



**GAVe
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2025
MILANO 12-13
maggio**

***Prevenzione, diagnosi e trattamento
della tip migration dei cateteri
epicutaneo cavali e dei cateteri venosi
ombelicali ombelicali***

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Prevenzione, diagnosi e trattamento della tip
migration dei cateteri epicutaneo cavali e dei
cateteri venosi ombelicali ombelicali

Catheters migration

Editorial

JVA | Vascular Access

An Italian expert consensus on the choice of the method of tip location for central venous access devices

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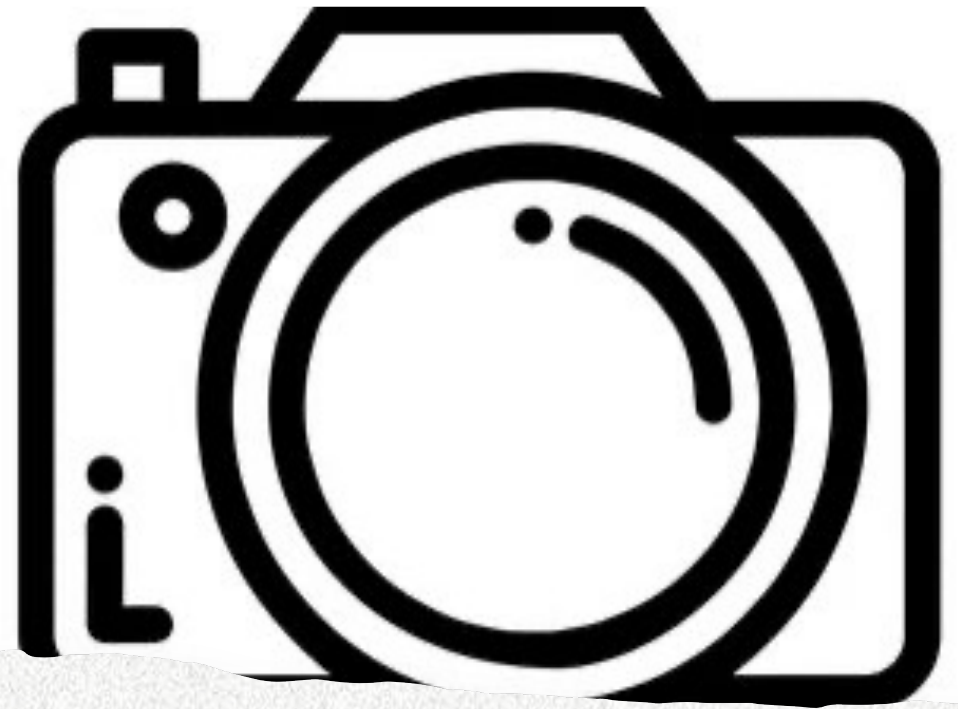
Vincenzo Faraone¹, Mauro Pittiruti², Maria Giuseppina Annetta³,
Giovanni Barone⁴, Fabrizio Brescia⁵, Maria Calabrese⁶,
Antonella Capasso⁷, Giuseppe Capozzoli⁸, Vito D'Andrea⁹,
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and Daniele G Biasucci²⁰



Tip migration

- **Malposizione secondaria della punta del catetere che si ritrova in posizione differente rispetto alla tip location iniziale senza variazioni della porzione extravascolare diverso da**
- **Malposizione primaria della punta catetere fuori dalla zona target all'atto del posizionamento**
- **Evento in divenire, in un 'arco temporale non ben determinato**





Non può essere un'istantanea del momento

Rx poco accurata per tip location e malposizionamenti:

- Effetto parallasse
- Posizione degli arti
- Atti del respiro
- Agitazione del neonato

Accuracy of chest radiography compared to ultrasound for positioning the umbilical venous catheter in neonates: A meta-analysis and systematic review Juan Cao, Yuzheng Zhang The Journal of Vascular Access 2023, Vol. 24(5) 1051– 1060

Anche IC-ECG poco accurato per lo studio della migrazione : non esiste un'onda P che possa rilevare minimi spostamenti della punta del catetere

