II Convegno GAVePed

Covegno del Gruppo Accessi Venosi Pediatrici

GAVePed

Gruppo Accessi Venosi Pediatrici

2019 Verona

2-3-4 Dicembre

December 2nd-3rd-4th

GAVeCeLT

Gli Accessi Venosi Centrali a Lungo Termine

Il protocollo ECHOTIP nel bambino e nel neonato: *l'uso dell'ecografo per tip navigation e tip location* degli accessi venosi centrali

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Fondazione Policlinico Universitario A. Gemelli
Università Cattolica del Sacro Cuore

EcoTIME

Ecografia in Terapia Intensiva e Medicina dell'Emergenza

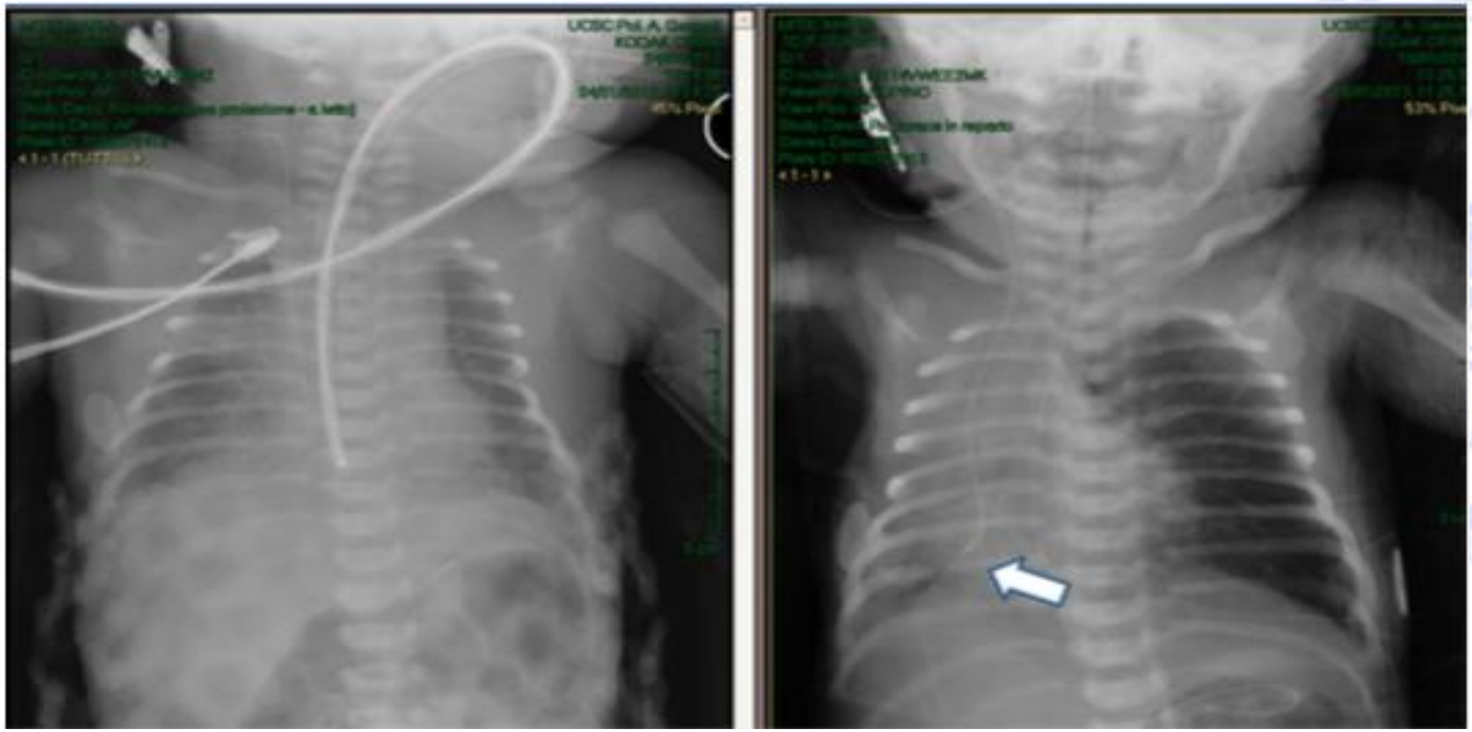
Resuscitation 84 (2013) e83–e84

Contents lists available at SciVerse ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Double cooling for pericardial tamponade and cardiac arrest after rewarming in neonatal asphyxia



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- CVO/ECC/CICC con posizionamento intra-atriale:
    1. Perforazione del cuore
    2. Versamento pericardico con tamponamento cardiaco
    3. Aritme, potenzialmente fatali
    4. Trombosi endocavitarie
    5. Versamento pleurico

- CVO posizionato nel sistema portale:
    1. NEC
    2. Perforazione del colon
    3. Necrosi ed ematomi epatici
    4. Cisti epatiche
    5. Perforazione di vasi del sistema portale
    6. Ipertensione portale

Avery Disease of the Newborn. Neonatology Gomella

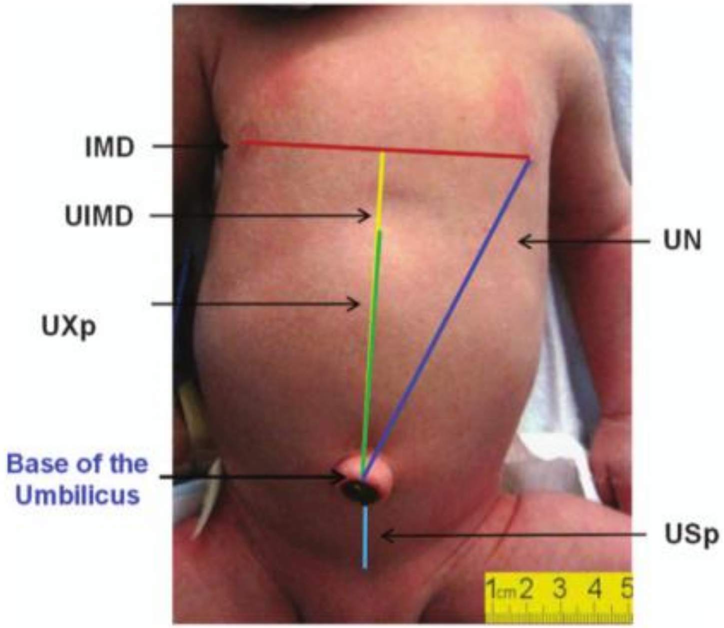
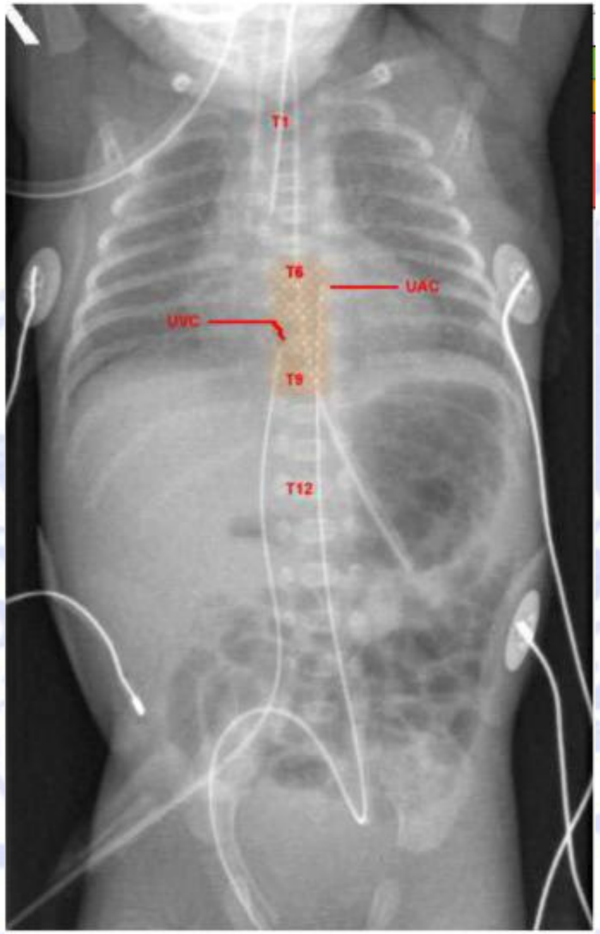


Figure 1. Morphometric measurements. IMD, inter-mammary distance; UIMD, umbilicus to midpoint of IMD; UN, umbilicus to nipple; USp, umbilicus to symphysis pubis; UXp, umbilicus to xiphoid process.



Journal of Neonatal-Perinatal Medicine xx (20xx) x–xx
DOI:10.3233/NPM-1642
IOS Press

Original Research

Optimal radiologic position of an umbilical venous catheter tip as determined by echocardiography in very low birth weight newborns

B.C.F. Karber[a,*], J. Nielsen[a], D. Balsam[b], C. Messina[c] and D. Davidson[a]

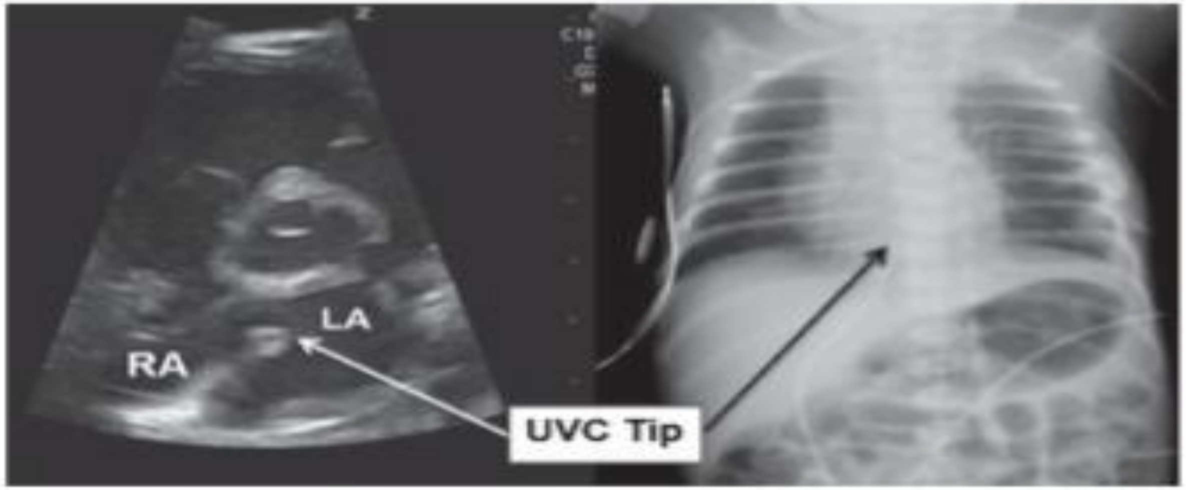


Table 2
Echocardiographic location of the UVC tip when screening X-ray is interpreted as acceptable in the central right atrium or the thoracic IVC-right atrial junction

UV tip location	By echocardiogram (%)	By X-ray (%)
Central right atrium or thoracic IVC-right atrium junction	22 (43)	50 (98)
Left atrium	21 (41)	1 (2)
Not found by echocardiography	8 (16)	0
Total subjects	51	51

JVA
ISSN 1129-7298

J Vasc Access 2014; 00 (00): 000-000
DOI: 10.5301/jva.5000314

ORIGINAL ARTICLE

Central venous access devices in pediatric malignancies: a position paper of Italian Association of Pediatric Hematology and Oncology

Alessandro Crocoli[1], Assunta Tornesello[2], Mauro Pittiruti[3], Angelica Barone[4], Paola Muggeo[5], Alessandro Inserra[1], Angelo Claudio Molinari[6], Valeria Grillenzoni[7], Viviana Durante[8], Maria Pia Cicalese[9], Giulio Andrea Zanazzo[10], Simone Cesaro[7]

- The tip location should be ideally verified in real time during the procedure by intracavitary EKG or by echocardiography or—as a second option—soon after the procedure by chest x-ray or by echocardiography
- Intracavitary ECG and/ or echocardiography is safer and more accurate than fluoroscopy for verifying tip location and is becoming increasingly used in clinical practice

Journal of Infusion Nursing
The Official Publication of the Infusion Nurses Society
Supplement to January/February 2016
Volume 39, Number 1S
ISSN 1533-1458
www.journalofinfusionnursing.com

Infusion Therapy Standards of Practice

INS

Use caution with ultrasound for CVAD tip location, as its use in replacing chest radiographs is controversial in all ages due to small sample sizes in available studies and lack of standardized techniques. Consider use in neonates and in emergency departments when immediate knowledge of the CVAD tip location is beneficial.

- Generally speaking, suggest caution with the use of US to detect tip location
- Recommend to consider US to detect tip location in neonates and in emergency condition when immediate knowledge of the CVAD tip location is beneficial.

