



V Convegno
Nazionale
GAVePed



Accessi venosi
nel neonato e
nel bambino

Palacongressi, Rimini
15-16 maggio 2023



Tip location dei cateteri epicutaneo cavali e dei cateteri venosi ombelicali

Dott.ssa A.Capasso

U.O.C. Neonatologia e Terapia intensiva neonatale Napoli
Antonellacapasso79@gmail.com



UNIVERSITÀ DEGLI STUDI DI NAPOLI
FEDERICO II

Il catetere centrale nel neonato

Infinitamente piccolo
.....infinitamente importante

CVO
ECC



What is the problem?



Calibro ridotto: ECC 1-2 Fr , CVO 2,5 -3,5-4F



Lunghezza : elevata rispetto al calibro



*Malposizionamento primario e dislocazione:
estremamente frequente e rischioso (CVO)*



*Sito d'inserzione : Arti inferiori e vena
ombelicale*



**RACCOMANDAZIONI GAVeCeLT 2021
PER LA INDICAZIONE, L'IMPIANTO E LA GESTIONE
DEI DISPOSITIVI PER ACCESSO VENOSO**

Verifica intra-procedurale della posizione centrale
della punta (tip location) mediante ECG
intracavitario e/o mediante ecocardioscopia con
bubble test (secondo il protocollo
ECHOTIP)

Infusion Therapy Standards of Practice

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8TH EDITION

REVISED 2021



4. Consider the use of ultrasound to confirm catheter tip position in neonates due to the relative ease of visualizing the catheter tip in this age group, as well as in the emergency department or other critical care environments where immediate confirmation of tip location is time critical.^{46,69} (IV)
5. Avoid fluoroscopy except where CVAD placement is difficult or has failed at the bedside, as it requires exposure to ionizing radiation.^{4,53,62,70} (IV)
6. Postprocedure radiograph imaging is not necessary if alternative tip location technology confirms proper tip placement.^{46,50,71} (II)

Confirmation of tip location by postprocedure chest radiograph remains acceptable practice and is required in the absence of technology used during the procedure. This method is less accurate because the CAI

Tip location



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ECC distretto sup:

Giunzione cavoatriale, tratto inferiore cava sup

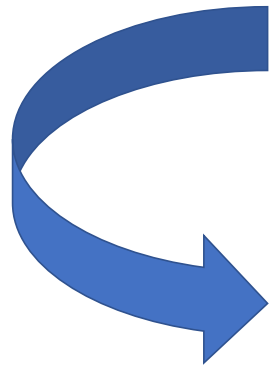
ECC distretto inf: centrale- giunzione cavo atriale inferiore

bassa-sopra le renali sotto lo sbocco dell'epatica in cava

CVO: giunzione cavo atriale inferiore

CVO- ECC : Lo Stato dell'arte?????

- Real time
- Costo efficacia
- Sicurezza
- Training



Fluoroscopia

Ecografia transesofagea

Ecocardiografia

IC ECG

Determination of Accurate Position of Umbilical Venous Catheters in Premature Infants

Selahattin Akar, MD¹ Emre Dincer, MD¹ Sevilay Topcuoğlu, MD¹ Taner Yavuz, MD²
Hatice Akay, MD³ Tulin Gokmen, MD¹ Guner Karatekin, MD¹



Simanovsky, N., Ofek-Shlomai, N.,
Rozovsky, K. et al. Umbilical venous
catheter position: evaluation by
ultrasound. *Eur Radiol* 21, 1882–1886
(2011).



Journal of Perinatology (2013) 33, 950–953
© 2013 Nature America, Inc. All rights reserved 0743-8346/13
www.nature.com/jp

ORIGINAL ARTICLE

Superiority of targeted neonatal echocardiography for umbilical venous catheter tip localization: accuracy of a clinician performance model

AS Pulickal¹, PK Charlagorla², SC Tume³, M Chhabra², P Narula² and AM Nadroo²

Rubortone et al. *Italian Journal of Pediatrics* (2021) 47:68
<https://doi.org/10.1186/s13052-021-01014-7>

Italian Journal of Pediatrics

RESEARCH

Open Access

Real-time ultrasound for tip location of umbilical venous catheter in neonates: a pre/post intervention study