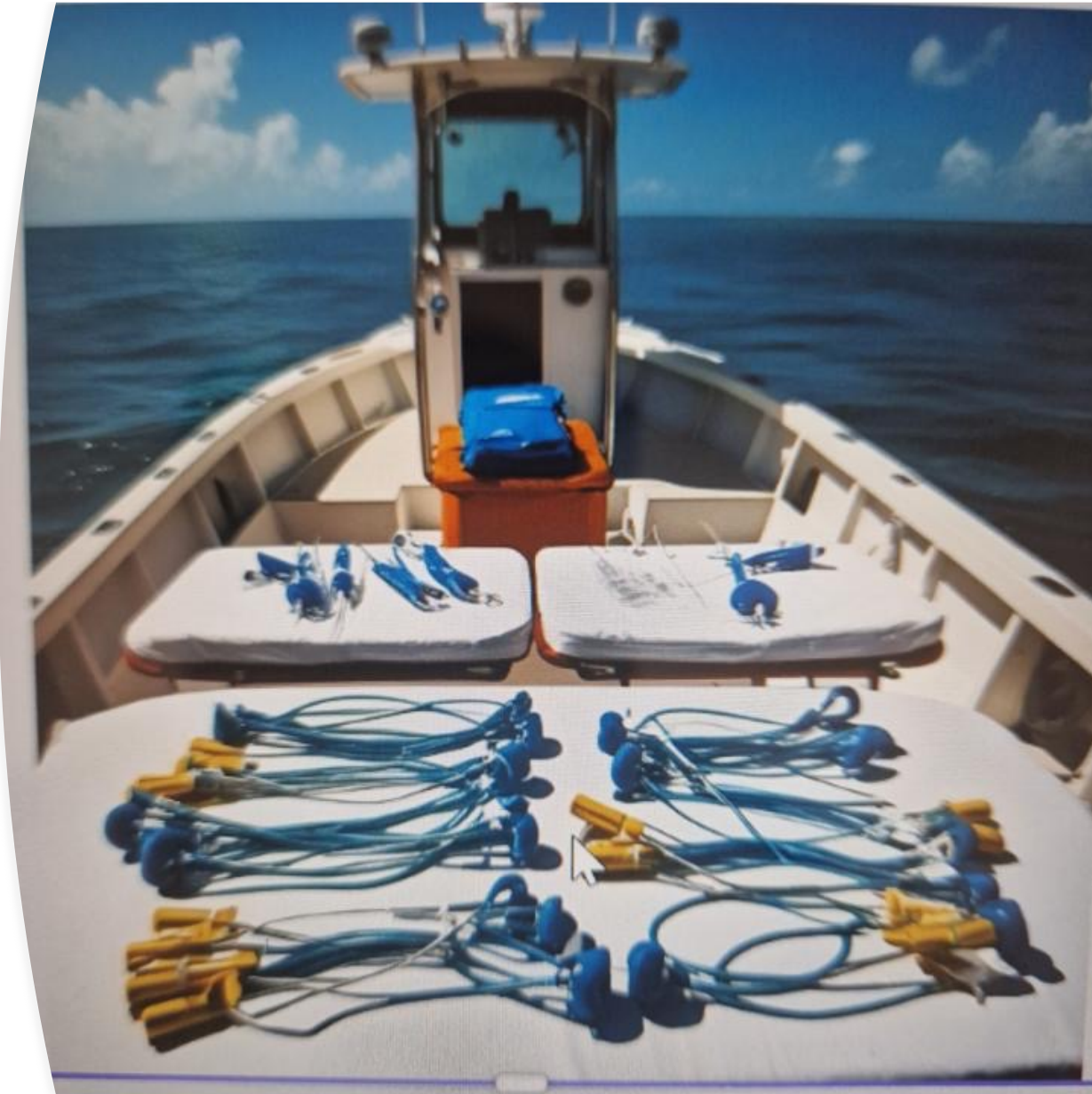
Ecocardiografia corredata da eventuale bubble test unica metodica al momento in grado di monitorare la migrazione