Journal of Infusion Nursing
Supplement to January/February 2016
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www.journalofinfusionnursing.com
The Official Publication of the Infusion Nurses Society

Infusion Therapy Standards of Practice

4. Ultrasound imaging using parasternal long- and short-axis views for UVC tip location compares favorably to radiography. Injection of normal saline through the catheter may assist in identifying the exact tip location. However, ultrasound will not rule out loops or curls in the catheter pathway.[18,22,23] (IV)
5. Neonatal echocardiography may be superior to chest and abdominal radiography for identifying malpositioned catheters or in extremely low-birth-weight neonates.[24,25] (V)

Traditional US vs POCUS

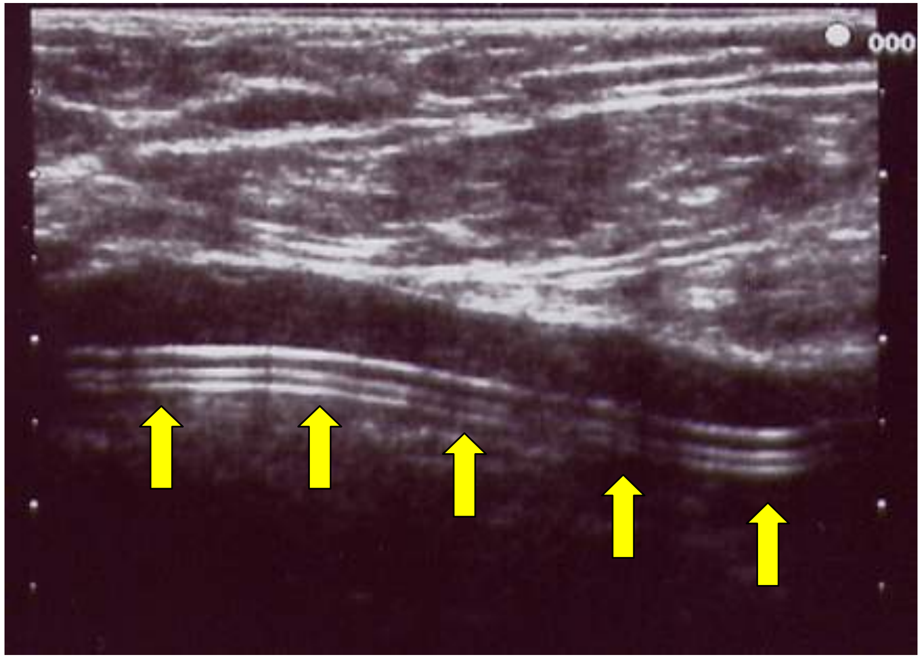
- **Traditional ultrasound**
- Experts in ultrasound
- Comprehensive exams (A-Z)
- Multiple ultrasound views
- Exam time approx. 20-30 min
- Advanced interpretation

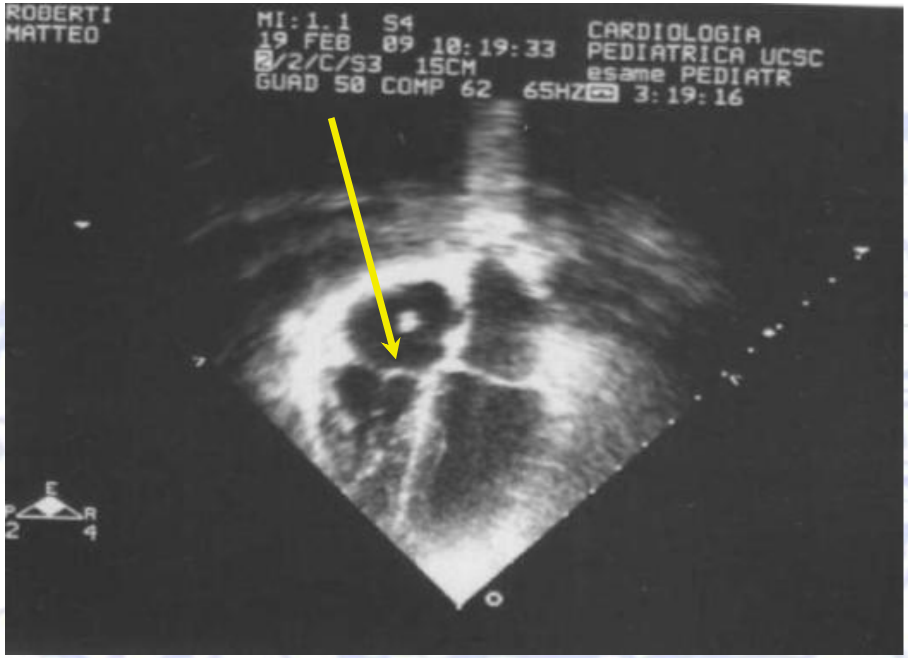
Hypertrophic cardiomyopathy

- **Point-of-care ultrasound**
- Traditional/non-traditional users
- Answer simple clinical questions
- Focused ultrasound view
- Exam time approx. 10 sec-5 min
- Simple interpretation

Abnormal left ventricular function

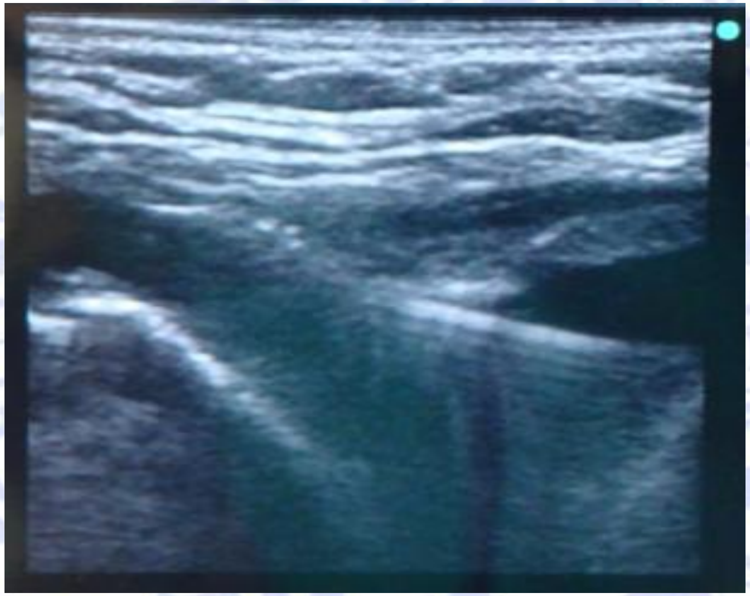
Proposta di algortimo per risposta a semplici domande…





Cosa ci dice la letteratura...

- Eseguire sempre *tip navigation* + *tip location*



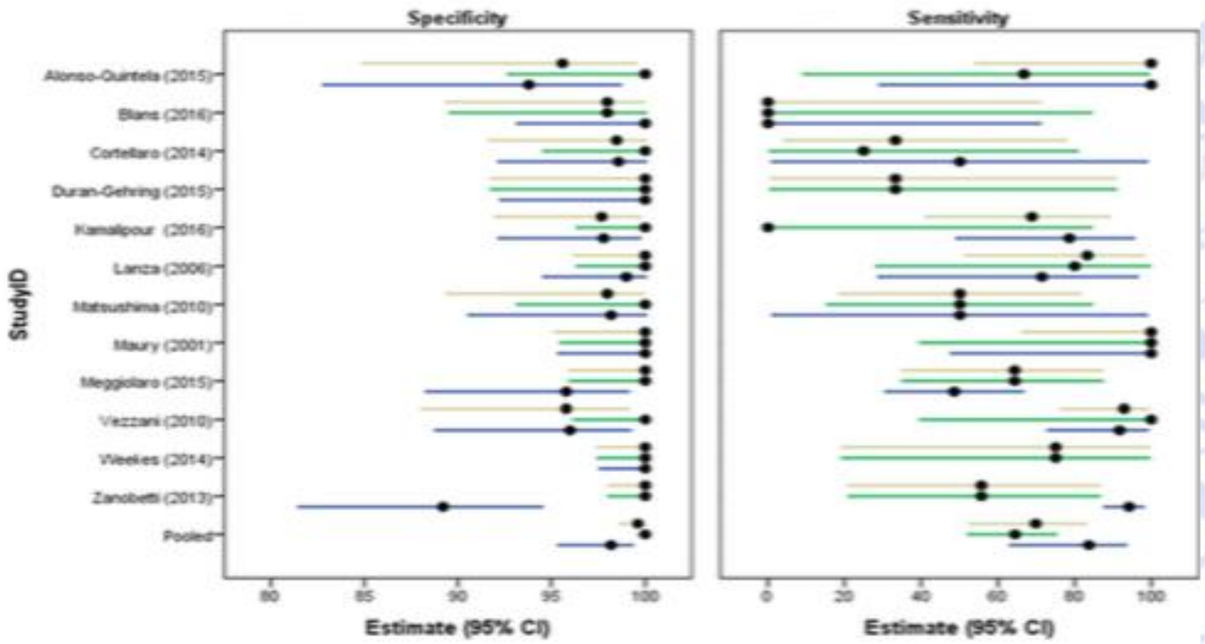
Smit *et al. Critical Care* (2018) 22:65
https://doi.org/10.1186/s13054-018-1989-x

Critical Care

REVIEW Open Access

Bedside ultrasound to detect central venous catheter misplacement and associated iatrogenic complications: a systematic review and meta-analysis

Jasper M. Smit[1,2*], Reinder Raadsen[1,2], Michiel J. Blans[3], Manfred Petjak[4], Peter M. Van de Ven[5] and Pieter R. Tuinman[1,2]



- ***"….CVC position, according to our meta-analysis, is best verified by vascular US combined with TTE…"***
- Theoretically, the best protocol is an US method incorporating a scan of the central vessels bilaterally (if needed) and visualizing the migration of the CVC tip into the heart through CEUS

Pediatric Anesthesia

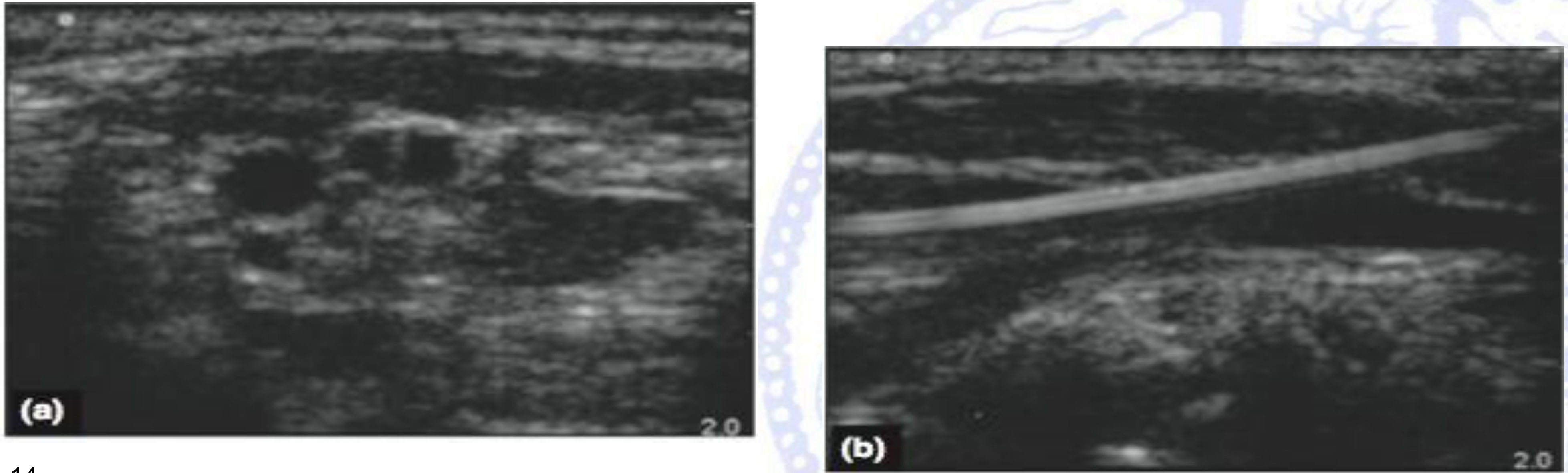
Pediatric Anesthesia ISSN 1155-5645

ORIGINAL ARTICLE

Ultrasound detection of guidewires in-plane during pediatric central venous catheterization