Serena Antonia Rubortone^{1*}, Simonetta Costa¹, Alessandro Perri¹, Vito D'Andrea¹, Giovanni Vento¹ and Giovanni Barone²



- ***Sonda settoriale 7-8 MHz***
- ***Sonda lineare 12-13 MHz***
- ***Sonda microconvex convex 7-8.5 MHz***
- ***Proiezione sottoxifoidea***
- ***Proiezione parasternale destra***



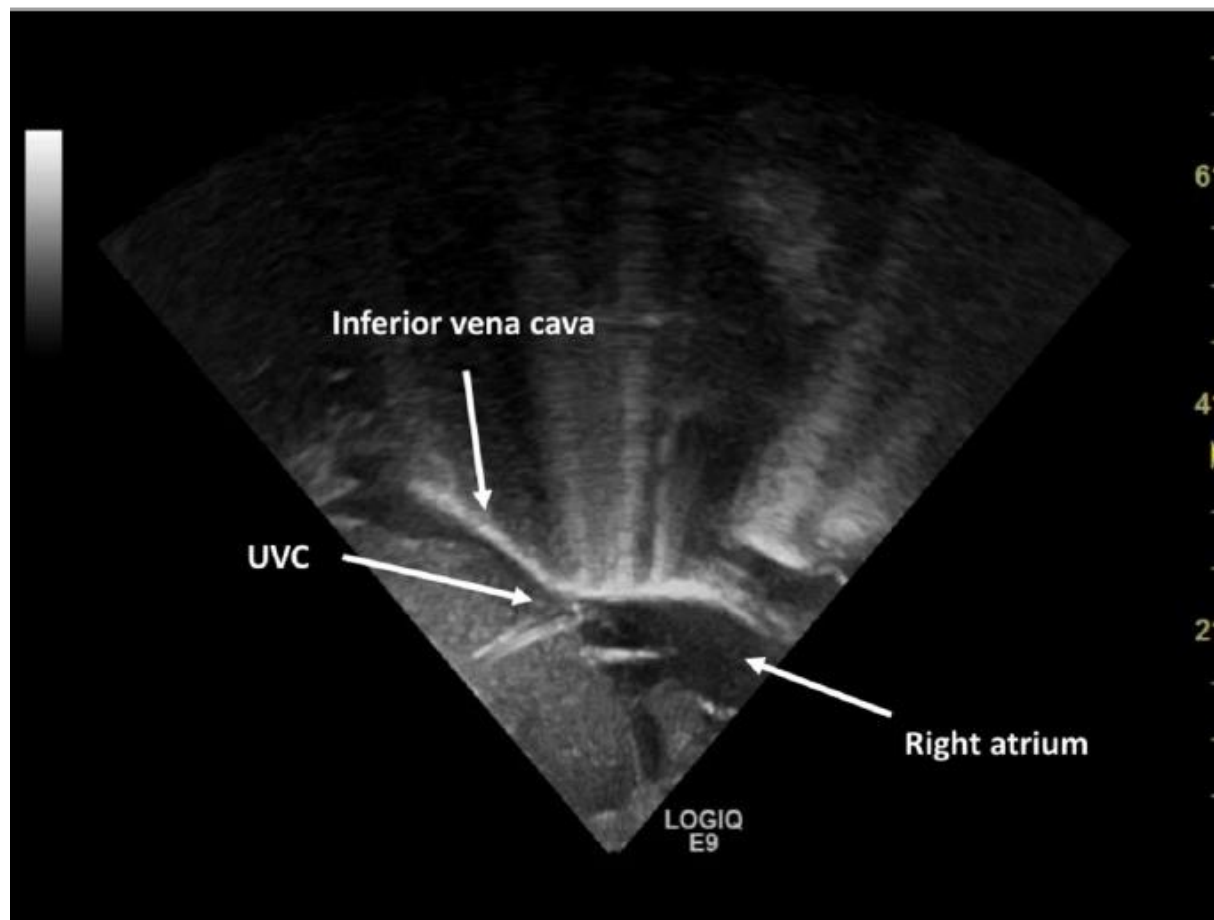
**Neo-ECHOTIP: A structured protocol
for ultrasound-based tip navigation and
tip location during placement of central
venous access devices in neonates**Giovanni Barone¹, Mauro Pittiruti², Daniele G Biasucci³,
Daniele Elisei⁴, Emanuele Iacobone⁴, Antonio La Greca²,
Geremia Zito Marinosci⁵ and Vito D'Andrea⁴