-

Tip migration: tutti i cateteri migrano

CAUSE di migrazione:

- Exit site in regione poco stabile o gelatina di Warthon
- Posizione della punta non centrale
- Lunghezza e materiali del catetere
- Fissaggio inefficace
- Movimenti del flusso sanguigno



UVC MIGRATION :diagnosis

- L'incidenza della migrazione del cvo è stimata fino al 70% in alcuni lavori pubblicati
- Limiti di molti studi : uso dell'Rx per tip location (punta centrale?), mancata standardizzazione del fissaggio
- Rispetto alla migrazione di altri cateteri è una complicanza piu temibile (dislocazione in vasi epatici,in dotto toracico, in atrio dx)
- Fondamentale diagnosi
- ECOcardiografia transtoracica

Neo Echo Tip protocol

Editorial

JVA The Journal of Vascular Access

Neo-ECHOTIP: A structured protocol for ultrasound-based tip navigation and tip location during placement of central venous access devices in neonates

Giovanni Barone¹, Mauro Pittiruti², Daniele G Biasucci³, Daniele Elisei⁴, Emanuele Iacobone⁴, Antonio La Greca², Geremia Zito Marinosci⁵ and Vito D'Andrea⁴

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Table 1. 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.

CVO
dislocato
in sistema
portale



Ultrasound Monitoring of Umbilical Catheters in the Neonatal Intensive Care Unit—A Prospective Observational Study

Alina Sobczak, Aleksandra Dudzik, Piotr Kruczek and Prze



**190 CVO monitorati con eco entro
24 e ogni 2 giorni con eco
68% di dislocazioni entro 24-48h**

- The standard umbilical catheter tip localisation by thoracoabdominal radiograph is very imprecise.
- Only 38% of catheter tips were found to be in optimum position on bedside ultrasound.
- Umbilical catheter tip migration occurs in nearly 50% of infants during first week and warrants close follow-up.

UVC MIGRATION: timing

Franta J, et al. Arch Dis Child Fetal Neonatal 2017 doi:10.1136/archdischild-2016-311202

Catheter tip migration occurred in 29 of 58 infants (50%) at any time during the first week.

Plooi-Lusthusz Migration of Umbilical Venous Catheters. Am J Perinatol. 2019 Nov;36(13):1377-1381. doi: 10.1055/s-0038-1677016. .

Migrazione tra 24 e 36 h associata a mummificazione cordone

UVC MIGRATION: Prevention

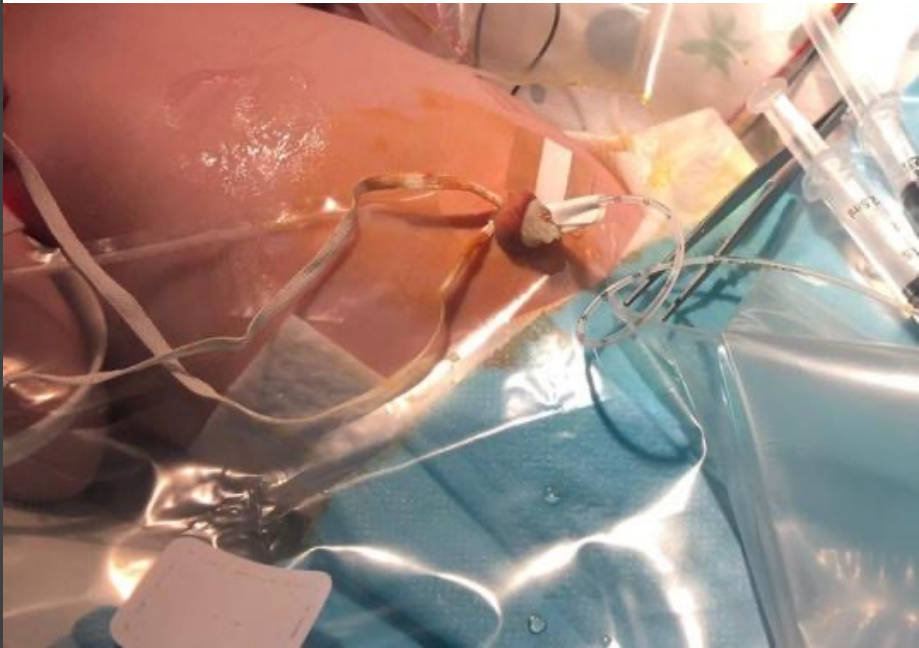
A novel neonatal protocol for Safe Insertion of Umbilical Venous Catheters (SIUVeC): Minimizing complications in placement and management

