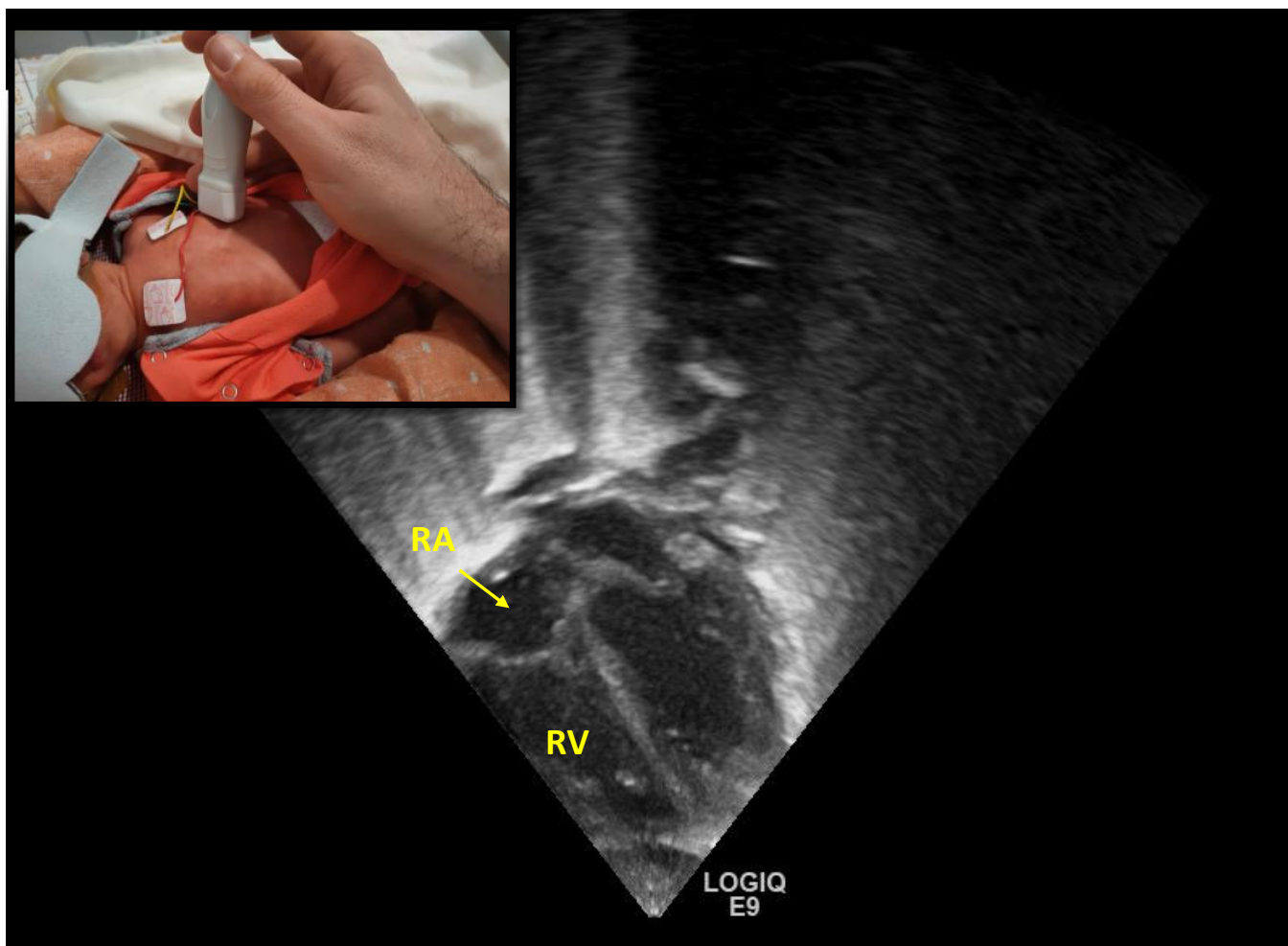
Table I. Summary of Neo-ECHO tip.

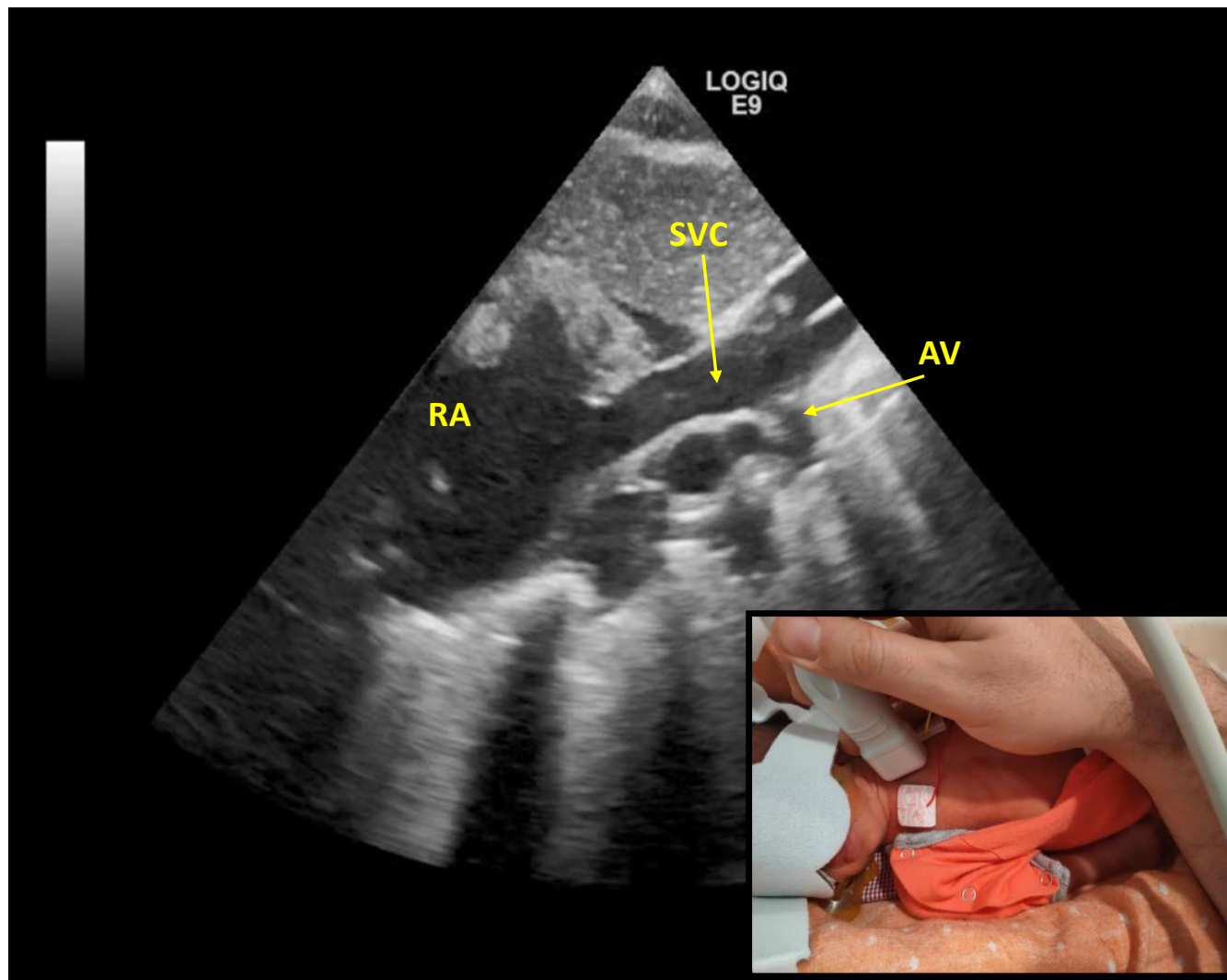
Catheter	Protocol	Probe	Windows
ECCs inserted via veins of the scalp or of the upper limbs	Tip navigation	Linear “hockey stick” probe, 10–14 MHz	Acoustic windows of RaCeVA and RaPeVA
	Tip location	Small sectorial probe, 7–8 MHz	Bi-caval view; four-chamber apical view; long axis view of SVC