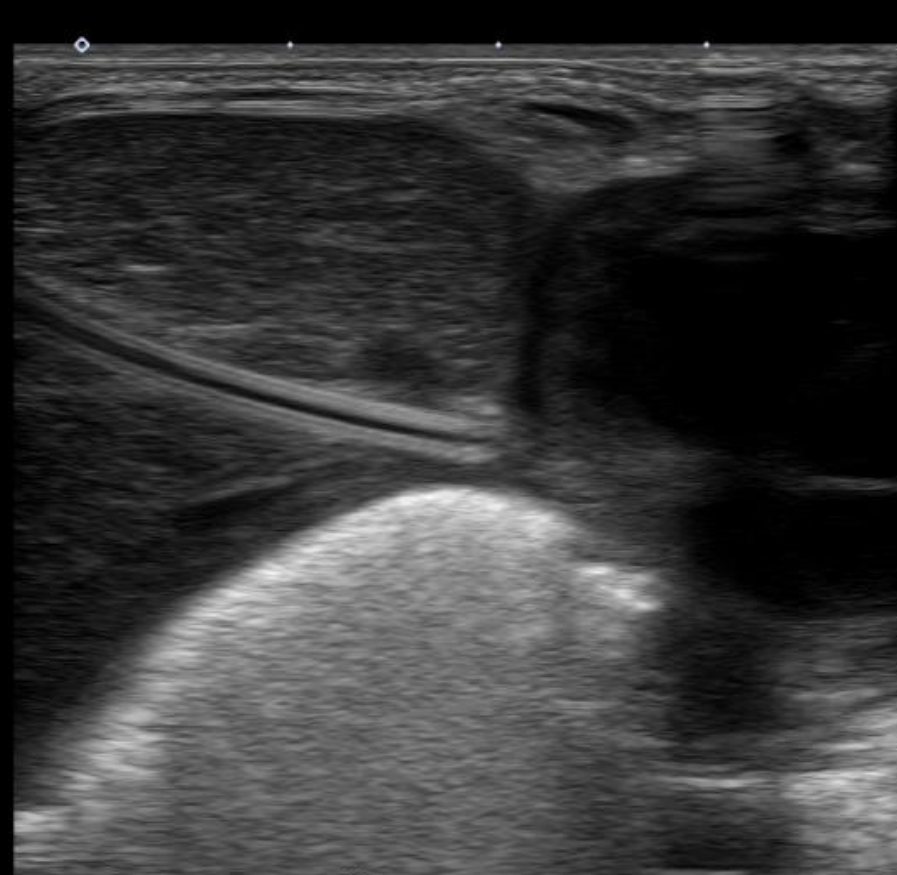
Neo Echo Tip protocol

Table 1. Summary of Neo-ECHO tip.