Arnone¹ , Mauro Pittiruti² , Giorgia Prontera³,
and Vito D'Andrea³ 

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Table 1. The eight steps of the SIUVeC protocol.

Pre-procedural evaluation (including US evaluation).
Adoption of pre-assembled insertion kits.
Appropriate aseptic technique (hand hygiene, maximal barrier precautions, skin antisepsis with 2% chlorhexidine in 70% isopropyl alcohol).
Vein cannulation using the smallest catheter that may meet the infusion requirements and choosing widely between single versus double lumen UVC.
Real-time tip navigation and tip location by US (according to the NeoECHOTIP protocol).
Securement of the catheter and protection of the exit site (combining sutureless devices, cyanoacrylate glue, semipermeable transparent membranes).
Post-procedural serial assessment of tip location by US.
Early removal of the device (within 4–5 days).





Reducing umbilical catheter migration rates by using a novel securement device

Juliana R. Journal of Perinatology (2024) 44:1359–1364



118 neonates LifeBubble significantly reduced migration of any UC > 1 vertebral body (12.3% vs. 55.7%), including UVC migration (5.3% vs. 39.3%) and UAC migration (7.0% vs 23.0%), as well as UVC discontinuation due to malposition (5.6% vs 37.7%). RX

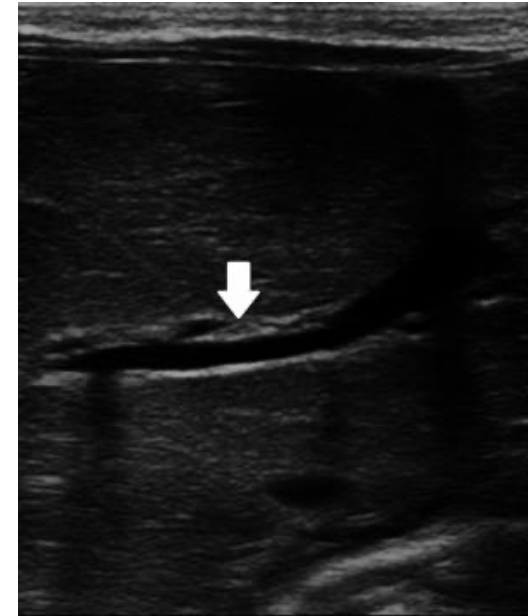
UVC MIGRATION: prevention

Open access

Protocol

BMJ Open Application of point-of-care ultrasound-guided tip navigation combined with visualised directional high-frequency linear array probe compression to improve the success rate of umbilical venous catheterisation in critical neonates: protocol of a multicentre randomised controlled trial in neonatal units

Xianping Liu BMJ Open 2025;15:e095017. doi:10.1136/bmjopen-2024-095017



UVC MIGRATION: Managment

- Ritiro del CVO in posizione di sicurezza (migrazione in atrio dx)
- Rimozione del CVO non piu centrale

It is especially crucial for UVCs, where millimeters of displacement lead to a completely different hemodynamic situation with further consequences of hyperosmolar fluid administration.

Complications Associated with Low Position versus Good Position Umbilical Venous Catheters in Neonates of ≤ 32 Weeks' Gestation Maher Shahroor Am J Perinatol 2022; 39(03): 259-264

ECC migration :Diagnosis

10-85% of reported migration rate

A noncentral catheter tip—location that is outside the superior vena cava (SVC) demonstrated a significantly increased likelihood of complications in pediatric patients.