Kenji Kayashima, Keiko Imai & Reiko Sozen

Department of Anesthesia, Kyushukoseinenkin Hospital Kitakyushu, Fukuoka, Japan

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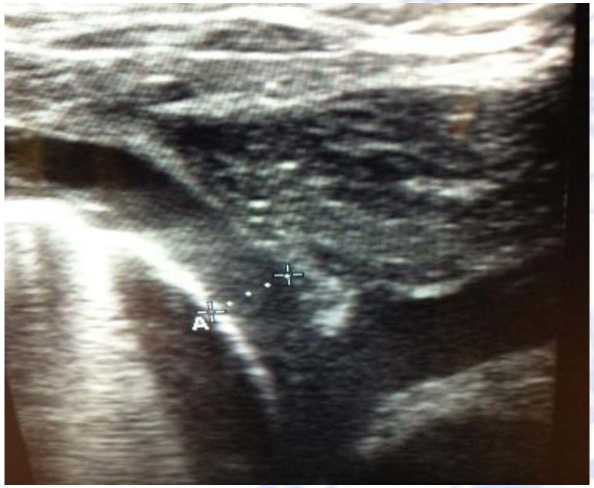
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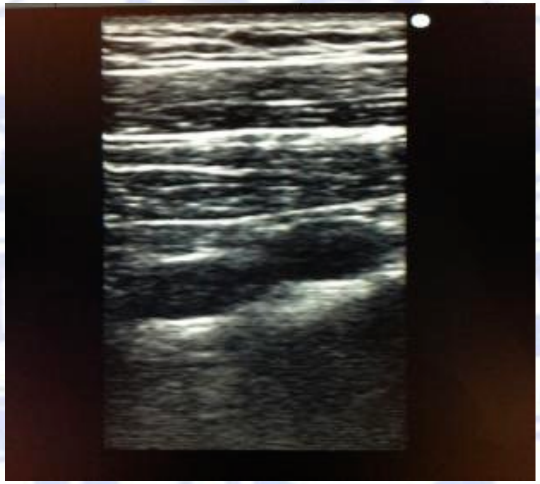

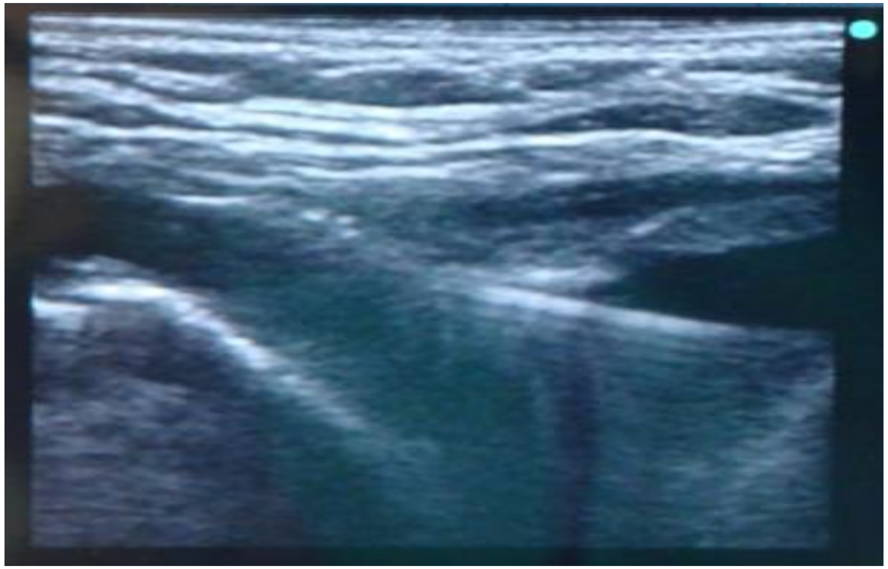

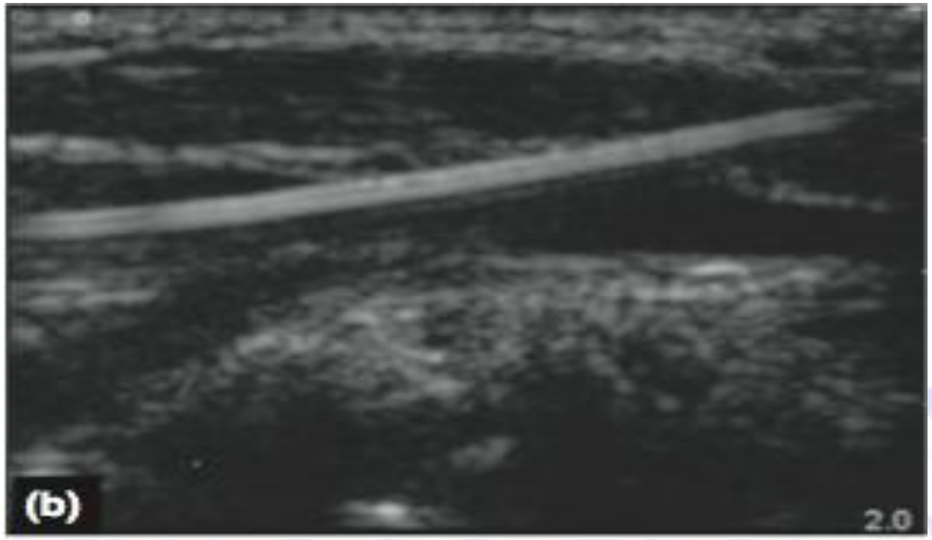
(b)
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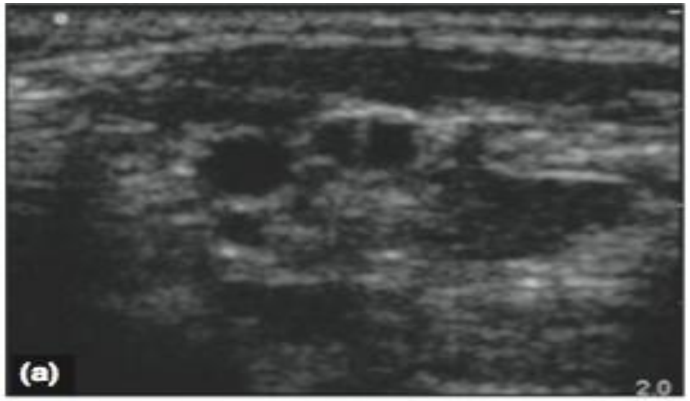
(a)
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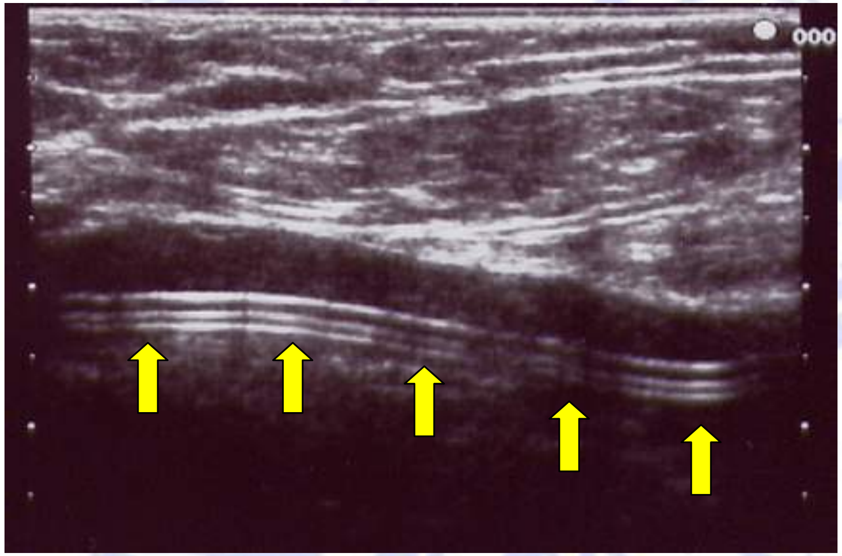
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EJA

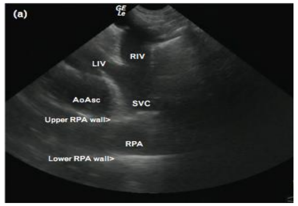
Eur J Anaesthesiol 2015; **32**:29–36

ORIGINAL ARTICLE

Ultrasound confirmation of central venous catheter position via a right supraclavicular fossa view using a microconvex probe

An observational pilot study

Se-Chan Kim*, Ingo Heinze*, Alexandra Schmiedel, Georg Baumgarten, Pascal Knuefermann, Andreas Hoeft and Stefan Weber



JVA
ISSN 1129-7298

J Vasc Access 2016; 00 (00): 000-000
DOI: 10.5301/jva.5000518

ORIGINAL ARTICLE

Ultrasound-guided supraclavicular central venous catheter tip positioning via the right subclavian vein using a microconvex probe

Se-Chan Kim[1], Ingo Gräff[1], Alexandra Sommer[2], Andreas Hoeft[1], Stefan Weber[1]

Electrocardiography-controlled central venous catheter tip positioning in patients with atrial fibrillation

Folkert Steinhagen[1], Maximilian Kanthak[1], Guido Kukuk[2], Christian Bode[1], Andreas Hoeft[1], Stefan Weber[3] and Se-Chan Kim[1,4]

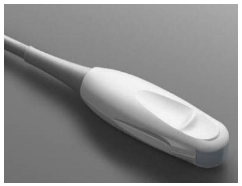
JVA The Journal of Vascular Access

Improving the "global use" of ultrasound for central venous access: a new supraclavicular scan by microconvex probe

Critical Ultrasound Journal
a SpringerOpen Journal

A La Greca[1*], DG Biasucci[2], A Emoli[3], M Pittiruti[1]

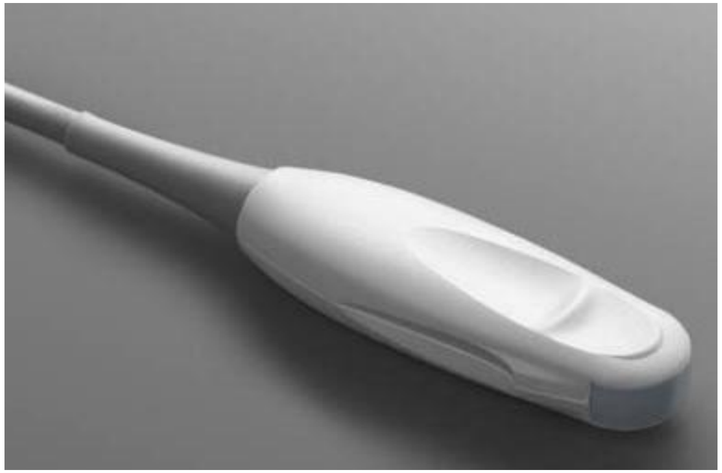
From 7th WINFOCUS Italian Congress on Ultrasound in Emergency, Anaesthesiology and Critical Care
Lodi, Italy. 26-29 March 2014



Using Ultrasound to Identify the Central Venous Catheter Tip in the Superior Vena Cava

ICU DIRECTOR

Keith Killu, MD, Alton Parker, MD, Victor Coba, MD, Mathilda Horst, MD, and Scott Dulchavsky, MD, PhD



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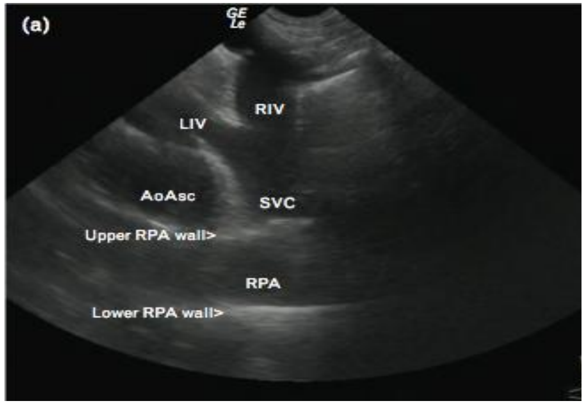
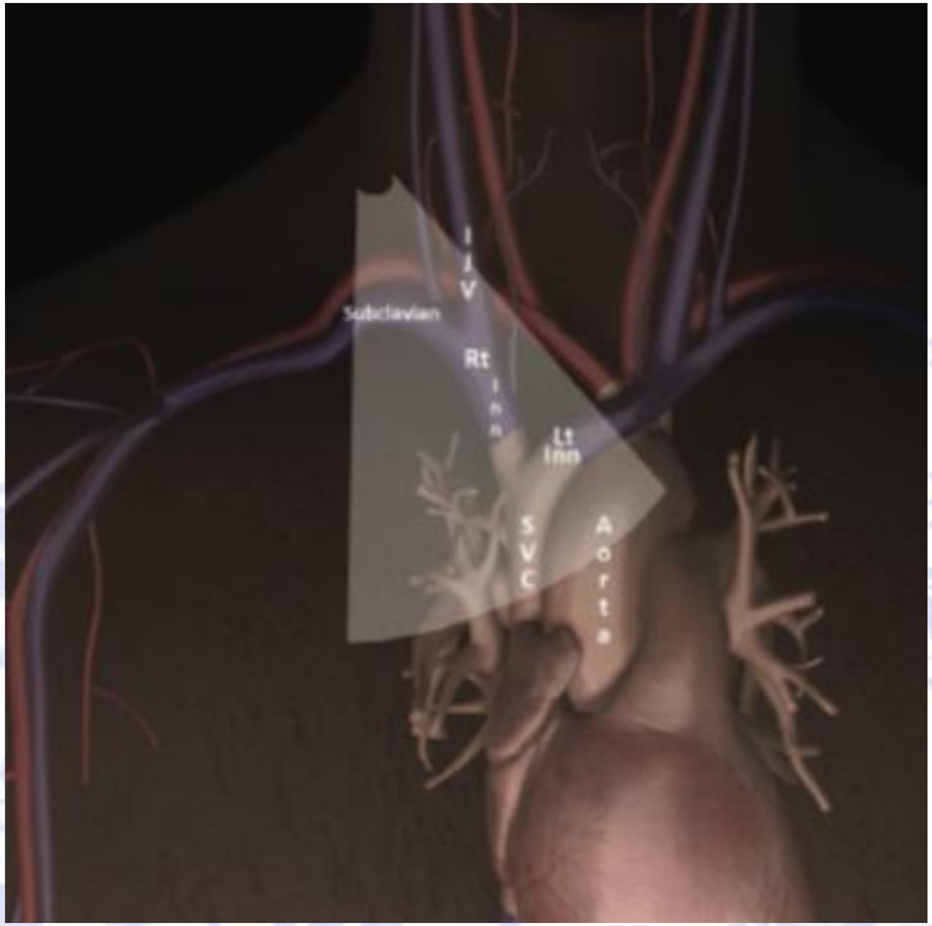