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





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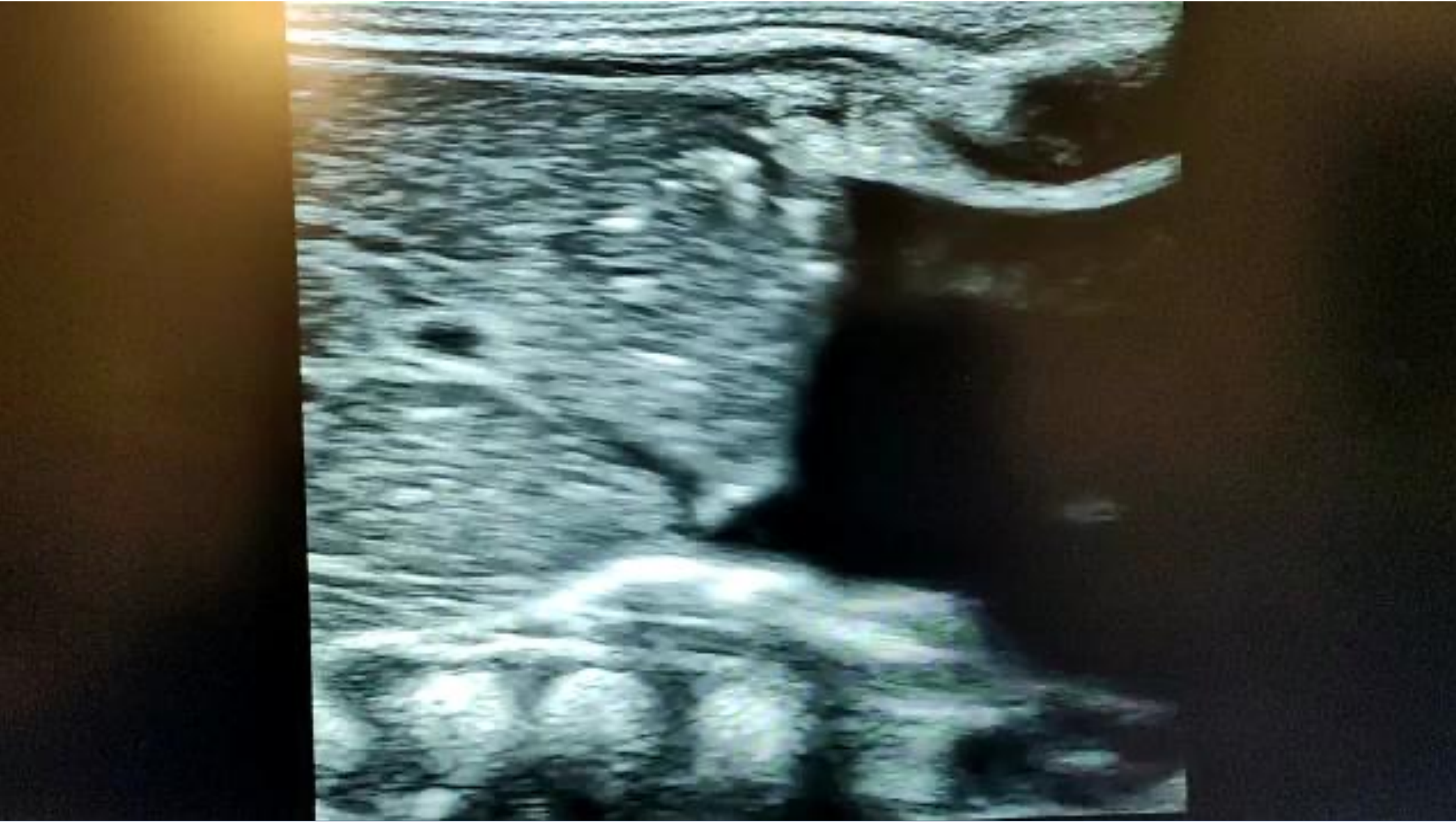
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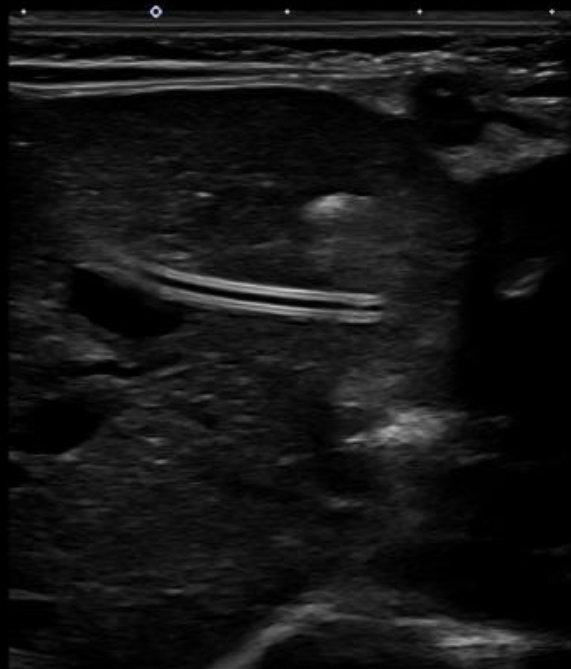
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Precision+ A Pure+

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Training



Rubortone et al. *Italian Journal of Pediatrics* (2021) 47:68
<https://doi.org/10.1186/s13052-021-01014-7>

Italian Journal of Pediatrics

RESEARCH

Open Access

Real-time ultrasound for tip location of umbilical venous catheter in neonates: a pre/post intervention study

Serena Antonia Rubortone^{1*}, Simonetta Costa², Alessandro Pemi³, Vito D'Andrea¹, Giovanni Vento³ and Giovanni Barone²



I discenti erano in grado di visualizzare la punta del cvo in sede dopo una singola lezione teorica frontale e due mesi di training su paziente

Pulickal et al. Superiority of targeted neonatal echocardiography for umbilical venous catheter tip localization: accuracy of a clinician performance model. *J Perinatol* 33, 950–953 (2013).

cardiac chambers), as certified by the cardiologist, on five consecutive neonates was the competency outcome required for the housestaff physician to participate in the study. The average time period required for the housestaff physicians to achieve the competency was 2 weeks.