Catheter tips located outside the SVC or in the proximal or upper portion of the SVC have been associated with a higher risk of thrombosis than the distal or lower portion of the SVC.

Migration frequently in hearth silhouette ,SVC brachiocefalic and Jugular vein

Editorial

JVA The Journal of Vascular Access

Neo-ECHOTIP: A structured protocol for ultrasound-based tip navigation and tip location during placement of central venous access devices in neonates

Giovanni Barone¹, Mauro Pittiruti², Daniele G Biasucci³, Daniele Elisei⁴, Emanuele Iacobone⁴, Antonio La Greca², Geremia Zito Marinosci⁵ and Vito D'Andrea⁶

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Neo Echo Tip protocol

Table 1. Summary of Neo-ECHO tip.

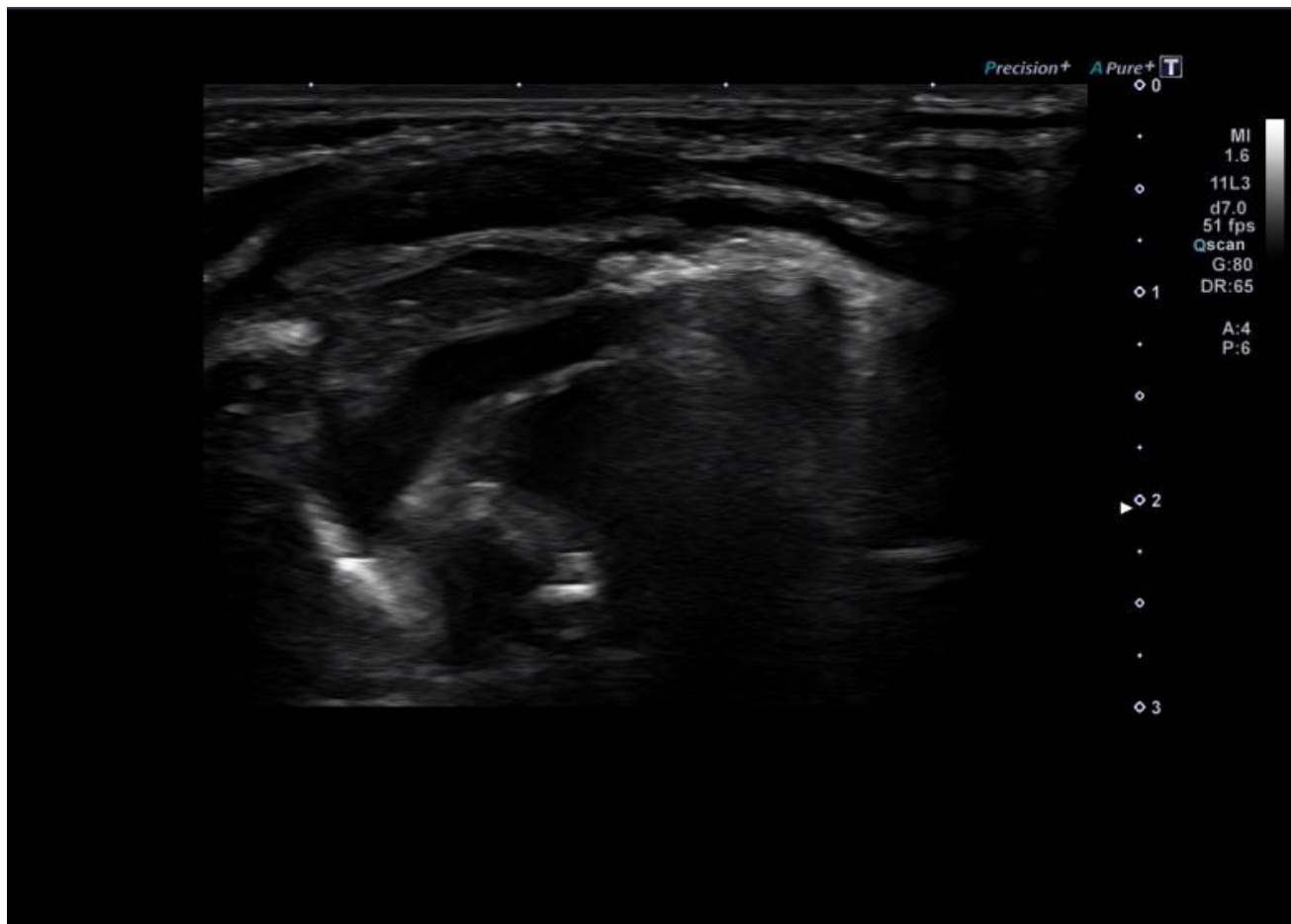
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UVC: umbilical venous catheter; ECC: epicutaneo-caval catheter; RaCeVA: rapid central vein assessment; RaPeVA: rapid peripheral vein assessment; CICC: centrally inserted central catheter; FICC: femoral inserted central catheter.