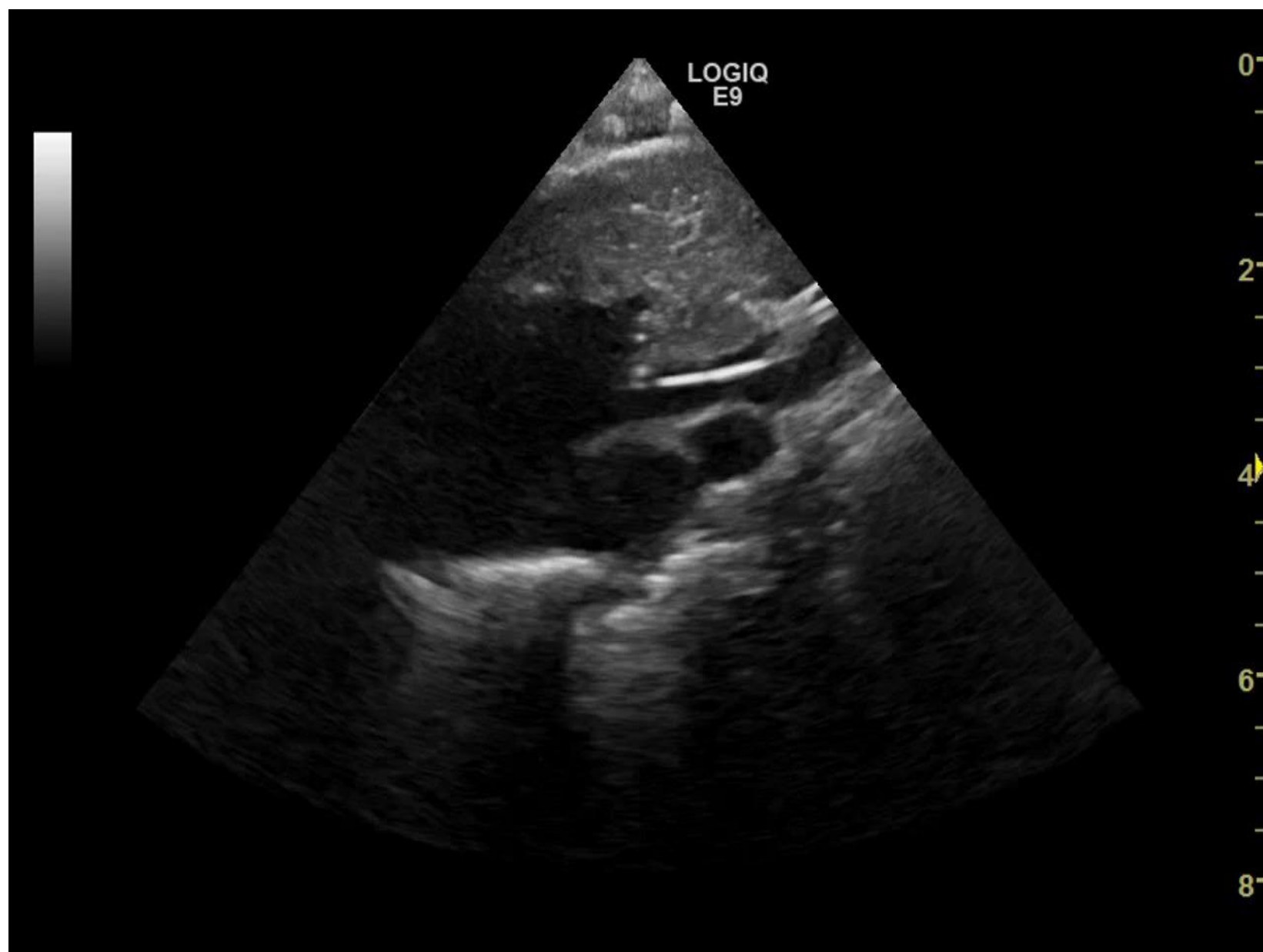
Procedura:

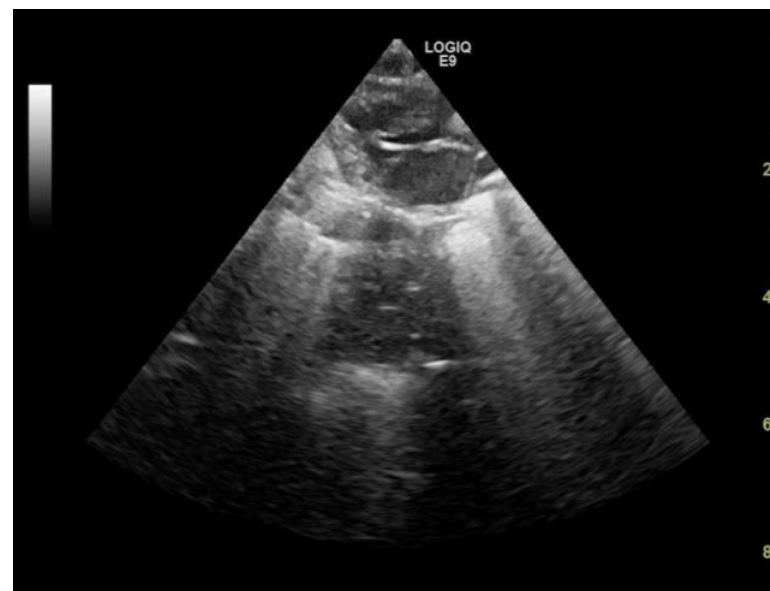
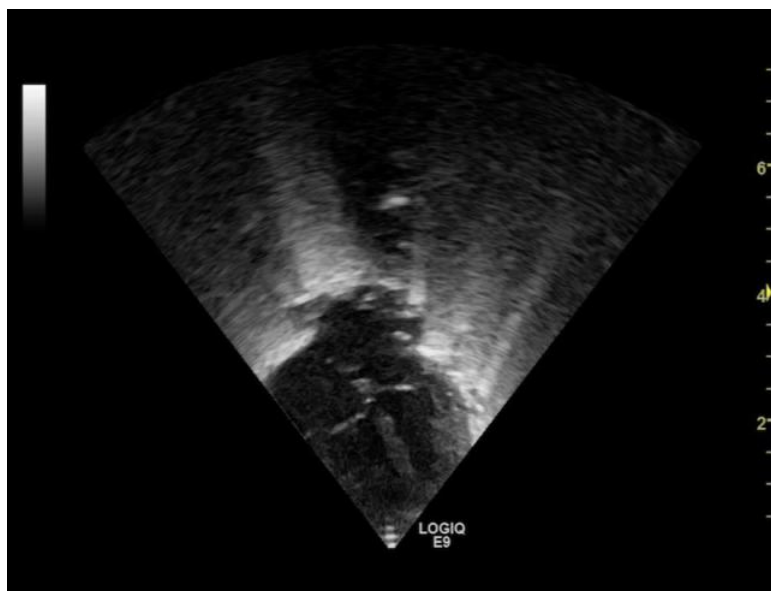
Valutazione della zona target alla giunzione tra VCS e atrio di destra utilizzando tutte e tre le proiezioni. In caso di catetere non visibile eseguire un flush rapido di soluzione fisiologica da 0.5-1 ml.

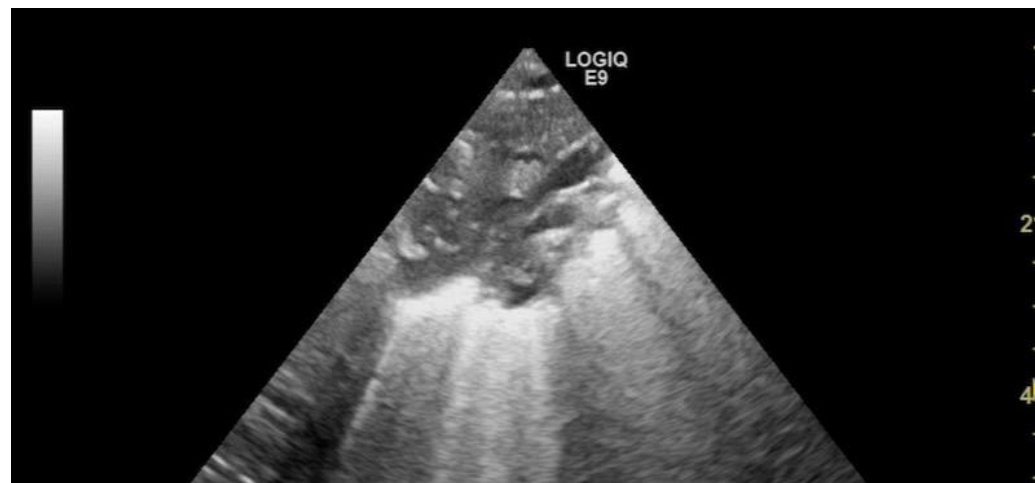
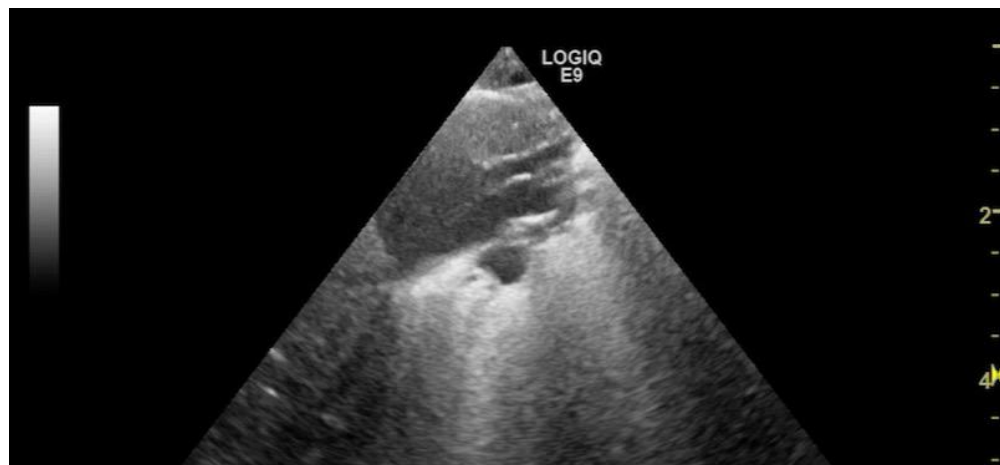












Neo Echo Tip protocol per la malposizione secondaria dell'ECC proveniente dagli arti superiori

Table 1. Summary of Neo-ECHO tip.