Positioning of umbilical vein catheter with
ECG-guided technique: randomized study 2000 P. Biban et al

Quale ruolo per l'IC-ECG

Intraprocedurale
Economico
Rapido training

Pochi lavori in letteratura e datati

Suppositivo ma non un vero target elettrico individuabile
Onda P diventa difasica in atrio e viene ritirato

Il “Buco nero” dell'assenza di onda P

ACTA BIOMEDICA

*Official Journal of the Society of Medicine
and Natural Sciences of Parma*

Il catetere centrale nel neonato

Infinitamente piccolo
.....infinitamente importante

ECC



ECC

Singh Y, Tissot C, Fraga MV, Yousef N, Cortes RG, Lopez J, et al. International evidence-based guidelines on point of care ultrasound (POCUS) for critically ill neonates and children issued by the POCUS Working Group of the European Society of Paediatric and Neonatal Intensive Care (ESPNIC). *Crit Care* 2020;24:65.

Ohki Y, Tabata M, Kuwashima M, Takeuchi H, Nako Y, Morikawa A. Ultrasonographic detection of very thin percutaneous central venous catheter in neonates. *Acta Paediatr* 2000;89:1381-4.

Kuschel CA, Bach KP, Webster NJ, Page B, Groves AM, Battin MR. The reliability of 2D and colour Doppler ultrasound in localising longline position. *J Paediatr Child Health* 2008;44:483-7.

Jain A, McNamara PJ, Ng E, El-Khuffash A. The use of targeted neonatal echocardiography to confirm placement of peripherally inserted central catheters in neonates. *Am J Perinatol* 2012;29:101-6.

Tauzin L, Sigur N, Joubert C, Parra J, Hassid S, Moulies ME. Echocardiography allows more accurate placement of peripherally inserted central catheters in low birthweight infants. *Acta Paediatr* 2013;102:703-6.

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**

THE JOURNAL OF PEDIATRICS • www.jpeds.com

ORIGINAL
ARTICLES

Ultrasound guided Catheter Tip Location in Neonates: A Prospective Cohort Study

Fiorentino Grasso, MD¹, Antonella Capasso, MD¹, Daniela Pacella, PhD², Francesco Borgia, MD³, Serena Salomè, MD¹,
Letizia Capasso. MD. PhD¹. and Francesco Raimondi. MD. PhD¹



Numerosità campionaria : 248 e 102 ECC



L Rx non può essere considerato il gold standard per i ECC



L'ecocardiografia è fattibile e più accurata e riduce anche i malposizionamenti



L'ecocardiografia è una metodica real-time rappresenta la scelta migliore per la tip location dell ECC