Migrazione
in atrio dx



Migrazione in
anonima

Controversie sul *timing della migrazione* dei cateteri ECC Studi principali tutti con radiografia e per questo discutibili

141 neonates .The incidence of catheter migration was determined radiographically at 12–24 hrs and every third day after insertion until it was removed. PICC migration was 28%and most commonly was detected within the first three days after PICC placement (83%). Acun C. Peripherally inserted central cathether migration in neonates: Incidence, timing and risk factors. J Neonatal Perinatal Med. 2021;14(3):411-417

The frequency of catheter tip migration into the cardiothymic silhouette was determined radiographically at 1 and 24 hours, respectively, after insertion. Results At 1 and 24 hours, 36 and 23% of UVCs (n = 41) migrated into the cardiothymic silhouette, respectively. At 1 and 24 hours, 23 and 11% of PICCs (n = 63) migrated into the cardiothymic silhouette, respectively. Gupta R. Migration of Central Venous Catheters in Neonates: A Radiographic Assessment. Am J Perinatol. 2016;33(6):600-604.

100 consecutively placed PICCs. An X-ray was obtained immediately after insertion and again at 24 hours postinsertion; 47% of PICCs placed in the upper limb migrated at 24 hours postinsertion with 32.6% migrating toward the heart. recommend a follow-up X-ray at 24 hours postinsertion for all catheters placed in the upper limb. Srinivasan HB. Migration patterns of peripherally inserted central venous catheters at 24 hours postinsertion in neonates. Am J Perinatol. 2013;30(10):871-874

As regards ECC, securement and protection can be obtained by the simultaneous use of cyanoacrylate glue and semipermeable transparent membranes with high transpirability. The application of 2–3 drops of cyanoacrylate glue (preferably butyl- or octyl-butyl-cyanoacrylate) over the exit site reduces the risk of local bleeding, protects from bacterial contamination, and increases stability, if used in combination with transparent membranes.²⁹ The

The SIECC protocol: A novel insertion bundle to minimize the complications related to epicutaneo-cava catheters in neonates

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Vito D'Andrea¹ , Mauro Pittiruti² , Giorgia Prontera¹,
Gianni Vento¹ and Giovanni Barone³ 

Real-Time Ultrasound Tip Location Reduces Malposition and Radiation Exposure during Epicutaneo-Caval Catheter Placement in Neonates

Vito D'Andrea, MD^{1,*} Giorgia Prontera, MD^{1,*} Francesco Cota, MD¹ Rosellina Russo, MD²
Giovanni Barone, MD³ Giovanni Vento, MD¹

Am J Perinatol 2022

ECHOview



**Changes in Upper Extremity Position Cause Migration of
Peripherally Inserted Central Catheters in Neonates
Ali M. Nadroo, Pediatrics 2002;110:131–136**

ECC migration : Menagment

With a catheter inserted in the basilic vein, abducting the upper extremity and extending the arm withdraws the catheter.

Adducting the upper extremity and flexing the elbow then advances the catheter tip, driving it deeper into the chest.