Transducer Type	Applications	Footprint	Frequency	Field of Vision	Advantages	Disadvantages
Linear	Peripheral vascular, small parts, musculoskeletal	42 × 7 mm	5-13 MHz	39 mm	Higher axial resolution	Less tissue penetration; large footprint, difficult to fit in the supraclavicular area
Microconvex	Pediatric applications, vascular, abdominal	26 × 10 mm	4-11 MHz	133°	Deeper tissue penetration; smaller footprint can fit in the supraclavicular area	Less axial resolution; specialty transducer, less commonly used

WOCOVA 5th World Congress on Vascular Access



Using Ultrasound to Identify the Central Venous Catheter Tip in the Superior Vena Cava

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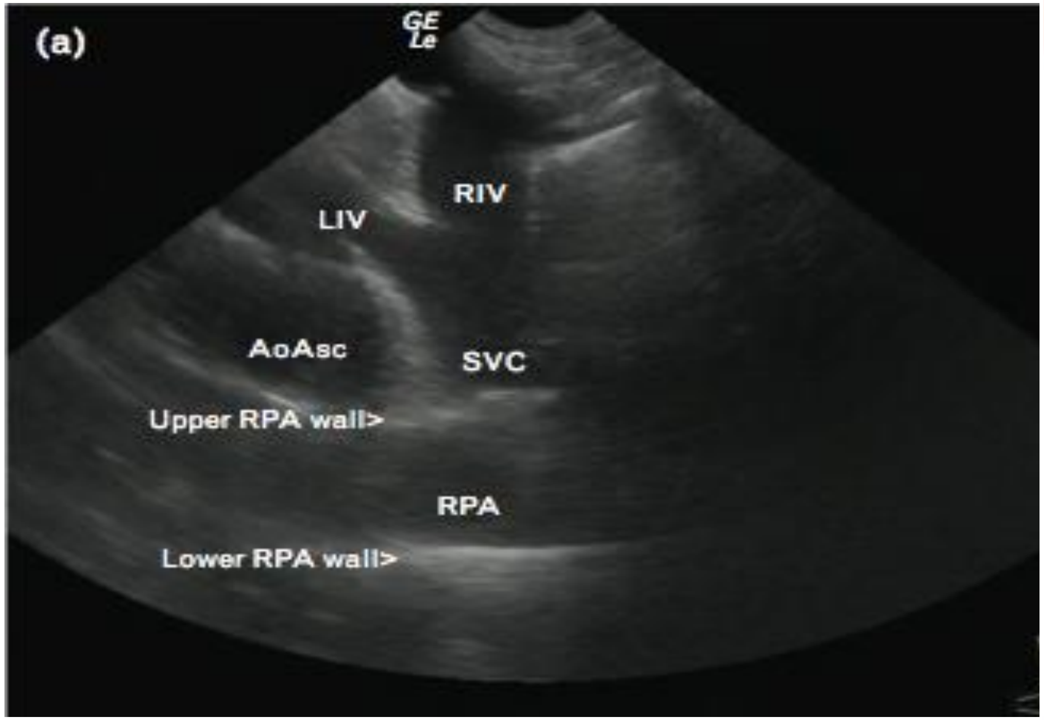

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Eur J Anaesthesiol 2015; **32**:29–36

ORIGINAL ARTICLE

Ultrasound confirmation of central venous catheter position via a right supraclavicular fossa view using a microconvex probe

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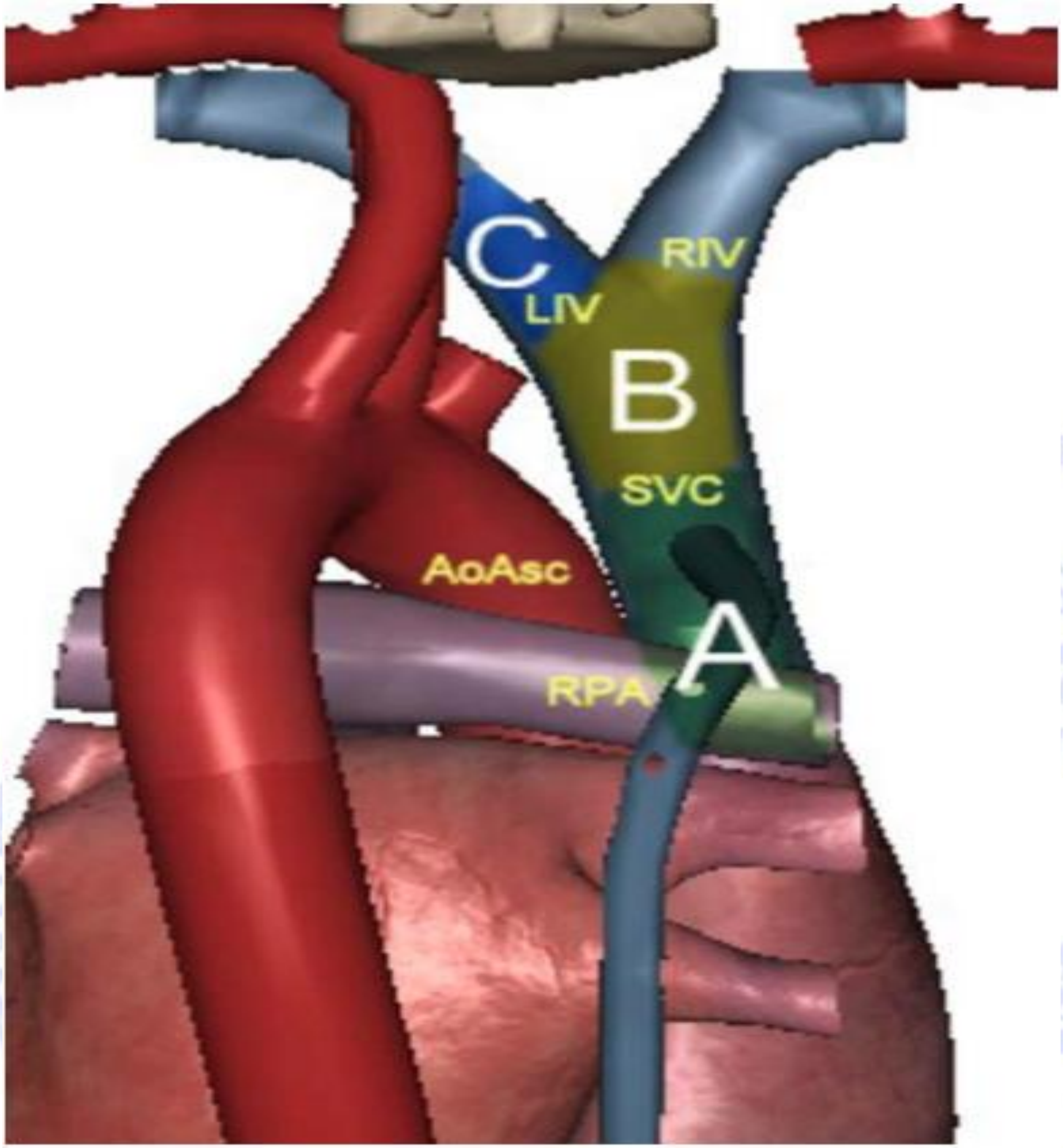
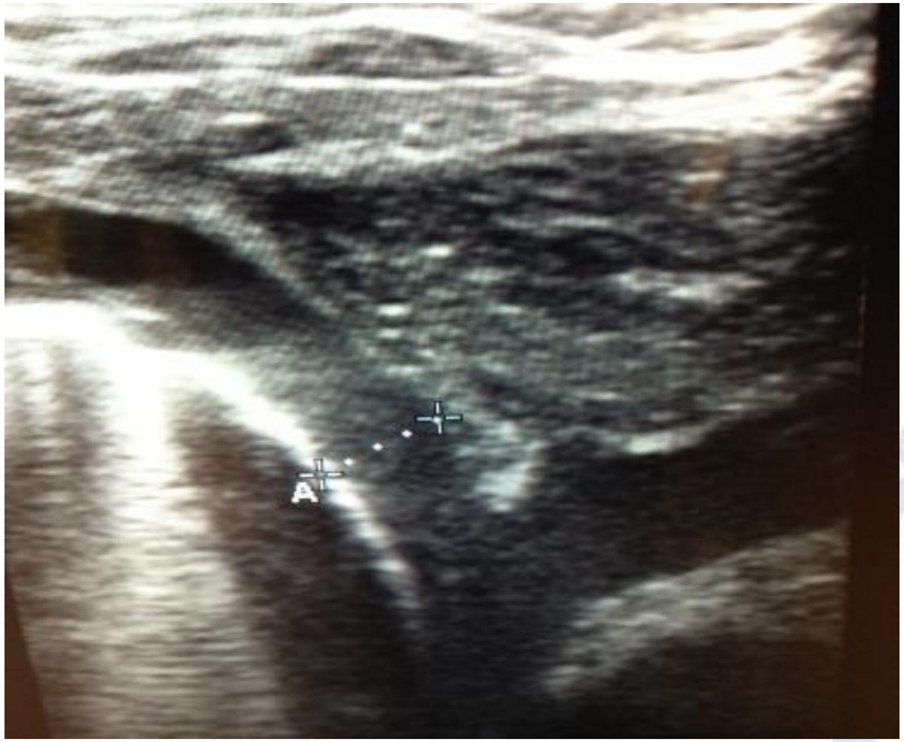
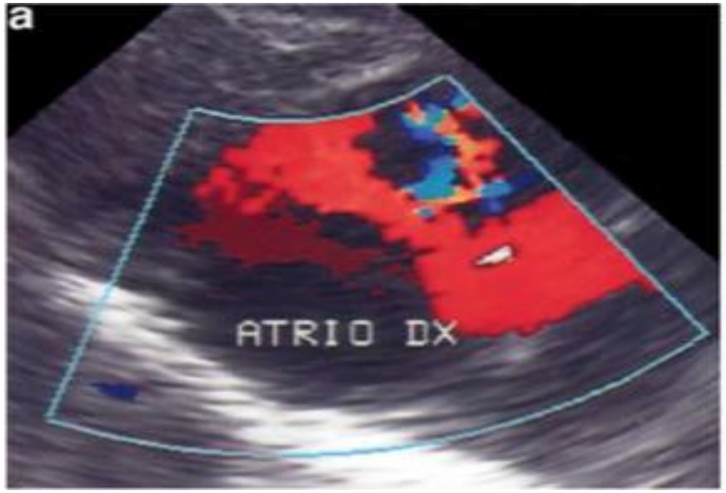
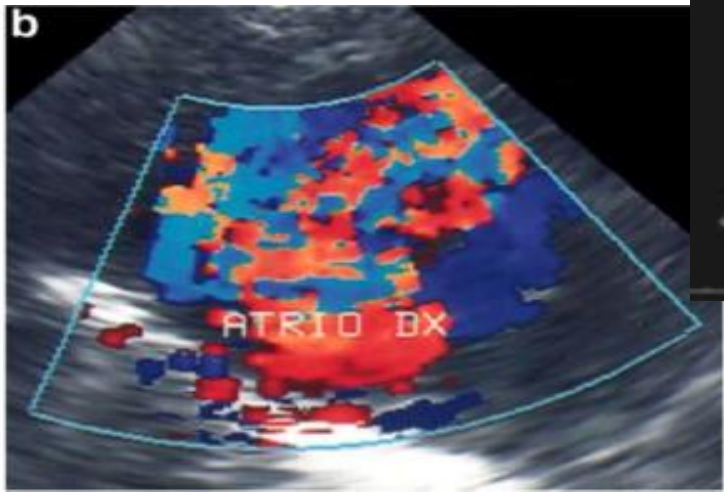