Catheter	Protocol	Probe	Windows
ECCs inserted via veins of the scalp or of the upper limbs	Tip navigation	Linear “hockey stick” probe, 10–14 MHz	Acoustic windows of RaCeVA and RaPeVA
	Tip location	Small sectorial probe, 7–8 MHz	Bi-caval view; four-chamber apical view; long axis view of SVC

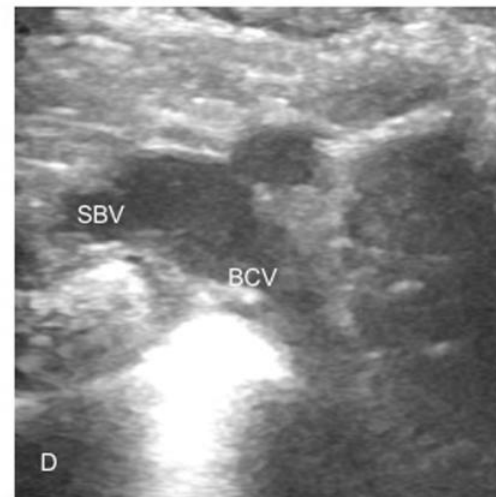
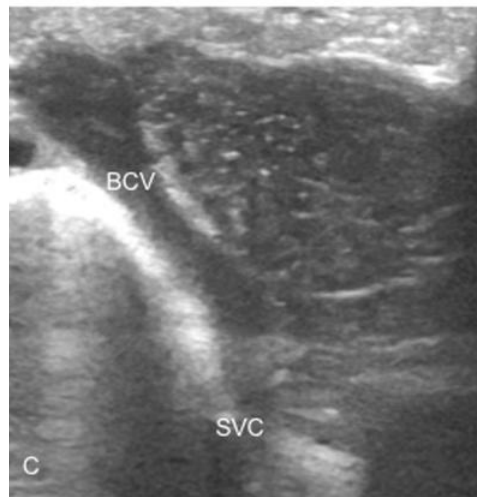
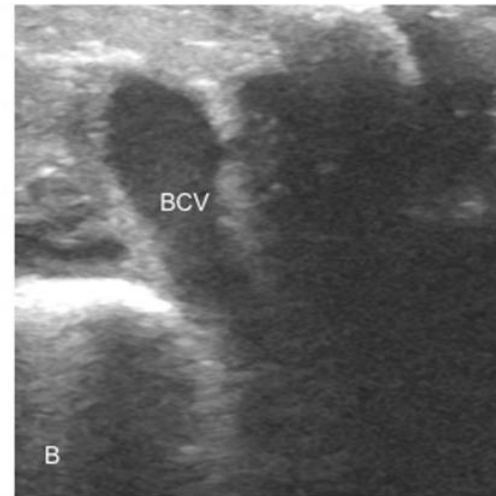
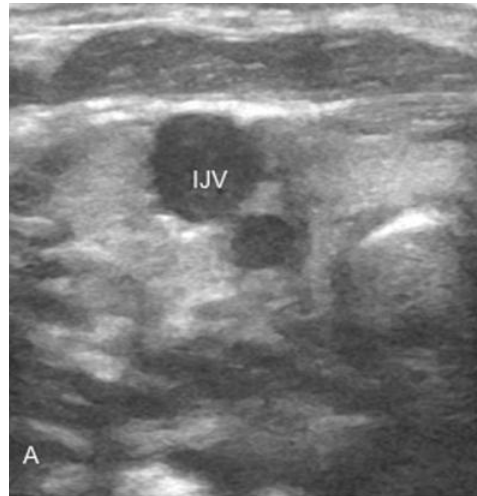
Procedura:

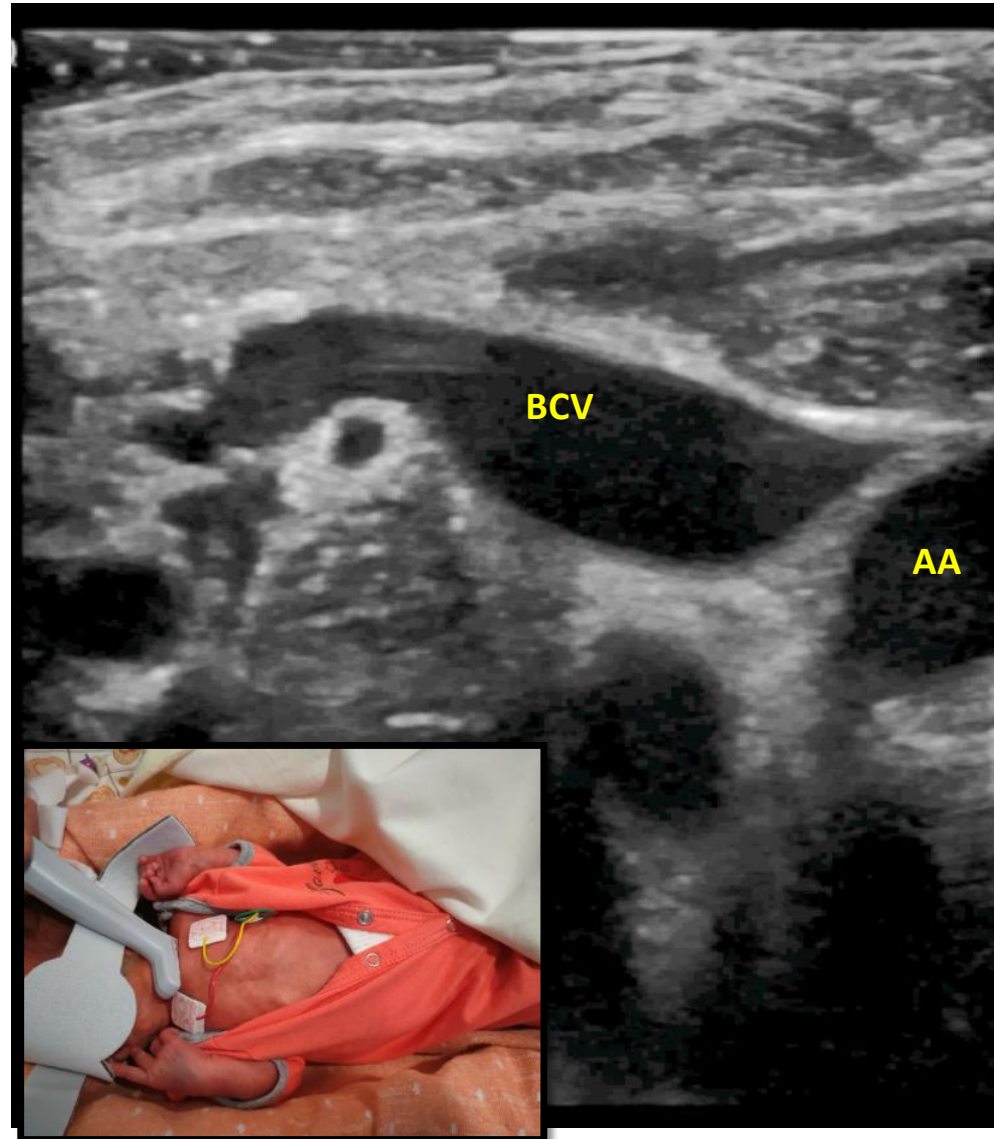
Valutazione del percorso a ritroso del catetere ECC utilizzando le finestre acustiche di RaCeVa e RaPeVa.