L Rx è raccomandabile solo quando la tip location fallisce con l'ecocardiografia

Neo Echo Tip protocol

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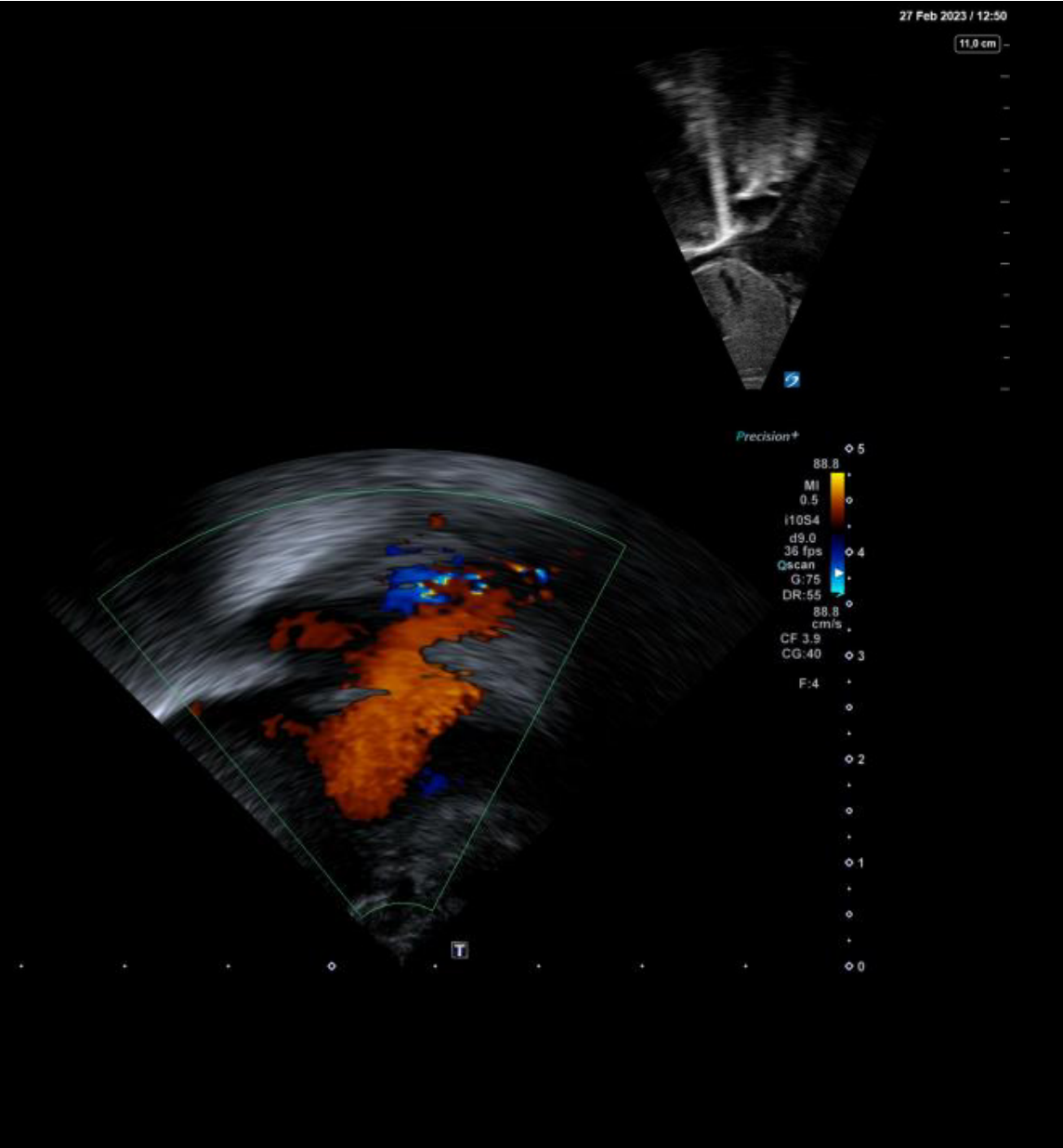
UVC: umbilical venous catheter; ECC: epicutaneo-caval catheter; RaCeVA: rapid central vein assessment; RaPeVA: rapid peripheral vein assessment; CICC: centrally inserted central catheter; FICC: femoral inserted central catheter.

Asse lungo della cava sup.