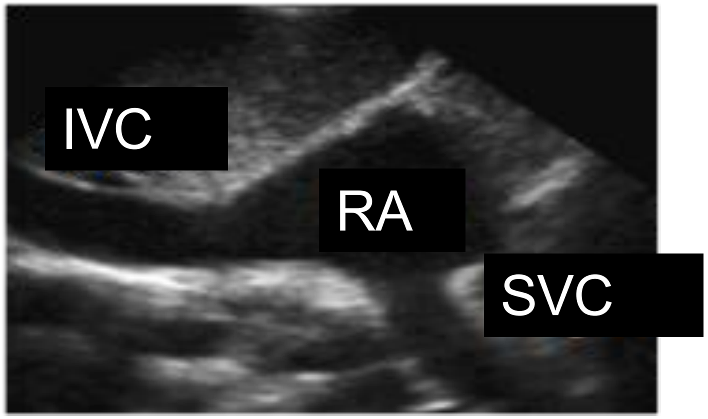
Vena Cava Superiore

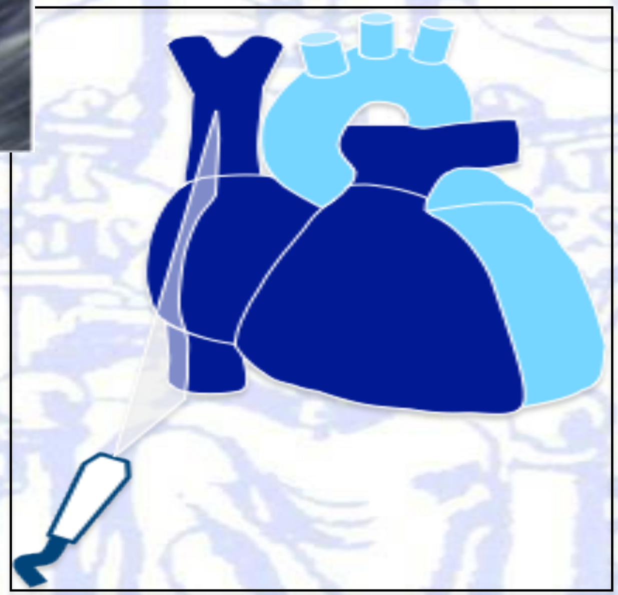


Tip location









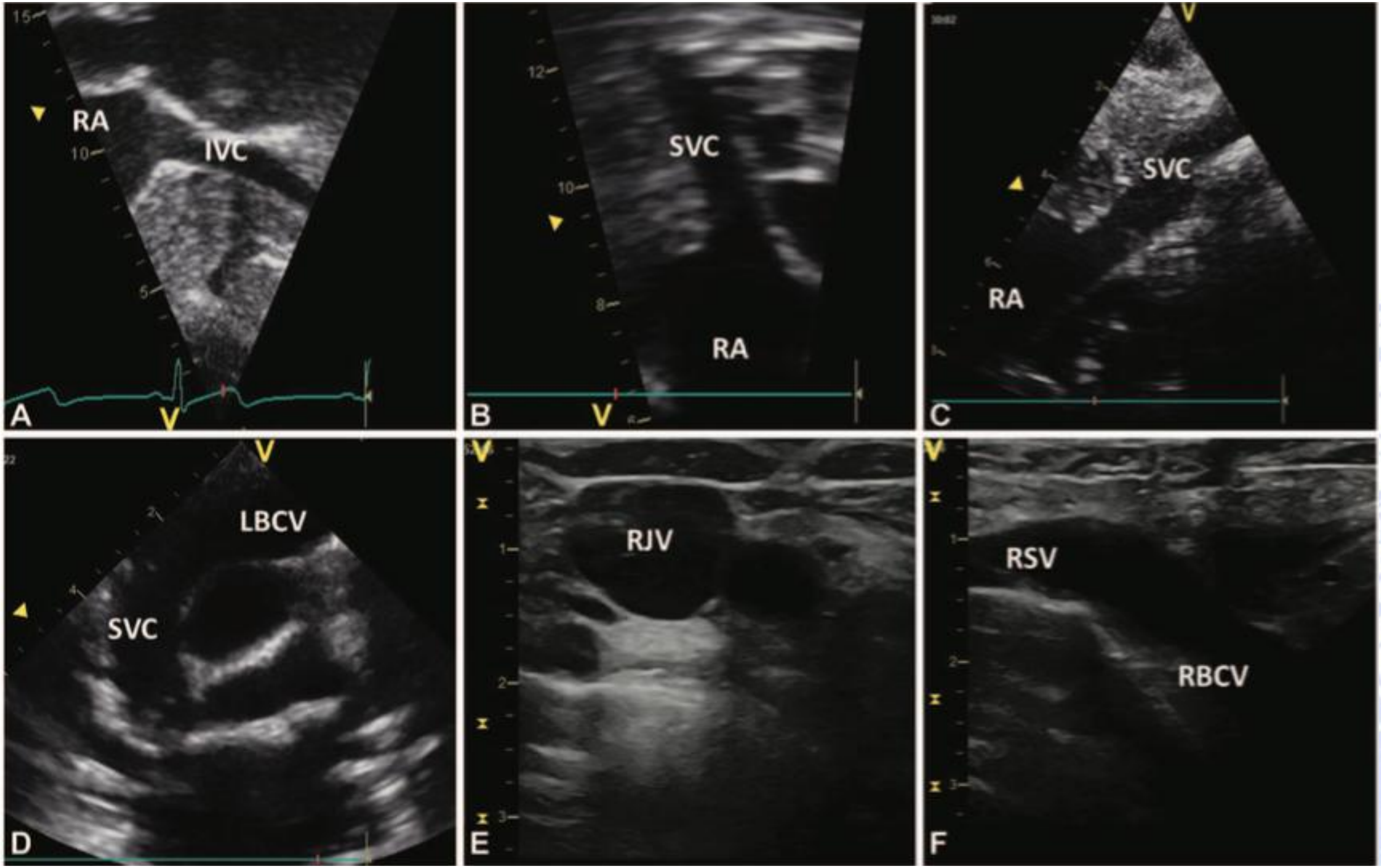
Letteratura Pediatrica

Alonso-Quintela	*2015*	*Observational Prospective*	*40*	*Tip nav + Tip loc*
Park	*2014*	*Observational Prospective*	*108*	*Tip nav + Tip loc*
Lanza	*2006*	*Observational Prospective*	*107*	*Tip loc + saline flush (doppler)*

Online Brief Report

Location of the Central Venous Catheter Tip With Bedside Ultrasound in Young Children: Can We Eliminate the Need for Chest Radiography?*

Paula Alonso-Quintela, MD[1,2]; Ignacio Oulego-Erroz, MD[1,2]; Silvia Rodriguez-Blanco, MD[1]; Manoel Muñiz-Fontan, MD[1]; Santiago Lapeña-López-de Armentia, MD, PhD[1,2]; Antonio Rodriguez-Nuñez, MD, PhD[3,4]



RA
IVC
A
SVC
RA
B
SVC
RA
C
LBCV
SVC
D
RJV
E
RSV
RBCV
F

TABLE 1. Catheter Tip Position and Time to Verification

	Chest Radiography	Bedside Ultrasonography	*p*
Catheter tip malposition	6 out of 51	8 out of 51	<0.05[a]
Jugular ($n = 17$)	2 (1 LSVC, 1 IA)	2 (1 LSVC, 1 IA)	
Subclavian-brachiocephalic vein ($n = 9$)	0	2 (2 IA)	
Peripherally inserted central catheter ($n = 2$)	1 (1 jugular)	1 (1 jugular)	
Femoral ($n = 23$)	3 (2 IA, 1 left renal vein)	3 (3 IA)	
Catheter tip–cavoatrial junction distance, cm	1.44 (0.55)	1.05 (0.43)	<0.001[b]
Time, min	22.96 (20.43)	2.23 (1.06)	<0.001[b]

TABLE 2. Comparison of Ultrasound Data for Upper-Body and Lower-Body Central Venous Catheters

	Upper-Body CVCs ($n = 28$)	Lower-Body CVCs ($n = 23$)
Age (mo)	5 (IQR, 2–25; range, 0.2–170)	8 (IQR, 3–30; range, 0.1–82)
Weight (kg)	5.2 (IQR, 4.2–16; range, 2.5–61)	7.9 (IQR, 4.7–21; range, 2.8–32)
CVC size (F)	4 (IQR, 4–5.5; range, 3–7)	4 (IQR, 4–5.5; range, 3–7)
Subcostal view only/other views needed	19/9	23/0[a]
CVC tip–CAJ distance, ultrasound (cm)	0.99 (0.41)	1.13 (0.44)
CVC tip–CAJ distance, CXR-ultrasound difference (cm)	0.38 (0.39)	0.37 (0.36)
Concordance with CXR in CVC tip location	26/28 (93%)	21/23 (91%)
Ultrasound protocol time (min)	2.5 (1.24)	1.9 (0.69)[b]

Pediatric Anesthesia

Pediatric Anesthesia ISSN 1155-5645

ORIGINAL ARTICLE

Transthoracic echocardiographic guidance for obtaining an optimal insertion length of internal jugular venous catheters in infants

Yong-Hee Park[1], Ji-Hyun Lee[2], Hyo-Jin Byon[3], Hee-Soo Kim[2] & Jin-Tae Kim[2]

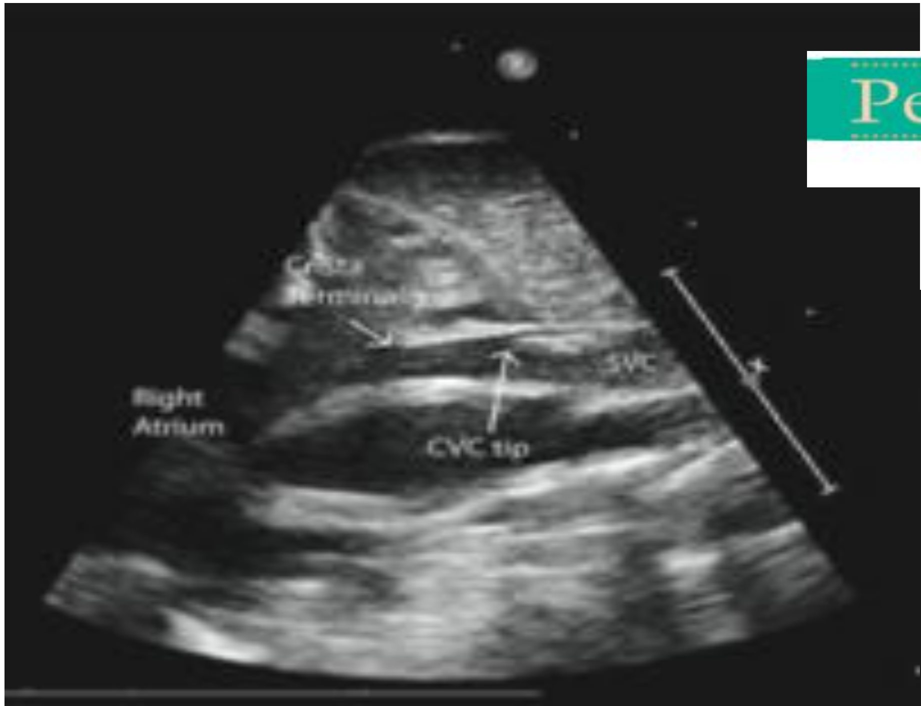
1 Department of Anesthesiology and Pain Medicine, Chung-Ang University Hospital, Seoul, Korea
2 Department of Anesthesiology and Pain Medicine, Seoul National University Hospital, Seoul, Korea
3 Department of Anesthesiology and Pain Medicine, In-Ha University Hospital, Incheon, Korea