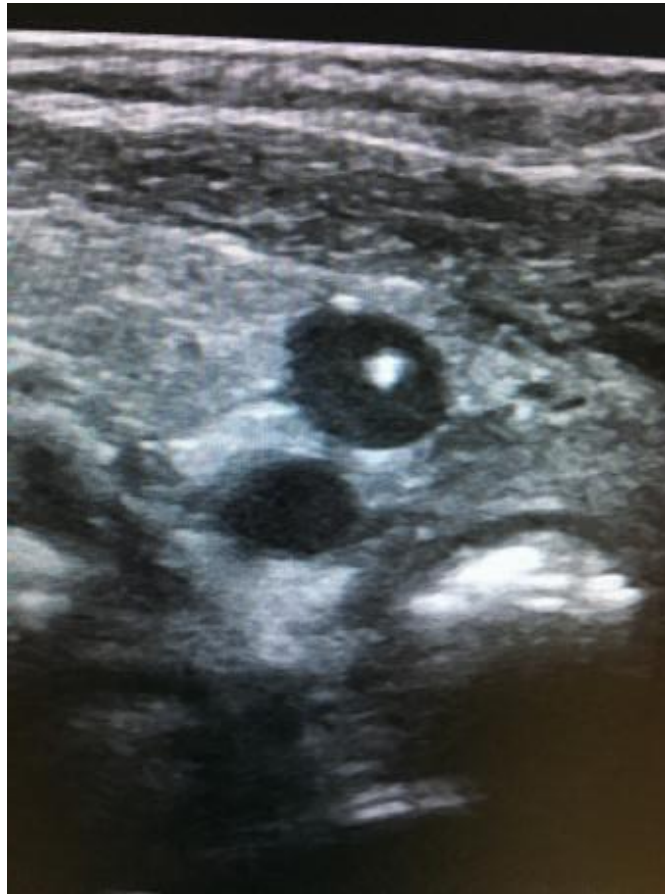
Vena Cava Superiore -> Vena Anonima ipsilaterale -> Vena Anonima controlaterale -> Vena giugulare Interna -> Vena Succlavia-> Vena Ascellare

In caso di catetere non visibile eseguire un flush rapido di soluzione fisiologica da 0.5-1 ml.

RaCeVa

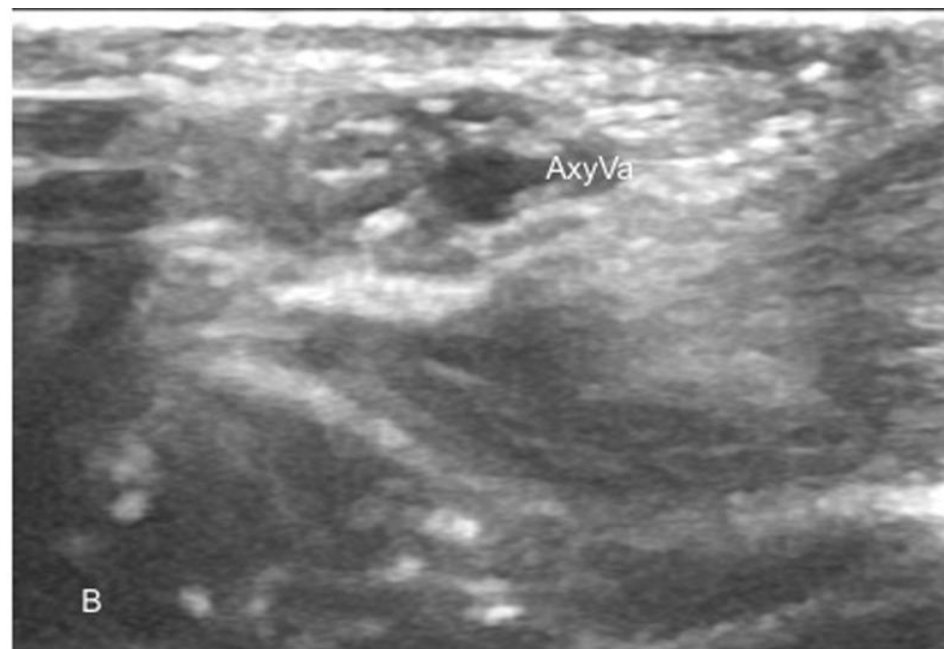
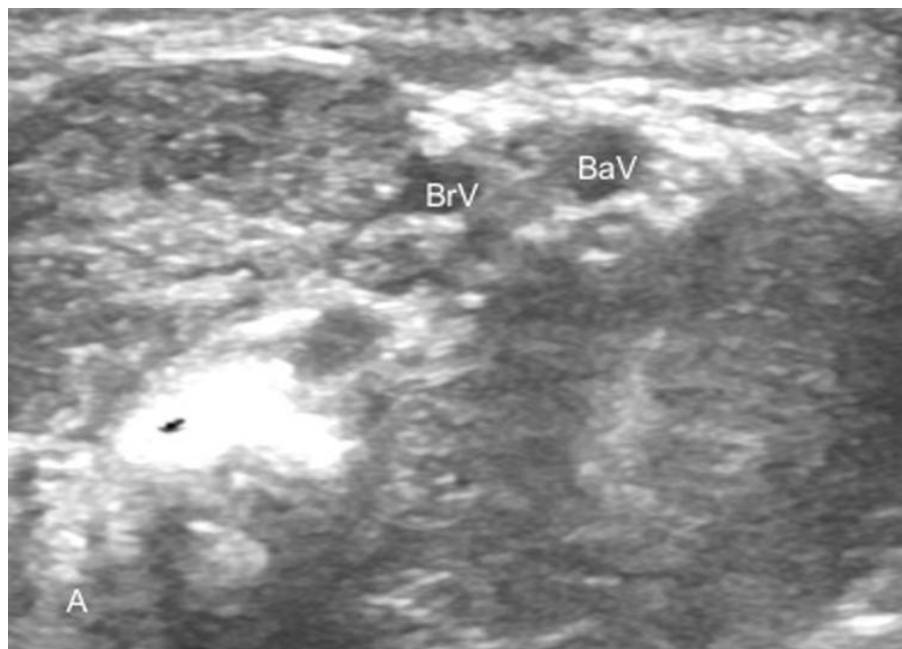








RaPeVa



Neo Echo Tip protocol per la malposizione secondaria dell'ECC proveniente dagli arti inferiori

Table 1. Summary of Neo-ECHO tip.