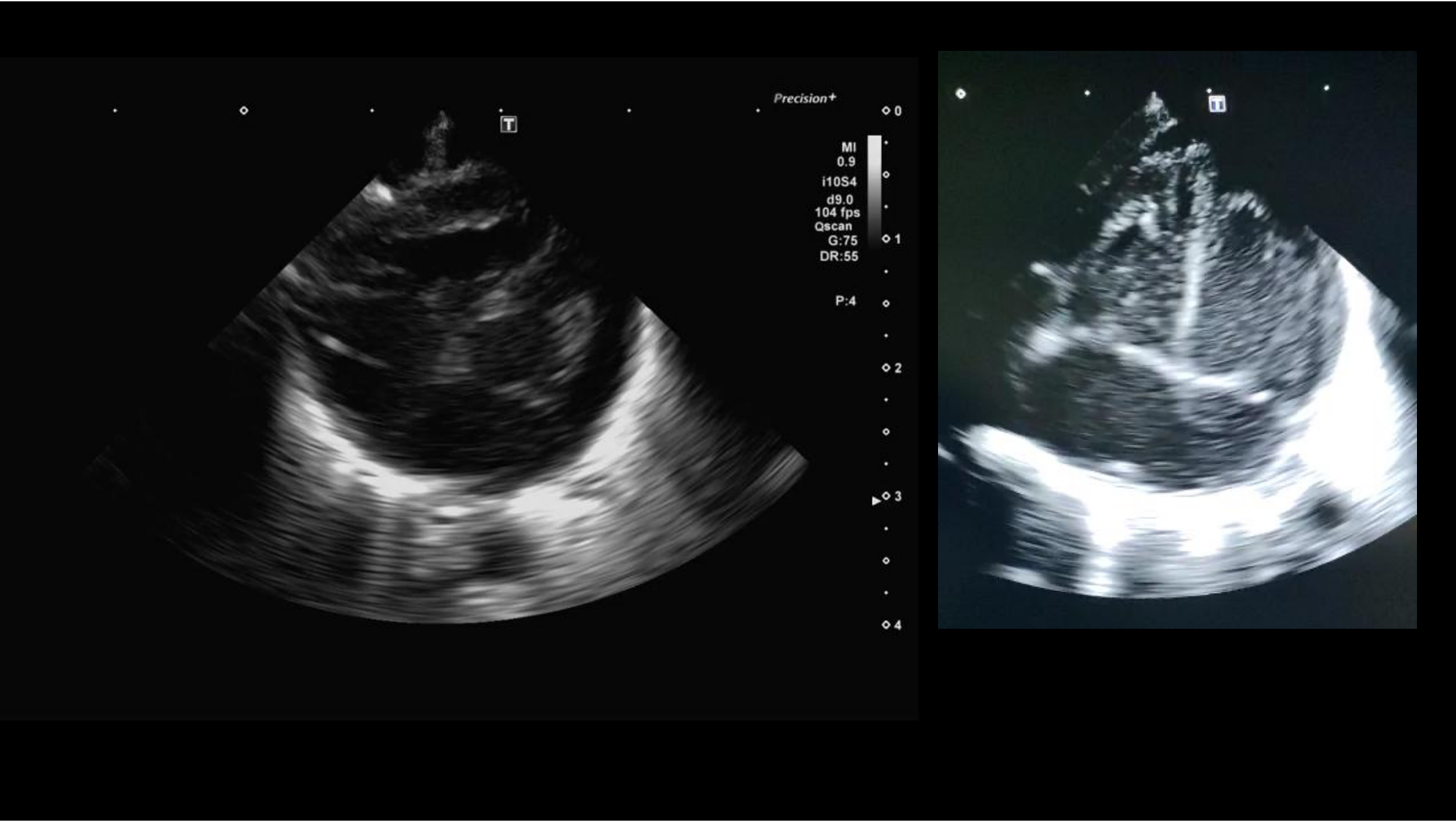


Bicavale





Apicale 4 camere



Training

for ultrasound-based tip navigation and tip location of ECCs should include:

1. Basic knowledge of targeted neonatal echocardiography and advanced vascular ultrasound assessment (in particular, the RaCeVA, RaPeVA, and RaFeVA protocols).
2. Advanced theoretical training, including the evaluation of several clinical case scenarios (at least 12 h).
3. Practical training supervised by a neonatologist with expertise in ultrasound-based tip location of ECCs (at least 50 cases).

Outcome of Intracavitary Electrocardiogram Guidance in PICC Tip Placement in Preterm Infants: A Single-center Experience of 327 Cases

Lilan He, Weiju Chen*, Meng

Neonatal Department, The First Affiliated

Original research article

The intracavitary electrocardiography method for positioning the tip of epicutaneous cava catheter in neonates: Pilot study

JVA | The Journal of
Vascular Access

The Journal of Vascular Access
1-6

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DOI: 10.1177/1129729818761292

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DE GRUYTER

Open Med. 2017; 12: 125-130

Research Article

Open Access

Lian-juan Zhou, Hong-zhen Xua*, Mei-fang Xu, Yan Hu, Xiao-Fang Lou

An accuracy study of the Intracavitary Electrocardiogram (IC-ECG) guided peripherally inserted central catheter tip placement among neonates

Applicability and feasibility of intraprocedural tip location of femorally inserted central catheters by transhepatic ultrasound visualization of the inferior vena cava in adult patients