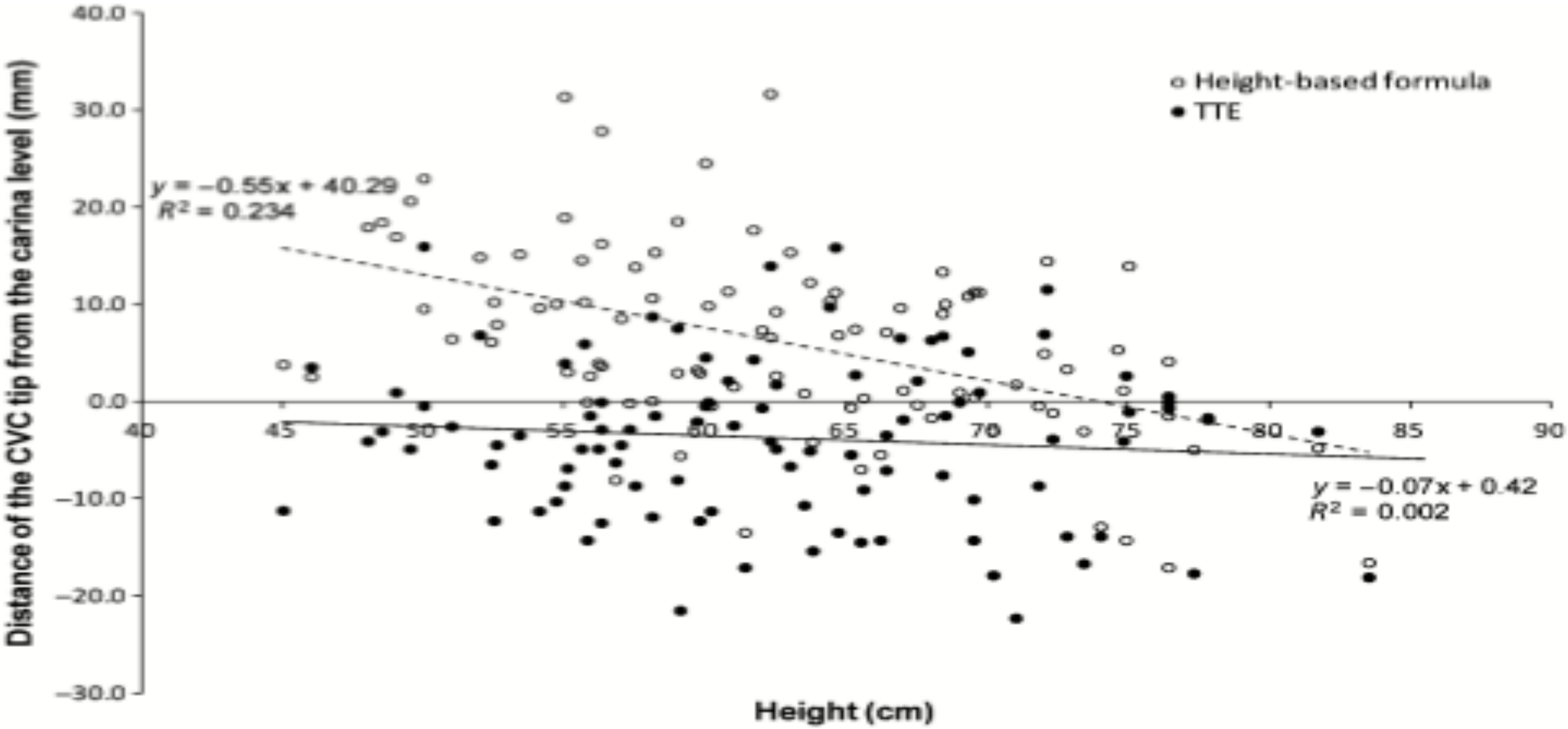
Results: Among 106 cases, positioning of the CVC tip under TTE guidance failed in four patients; thus, the success rate was 96.2%. The mean distance from the CVC tip to the level of the carina was different for positioning using the TTE method (-3.8 ± 8.2 mm; 95% confidence interval, -5.5 to -2.2 mm) and that using the height-based formula (6.1 ± 9.6 mm; 95% CI, 4.2 to 8.0 mm; $P = 0.001$). The distance was consistent regardless of the height when the insertion length was determined using TTE ($r = -0.048$, $P > 0.05$).

Conclusions: Transthoracic echocardiography is a practical method for the correct placement of the CVC tip with less variability compared to the height-based method.

Pediatric Anesthesia

Pediatric Anesthesia ISSN 1155-5645





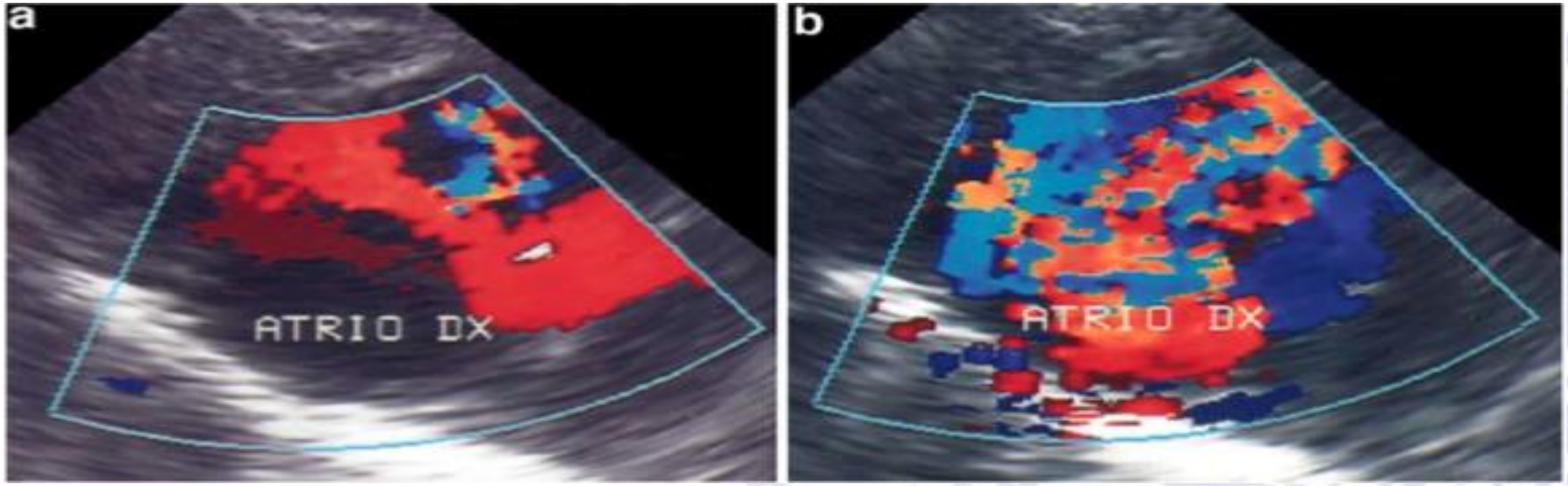
Height-based formula
TTE
y = −0.55x + 40.29
R² = 0.234
y = −0.07x + 0.42
R² = 0.002
Distance of the CVC tip from the carina level (mm)
Height (cm)
40.0
30.0
20.0
10.0
0.0
−10.0
−20.0
−30.0
40
45
50
55
60
65
70
75
80
85
90

Pediatr Radiol (2006) 36: 1252–1256
DOI 10.1007/s00247-006-0307-y

ORIGINAL ARTICLE

Cecilia Lanza · Marco Russo · Giancarlo Fabrizzi

Central venous cannulation: are routine chest radiographs necessary after B-mode and colour Doppler sonography check?



- Color Doppler signals in the vena cava.

- Increased colour signal due to turbulent flow during infusion of saline solution

Pediatr Radiol (2006) 36: 1252–1256
DOI 10.1007/s00247-006-0307-y

ORIGINAL ARTICLE

Cecilia Lanza · Marco Russo · Giancarlo Fabrizzi

Central venous cannulation: are routine chest radiographs necessary after B-mode and colour Doppler sonography check?

Table 2 Malpositions and complications

Complications	Postprocedural chest radiograph	Colour Doppler
Total	13	11
Malposition		
Right atrium	7	6
Axillary vein	5	4
Pneumothorax	1	1

Problemi metodologici…

- Reference standard inaccurato
  - US vs RX
- Sample size inadeguato
- Sensibilità bassa per bassa incidenza di malposizioni rilevate

Can J Anesth/J Can Anesth (2018) 65:427–436
https://doi.org/10.1007/s12630-018-1049-7

CrossMark

REVIEW ARTICLE/BRIEF REVIEW

Acquiring and maintaining point-of-care ultrasound (POCUS) competence for anesthesiologists

L'acquisition et le maintien des compétences en échographie au chevet (POCUS) pour les anesthésiologistes

T. Jared McCormick, MD · Elizabeth Clarke Miller, MD · Robert Chen, MD · Viren N. Naik, MD, MEd, MBA

Examination	Views
Basic critical care echocardiography	Parasternal long axis
	Parasternal short axis
	Apical four-chamber view
	Sub-xiphoid four-chamber view
	Inferior vena cava-long axis
Lung and pleura	Anterior chest wall
	Anterolateral chest wall
	Posterosuperior chest wall
	Posteroinferior chest wall
Abdominal free fluid	Right upper quadrant view
	Left upper quadrant view
	Suprapubic view
Guidance for vascular access	Short axis of vessel and surrounding structures
	Long axis of vessel with guidewire *in situ*

Point-of-Care Ultrasound in General Practice: A Systematic Review

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ABSTRACT

PURPOSE Ultrasound examinations are currently being implemented in general practice. This study aimed to systematically review the literature on the training in and use of point-of-care ultrasound (POCUS) by general practitioners.

METHODS We followed the Cochrane guidelines for conduct and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for reporting. We searched the databases MEDLINE (via PubMed), EMBASE, CINAHL, Web of Science, and Cochrane Central Register of Controlled Trials using the key words *ultrasonography* and *general practice* in combination and using thesaurus terms. Two reviewers independently screened articles for inclusion, extracted data, and assessed the quality of included studies using an established checklist.

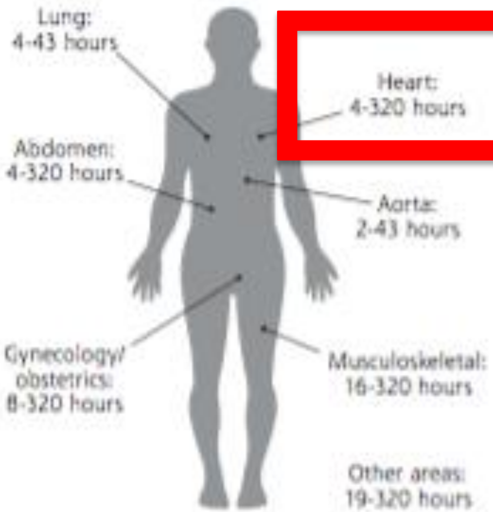
RESULTS We included in our review a total of 51 full-text articles. POCUS was applied for a variety of purposes, with the majority of scans focused on abdominal and obstetric indications. The length of training programs varied from 2 to 320 hours. Competence in some types of focused ultrasound scans could be attained with only few hours of training. Focused POCUS scans were reported to have a higher diagnostic accuracy and be associated with less harm than more comprehensive scans or screening scans. The included studies were of a low quality, however, mainly because of issues with design and reporting.

CONCLUSIONS POCUS has the potential to be an important tool for the general practitioner and may possibly reduce health care costs. Future research should aim to assess the quality of ultrasound scans in broader groups of general practitioners, further explore how these clinicians should be trained, and evaluate the clinical course of patients who undergo scanning by general practitioners.

Ann Fam Med 2019;17:61-69. https://doi.org/10.1370/afm.2330.

Figure 3. Training in ultrasound examinations by anatomic area.

Training Time



Elements of Training		References
Heart	Elements of training: lectures: 5 studies; hands-on: 6 studies; e-learning: 2 studies; case review: 2 studies; supervised scans: 2 studies; training in hospital: 2 studies	20-22, 27, 32, 39, 52, 58, 65, 67
Lung	Elements of training: lectures: 2 studies; hands-on: 2 studies; e-learning: 1 study; case review: 1 study; supervised scans: 1 study; training in hospital: 1 study	22, 30, 32
Aorta	Elements of training: lectures: 7 studies; hands-on: 6 studies; e-learning: 3 studies; case review: 3 studies; supervised scans: 6 studies; training in hospital: 3 studies	17, 19, 20, 22, 32, 37, 51, 57, 59, 62, 63, 65
Abdomen	Elements of training: lectures: 6 studies; hands-on: 6 studies; e-learning: 1 study; case review: 2 studies; supervised scans: 4 studies; training in hospital: 4 studies	20, 25, 26, 31-33, 37, 51, 57, 62, 63, 65
Gynecology/obstetrics	Elements of training: lectures: 9 studies; hands-on: 9 studies; e-learning: 2 studies; case review: 3 studies; supervised scans: 7 studies; training in hospital: 8 studies	20, 23, 24, 35, 36, 40, 45, 46, 49-51, 55-57, 60-62, 64
Musculoskeletal	Elements of training: lectures: 1 study; hands-on: 2 studies; e-learning: 1 study; case review: 1 study; training in hospital: 1 study	20, 24, 62
Other areas	Elements of training: e-learning: 1 study; case review: 2 studies; supervised scans: 1 study; training in hospital: 1 study	22, 24, 62

Note: Icons made by Freepik from www.flaticon.com.