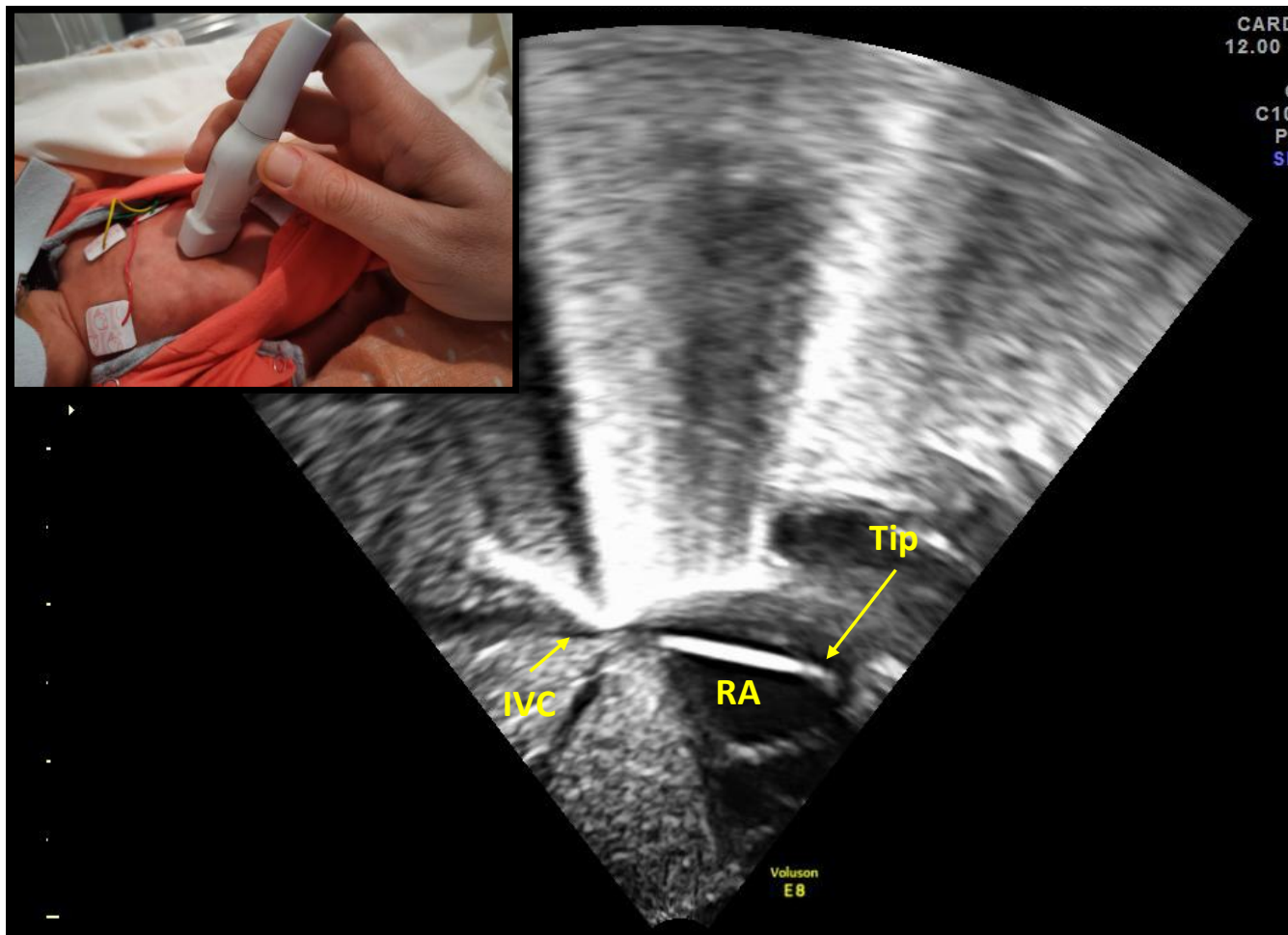
Catheter	Protocol	Probe	Windows
ECCs inserted via veins of the lower limbs	Tip navigation	Linear “hockey stick” probe, 10–14 MHz	Short and long axis view of the femoral vein
	Tip location	Small sectorial probe, 7–8 MHz	Subcostal longitudinal view