Maria Giuseppina Annetta¹, Bruno Marche¹, Igor Giarretta²
and Mauro Pittiruti¹

The Journal of Vascular Access
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SAGE

Ultrasound identification
of the tip of FICCs in the
abdominal tract of the IVC,
using the right transhepatic
coronal long axis view
(THCLA)





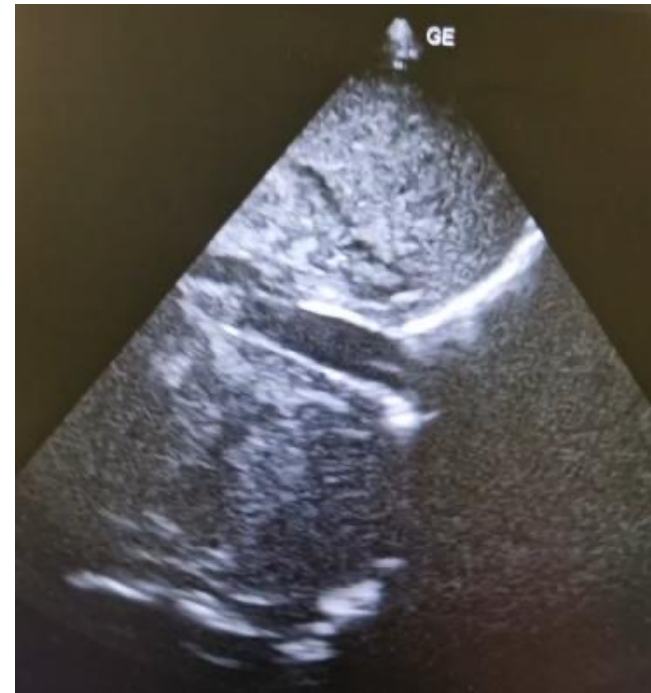
- 50 neonati con FICC:**
 - sonda lineare
 - proiezione transepatica
 - proiezione sottocostale
 - con bubble test
 - Rx torace



Fig 5 Transhepatic Ultrasound View



Fig 2 Abdominal Radiograph
Confirmation of ST-FICC



Techniques in vascular access

JVA | The Journal of
Vascular Access

Applicability and feasibility of intraprocedural tip location of femorally inserted central catheters by transhepatic ultrasound visualization of the inferior vena cava in adult patients

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RICOMINCIO DA TRE

L Echo nell UVC è nettamente superiore all Rx, rapida curva di apprendimento e possibilità di tip navigation. Studi necessari per IC- ECG

L ECHO per l ECC curva di apprendimento meno rapida, operatore dipendente, maggiore specificità dell RX. Consente tip navigation. Studi in corso sull IC ECG

L ECHO per ECC arti inferiori superiore all RX, consente tip navigation. Ruolo per la transepatica nelle localizzazioni basse. Scarse evidenze sull'IC ECG

Multicentrico: dislotip

CENTRI PARTECIPANTI

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18. U.O Neonatologia Fondazione MBBM Ospedale San Gerardo. Monza. Italia

superiore/inferiore), la tip location ecografica verrà ripetuta, utilizzando lo stesso protocollo ecografico, a 60-120 min dal posizionamento, 48-72 ore dal posizionamento, e 6-8 giorni dal posizionamento.

ENDPOINTS

Endpoint primario

Dimostrare l'applicabilità della metodica ecografica per lo studio della malposizione secondaria dei ECC.

Endpoints secondari

- Validare con uno studio multicentrico i risultati dello studio di Grasso F et al. (8) sulla fattibilità della tip location ecografica applicata ai ECC
- Stabilire la tempistica ideale per la rivalutazione della posizione della punta dopo posizionamento di un ECC
- Verificare l'incidenza di malposizione secondaria dei ECC



Utilizzo di un dispositivo per la tip location mediante ECG intracavitario in ambito neonatale e pediatrico

Dott. Gaetano Ausanio.

Dott.ssa Rossella Mastroianni.

AORN Sant'Anna e San Sebastiano Caserta.

Dott.ssa Antonella Capasso.

AOU Federico II Napoli.

Dott. Ferdinando Spagnuolo.

AOU Università degli Studi della Campania «L. Vanvitelli» Napoli.



GAVePed
V Convegno Nazionale

Rimini
15-16 maggio 2023
2/28



L'unione fa la forza



GRAZIE