Clinical Review & Education

Review

Point-of-Care Ultrasound in Pediatric Clinical Care

David J. McLario, DO, MS; Adam B. Sivitz, MD

JAMA Pediatrics June 2015 Volume 169, Number 6

Box. Pediatric Point-of-Care Ultrasound Applications

Basic

1. Basic echocardiography
2. Volume and/or hydration assessment
3. Peripheral vascular access
4. Soft-tissue examination (abscess and/or cellulitis)
5. Bladder volume measurement
6. Musculoskeletal examination (long bone fractures)
7. Intrauterine pregnancy identification

Advanced

1. Resuscitation (eg, extended focused assessment with sonography in trauma, rapid ultrasound for shock and hypertension)
2. Foreign body detection and removal
3. Nerve blocks
4. Pulmonary applications
5. Central vascular access
6. Ocular applications
7. Abdomen (constipation, hydronephrosis, hepatobiliary system, and spleen)

Emergency Medicine Australasia (2008) **20**, 32–37 doi: 10.1111/j.1742-6723.2007.01039.x

ORIGINAL RESEARCH

How fast is the focused assessment with sonography for trauma examination learning curve?

O John Ma,[1] Gary Gaddis,[2] Jeffrey G Norvell[3] and Srikala Subramanian[2]
[1]Department of Emergency Medicine, Oregon Health and Science University, Portland, Oregon,
[2]Department of Emergency Medicine, University of Missouri–Kansas City School of Medicine,
[3]Division of Emergency Medicine, University of Kansas School of Medicine, Kansas City, Kansas, USA

Table 1. Accuracy of FAST examination interpretation at baseline, 6 months, 12 months and 18 months for examinations with varying sizes of AS

	Accuracy percentage (95% CI)			
	Baseline	6 months	12 months	18 months
No AS	79.8 (70.3–86.9)	85.9 (77.1–91.8)	91.9 (84.2–96.2)	92.9 (85.5–96.9)
Small AS	27.8 (10.7–53.6)	50.0 (26.8–73.2)	66.7 (41.2–85.7)	72.2 (46.4–89.3)
Medium AS	63.0 (42.5–79.9)	80.6 (63.4–91.2)	86.1 (69.7–94.8)	91.7 (76.4–97.8)
Large AS	77.8 (57.3–90.6)	92.6 (74.2–98.7)	85.2 (65.4–95.2)	100.0 (84.5–100)
Cardiac view	80.0 (64.9–89.9)	86.7 (72.5–94.5)	91.1 (77.9–97.1)	91.1 (77.9–97.1)
RUQ view	77.8 (62.5–88.3)	91.1 (77.9–97.1)	95.6 (83.6–99.2)	95.6 (83.6–99.2)
LUQ view	64.4 (48.7–77.7)	77.8 (62.5–88.3)	80.0 (64.9–89.9)	82.2 (67.4–91.5)
Pelvic view	66.7 (50.9–79.6)	73.3 (57.8–84.9)	82.2 (67.4–91.5)	97.8 (86.8–99.9)
Mean number FAST per EM resident	0	13	35	73

Training: questioni aperte?

- Quale training per l’impiantatore generico?

- Quale training per pediatra/intensivista pediatra?

Tip navigation + Tip location

PROPOSTA DI ALGORITMO ECHOTIP NEL BAMBINO

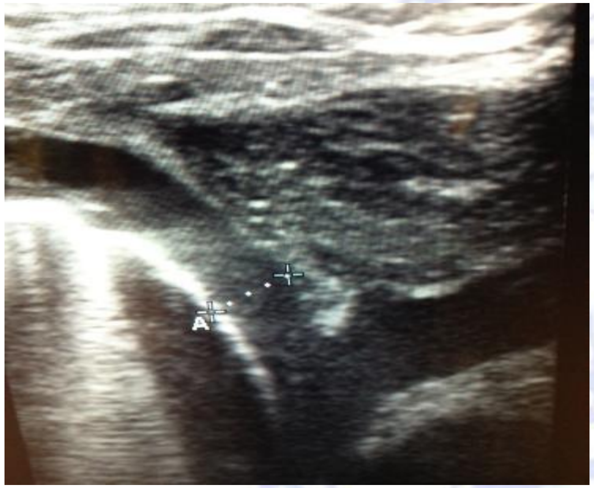
Perché un algoritmo?

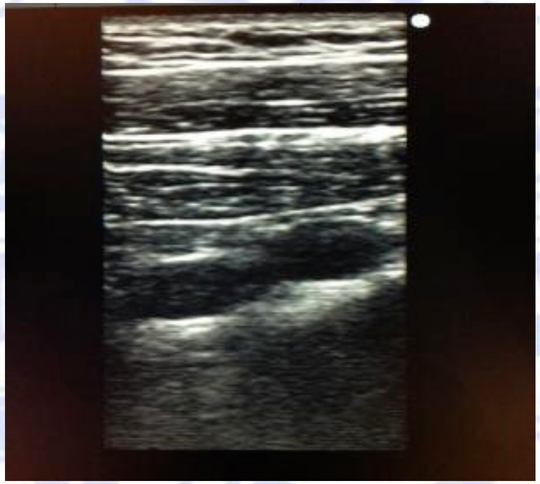
- Targeting zero limitations!
  - Paziente-dipendenti
  - Operatore-dipendenti

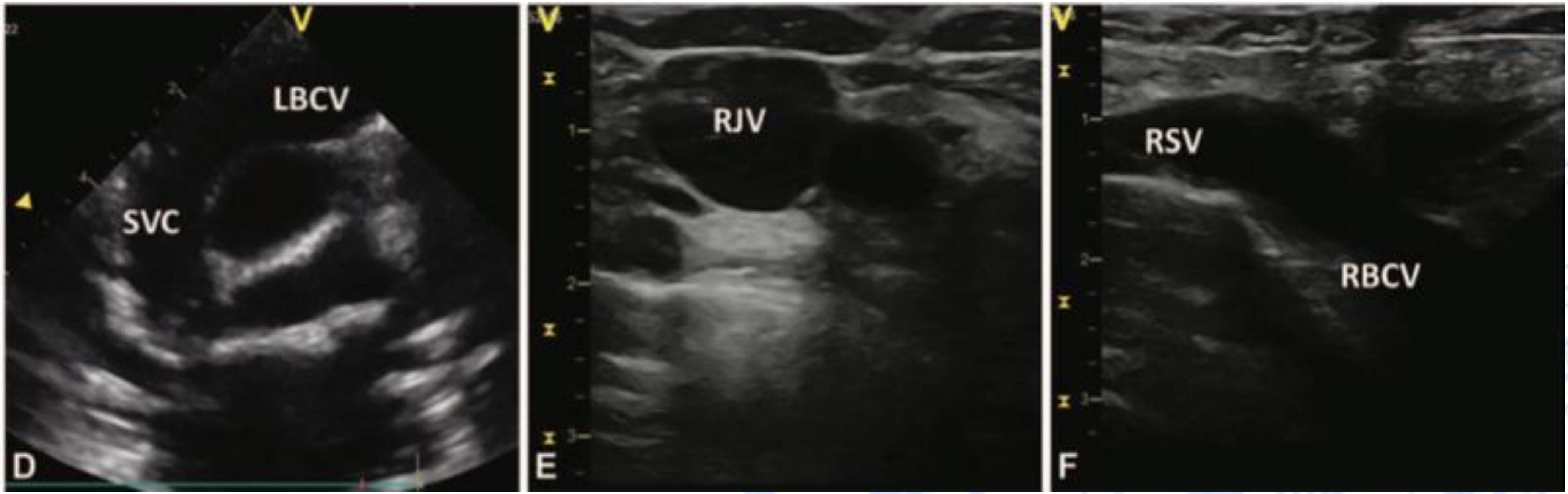
Scansione Sovrasternale: tip navigation

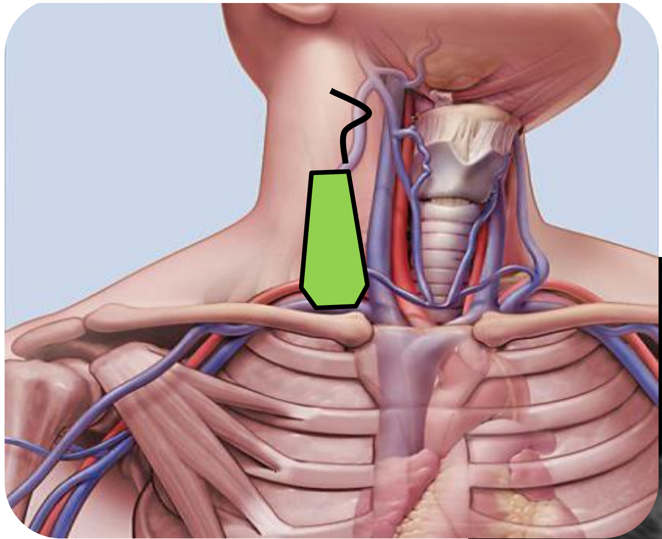
- Mandatoria
- Include:
  - Valutazione vasi omolaterali e, eventualmente, visualizzazione di guida o catetere nei vasi controlaterali ‘real-time’
  - Visualizzazione della Vena Cava Superiore
- Sonde
  - Lineare
  - Microconvex