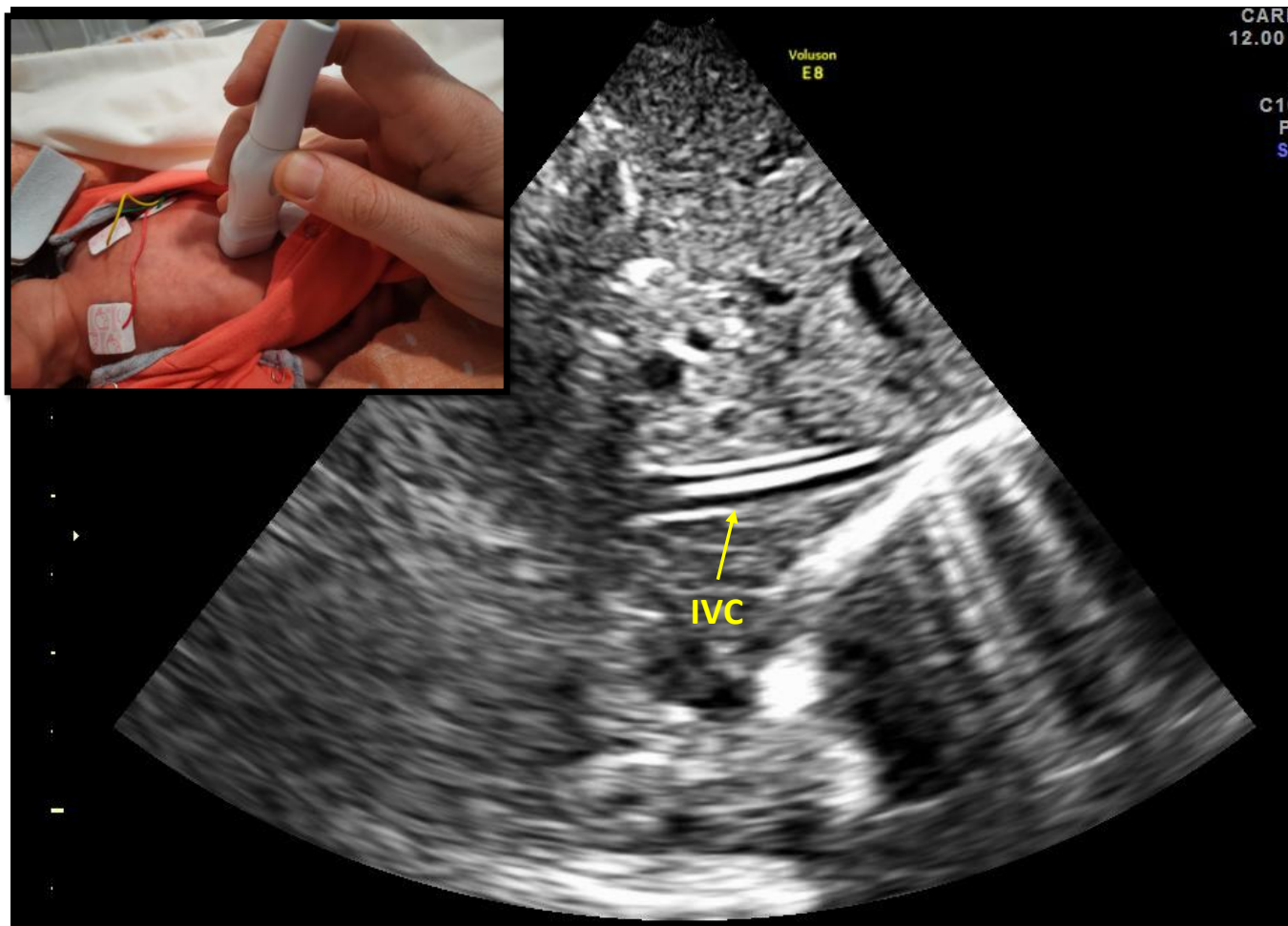
Procedura:

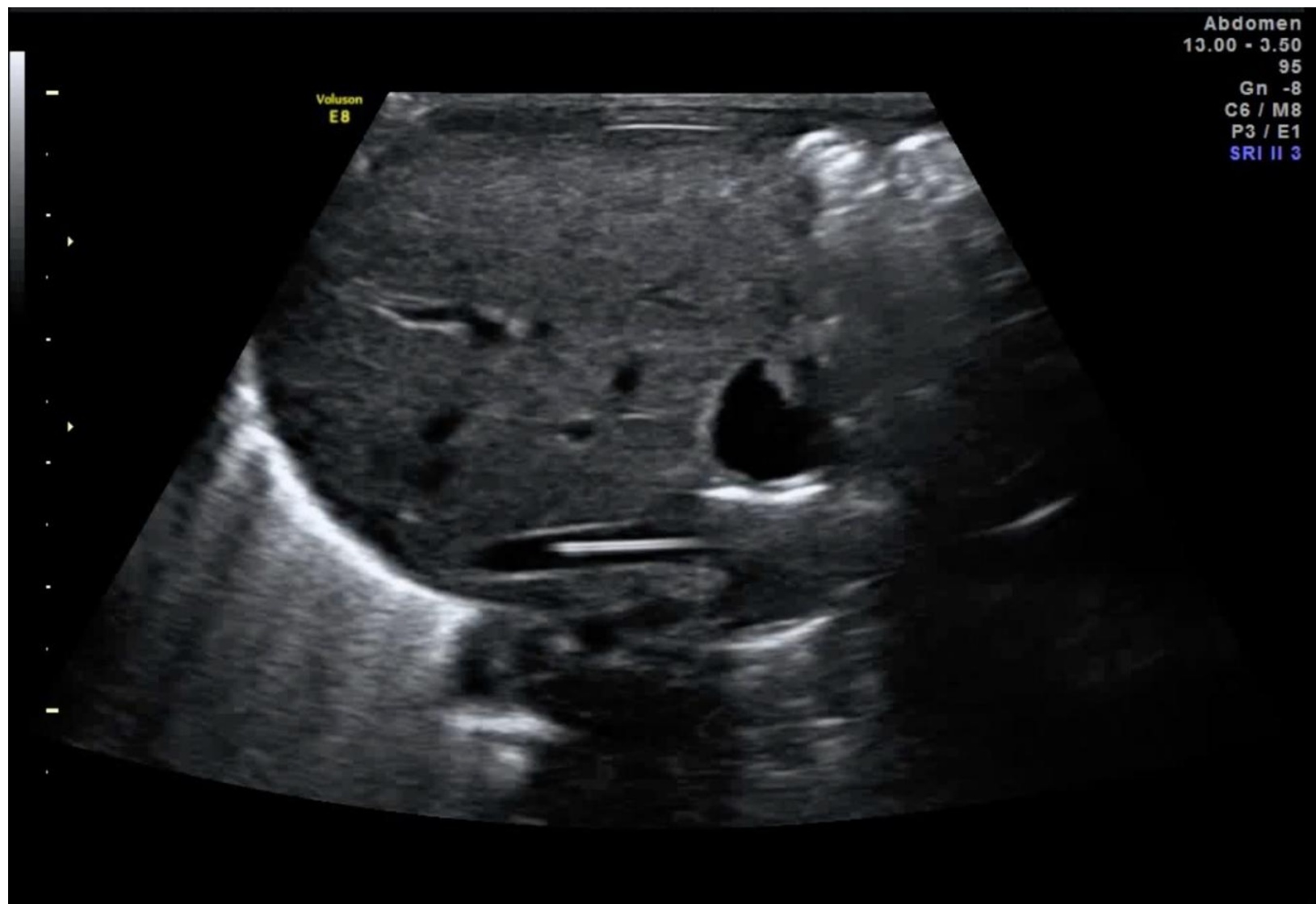
Valutazione della zona target alla giunzione tra VCI e atrio di destra utilizzando la finestra sottocostale bicavale.

In caso di catetere non visibile valutare la VCI attraverso la finestra sottocostale longitudinale oppure attraverso la finestra transepatica.

In caso di catetere non visibile eseguire un flush rapido di soluzione fisiologica da 0.5-1 ml.