The injection of flush solution into the catheter produces movement at the distal tip of the catheter

Ritiro del catetere con ecoguida

Tentativo di manovre di riposizionamento

Rimozione

Repositioning Techniques for Malpositioned Neonatal Peripherally
Inserted Central Catheters

Elizabeth L. Sharpe Advances in Neonatal Care 2010 • Vol. 10, No. 3 • pp. 129-132



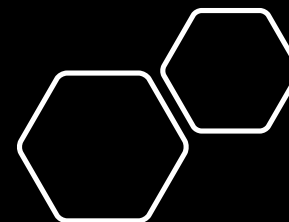
An Italian expert consensus on the choice of the method of tip location for central venous access devices.

V.Faraone et al.

Panel recommendation

Statement 2.1: Post-procedural tip location is indicated:

- a. **When intraprocedural tip location was impossible due to clinical emergency.**
- b. **In rare but possible cases in which the main intraprocedural tip location methods (IC-ECG and TTE) were both found to be inapplicable or infeasible or associated with uncertain results.**
- c. **In case of a CVAD placed in another hospital, or not used for a long time, or with history of previous tip migration (secondary tip malposition).**
- d. **In case of device malfunction (e.g. persistent withdrawal occlusion).**
- e. **In the case of dislocation of the extracutaneous tract of the device (unless the dislocation is obviously incompatible with a central position of the tip).**
- f. **In the newborn with CVADs at high risk of dislocation and/or tip migration, such as UVC (where tip location should be checked every 48h) or ECC (where tip location should be checked weekly).**
- g. **In infants/children with long-term CVADs whose tip may no longer be central, due to patient growth.**



Studio multicentrico :Dislotip Concluso ad Ottobre 2024

- Università Federico II, Napoli: **Centro hub**
- Università Vanvitelli, Napoli;
- Ospedale Sant'Anna e San Sebastiano, Caserta;
- Ospedale Careggi, Firenze;
- Università di Padova, Padova,
- Università di Siena, Siena;
- Università Cattolica, Roma;
- Università di Brescia, Brescia;
- Ospedale Infermi, Rimini;
- Università Verona, Verona

Studio multicentrico :Dislotip
Concluso ad Ottobre 2024

Primary outcome was the feasibility of the ECC tip location ultrasound procedure, defined as obtaining clear images of all protocol-specified echographic views.

***Secondary outcomes were:
the incidence and the timing of secondary ECC malposition;***

Multicentrico: dislotip

**Metodo di fissaggio
standardizzato**

Echo tip

**Posizione degli arti
standardizzata**

Timing : 1 h , 48/72 h, 6-8 gg

**Medicazioni e porzione
extracorporea misurata**



Risultati preliminari mostrano che:

- **219 ECC**
- **Echotip metodica fattibile ed accurata in tutti i centri partecipanti**
- **Quasi la metà dei cateteri sono migrati (intracardiaci,anonima)**
- **La maggioranza dei cateteri sono migrati già nella prima ora**
- **Cateteri ritirati o rimossi**

Perfezionato il bundle di prevenzione delle migrazioni (Zerodislotip)

- 1. Indicazioni del Dav expert per la scelta dell'accesso e dell'exit site**
- 2. Neoechotip per la tip navigation (CVO) e tip location**
- 3. Secure and protect secondo protocollo SIECC e SIUVEC**
- 4. Standardizzazione della posizione dell'arto per la tip location seriata**
- 5. Controlli precoci e ripetuti in timing adeguati**
- 6 Rimozione del catetere se malposizionato con impossibilita' a riposizionamento**

In conclusione

- L'echo Tip resta la metodica di scelta per la tip locatione e la diagnosi di migrazione
- Il timing adeguato per il monitoraggio resta da definire ma consigliabile monitoraggio precoce e frequente (entro 24h) soprattutto per il CVO
- Il fissaggio adeguato e la posione centrale della punta all'atto del posizionamento restano le armi principali per prevenire la dislocazione

GRAZIE



Kiss of tips