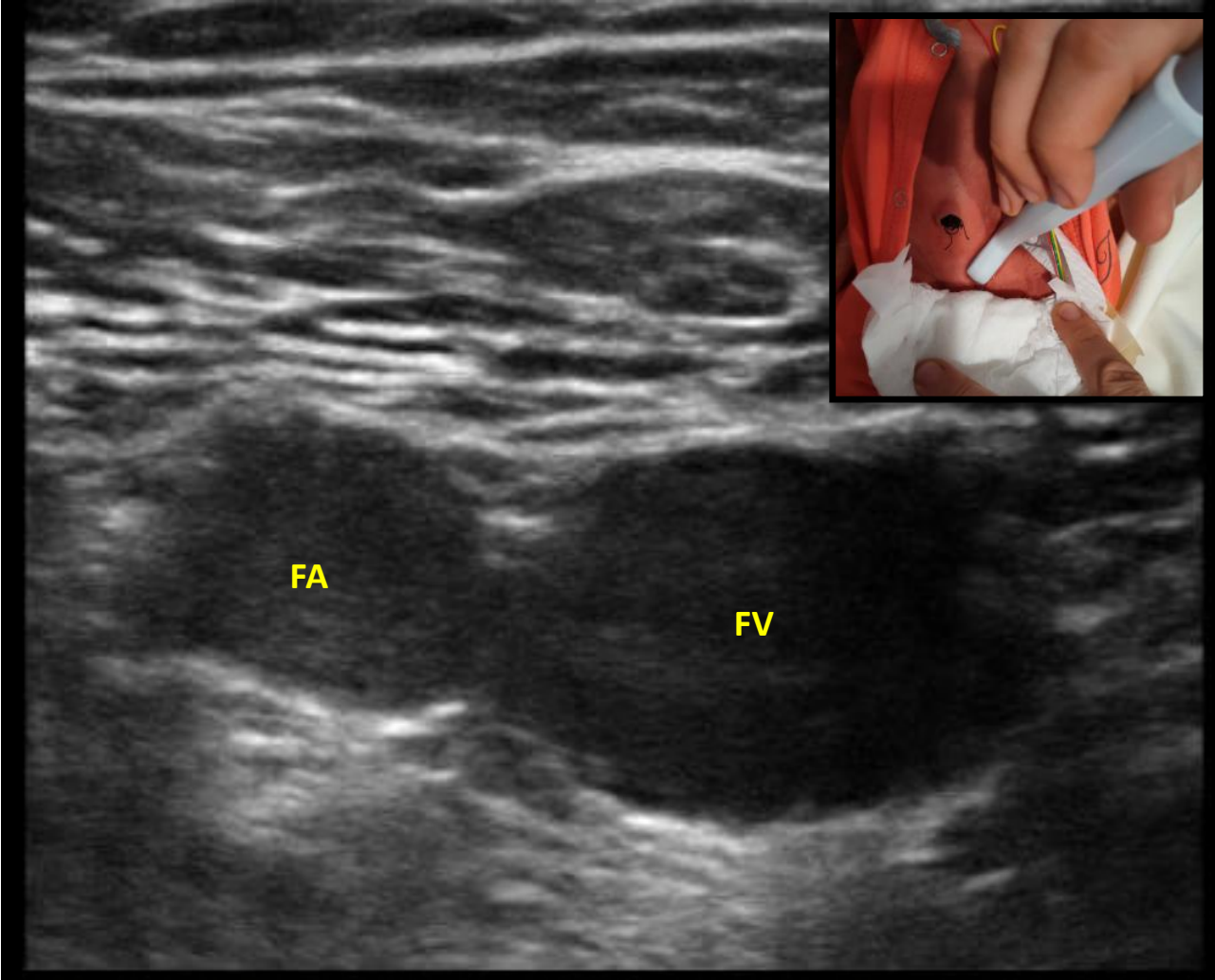
Neo Echo Tip protocol per la malposizione secondaria dell'ECC proveniente dagli arti inferiori

Table I. Summary of Neo-ECHO tip.

Catheter	Protocol	Probe	Windows
ECCs inserted via veins of the lower limbs	Tip navigation	Linear “hockey stick” probe, 10–14 MHz	Short and long axis view of the femoral vein
	Tip location	Small sectorial probe, 7–8 MHz	Subcostal longitudinal view

Procedura:

Valutazione del percorso a ritroso del catetere ECC utilizzando le finestre acustiche del RaFeVa
Vena iliaca> Vena femorale comune-> Vena femorale superficiale e profonda -> Vena safena
In caso di catetere non visibile eseguire un flush rapido di soluzione fisiologica da 0.5-1 ml.



Neo Echo Tip protocol

Table 1. Summary of Neo-ECHO tip.

Catheter	Protocol	Probe	Windows
UVC	Tip navigation	Small sectorial probe, 7–8 MHz	Low subcostal longitudinal view
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ECCs inserted via veins of the lower limbs	Tip navigation	Linear “hockey stick” probe, 10–14 MHz	Short and long axis view of the femoral vein
	Tip location	Small sectorial probe, 7–8 MHz	Subcostal longitudinal view
CICC	Tip navigation	Linear “hockey stick” probe, 10–14 MHz	Acoustic windows of RaCeVA
	Tip location	Small sectorial probe, 7–8 MHz	Bi-caval view; four-chamber apical view; long axis view of SVC
FICC	Tip navigation	Linear “hockey stick” probe, 10–14 MHz and small sectorial probe	Short and long axis view of the femoral vein and subcostal longitudinal view
	Tip location	Small sectorial probe, 7–8 MHz	Subcostal longitudinal view

UVC: umbilical venous catheter; ECC: epicutaneo-caval catheter; RaCeVA: rapid central vein assessment; RaPeVA: rapid peripheral vein assessment; CICC: centrally inserted central catheter; FICC: femoral inserted central catheter.

Conclusioni

- La malposizione secondaria è un fenomeno **frequente** nel neonato.
- Può avvenire in presenza o in assenza di dislocazione del tratto esterno del catetere.
- É raccomandato **un screening ecografico** per l'identificazione precoce.
- Il protocollo Neo-ECHOTIP rappresenta una **procedura standardizzata** che può essere agevolmente impiegata per una diagnosi efficace della **malposizione secondaria**.
- La maggior parte delle finistre acustiche sono **semplici** da realizzare e richiedono solo un **minimo training**.