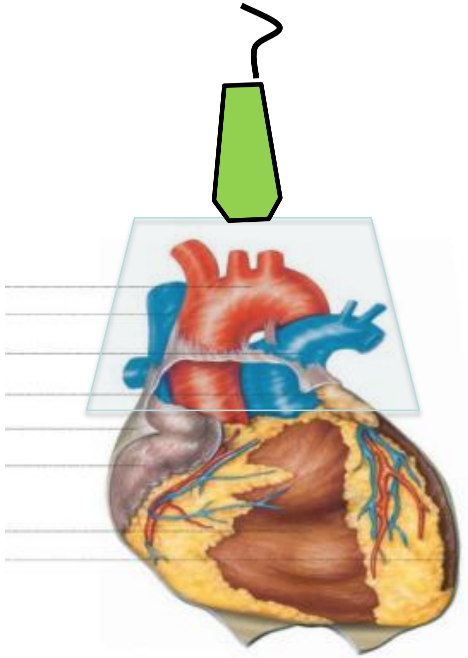

2011

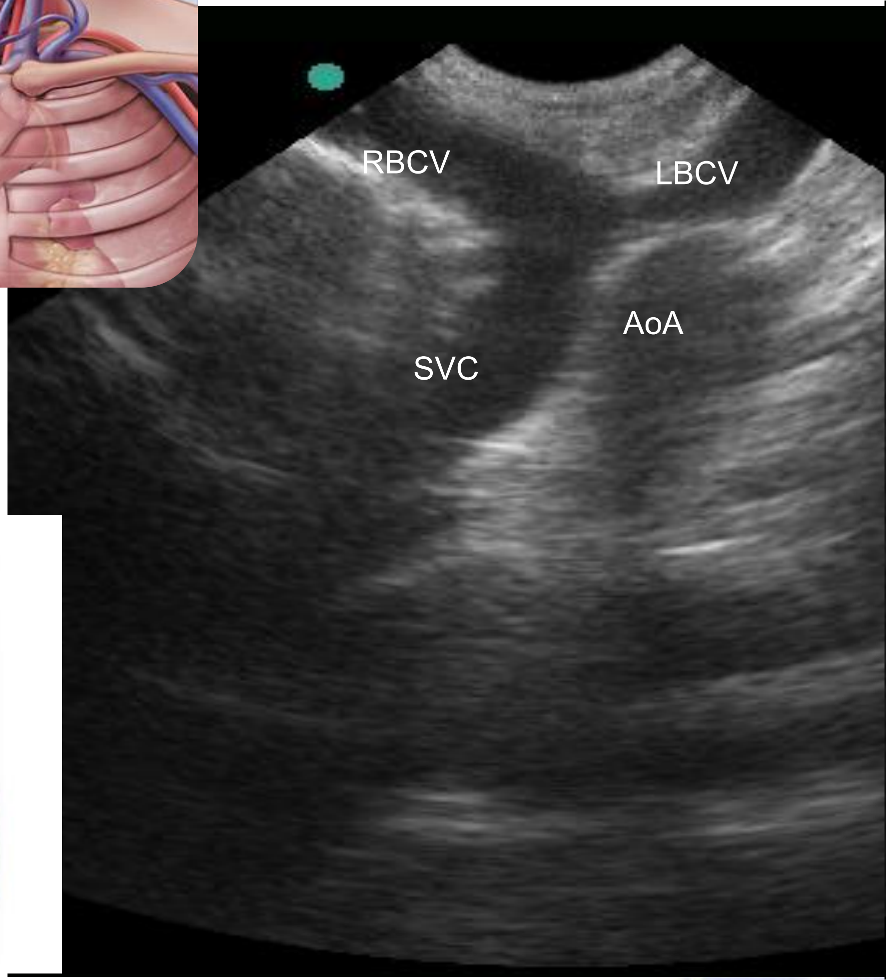


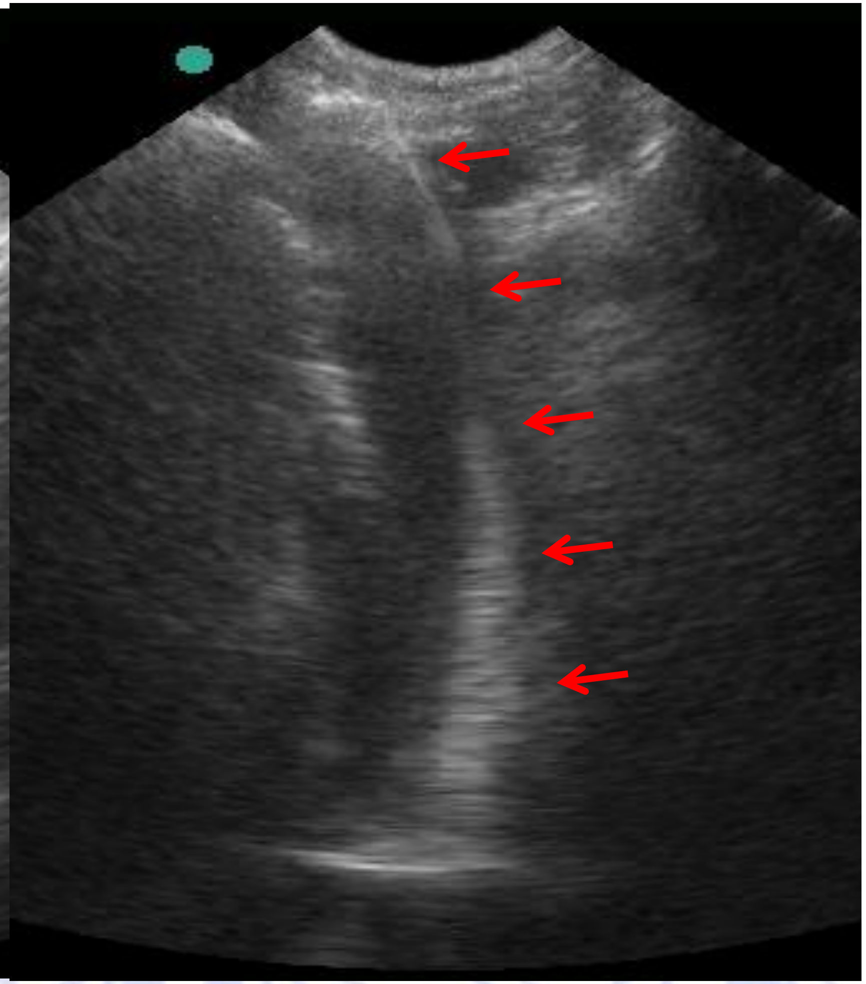


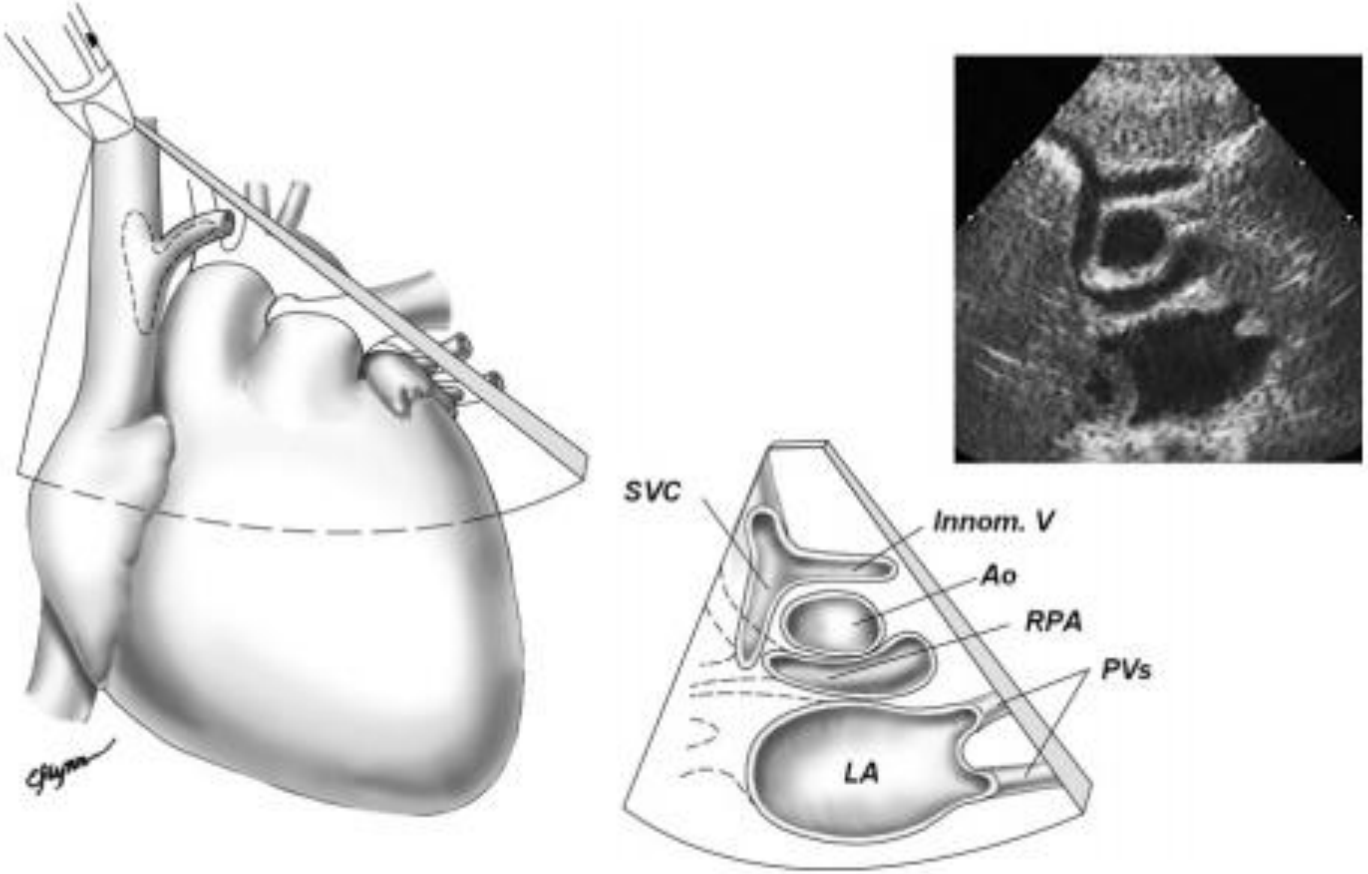

LBCV
SVC
D
RJV
E
RSV
RBCV
F






RBCV
LBCV
AoA
SVC



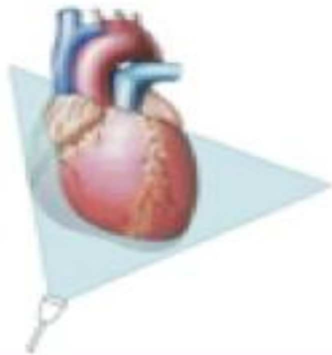


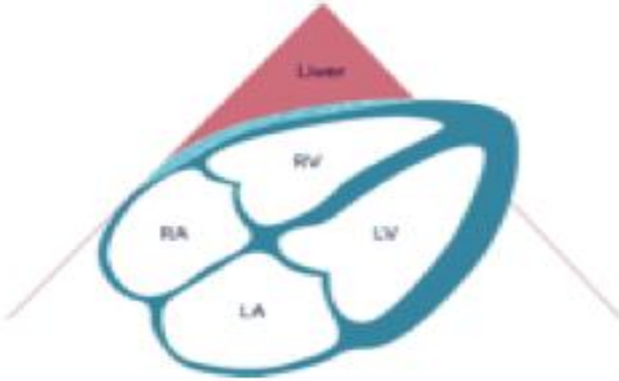
SVC
Innom. V
Ao
RPA
PVs
LA

Scansione Sottocostale Bicavale

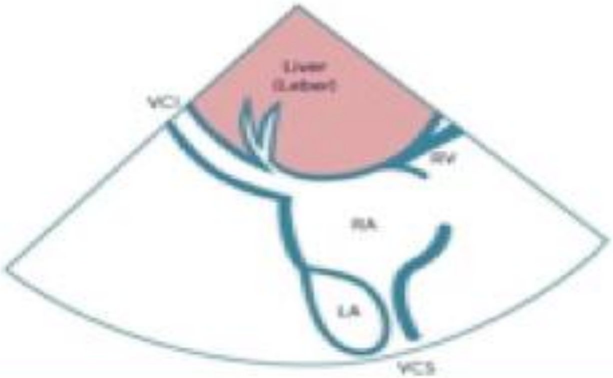
- Raccomandata (per tip location ecografica)
  - *Learning Curve* rapida
- Include:
  - Valutazione VCI, atrio destro, VCS
  - Ideale per verifica corretto posizionamento cateteri cavali inferiori e cavali superiori
- Sonde
  - Microconvex
  - Settoriale

Subcostal Views





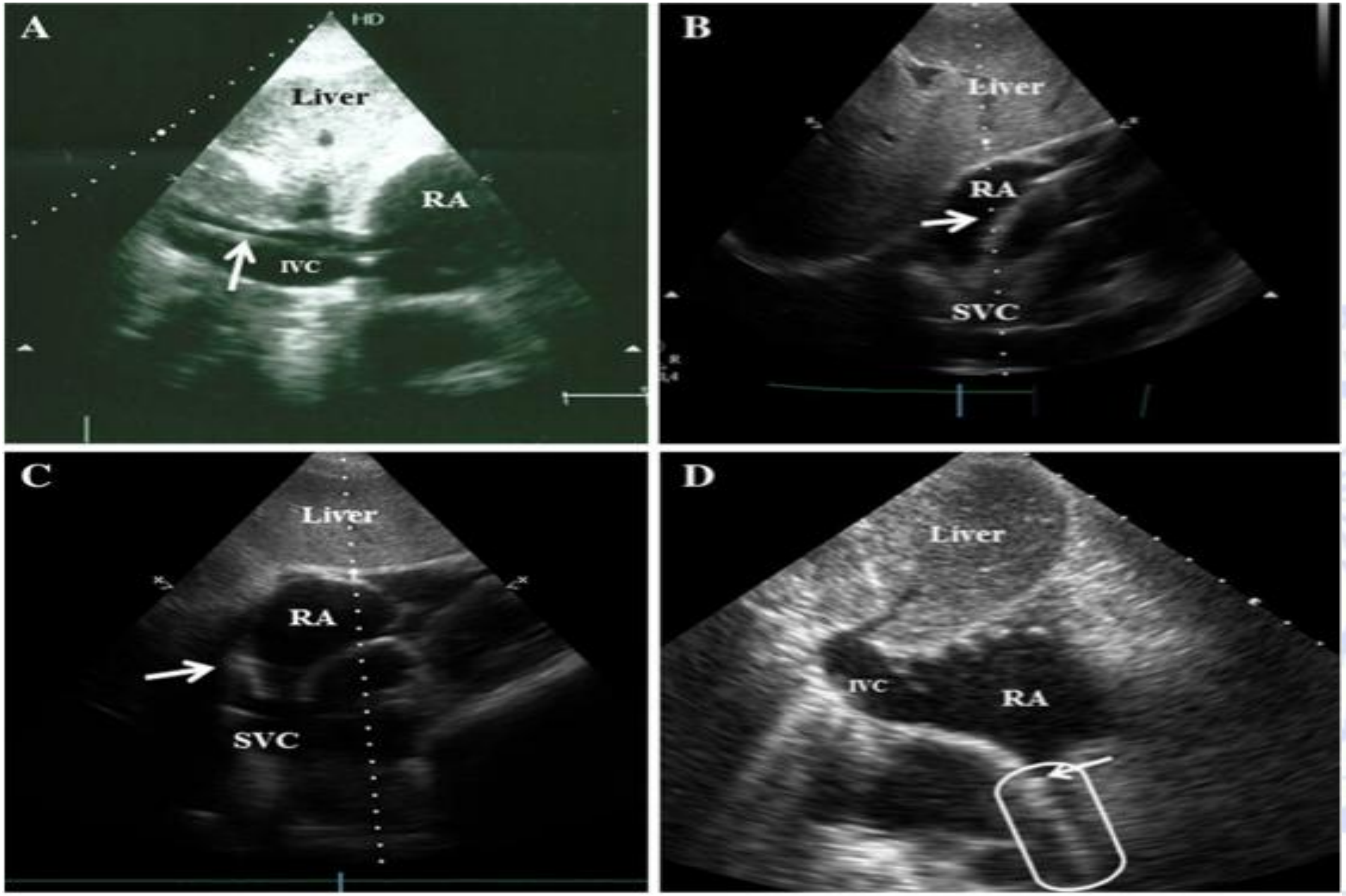
Subcostal 4 chamber view



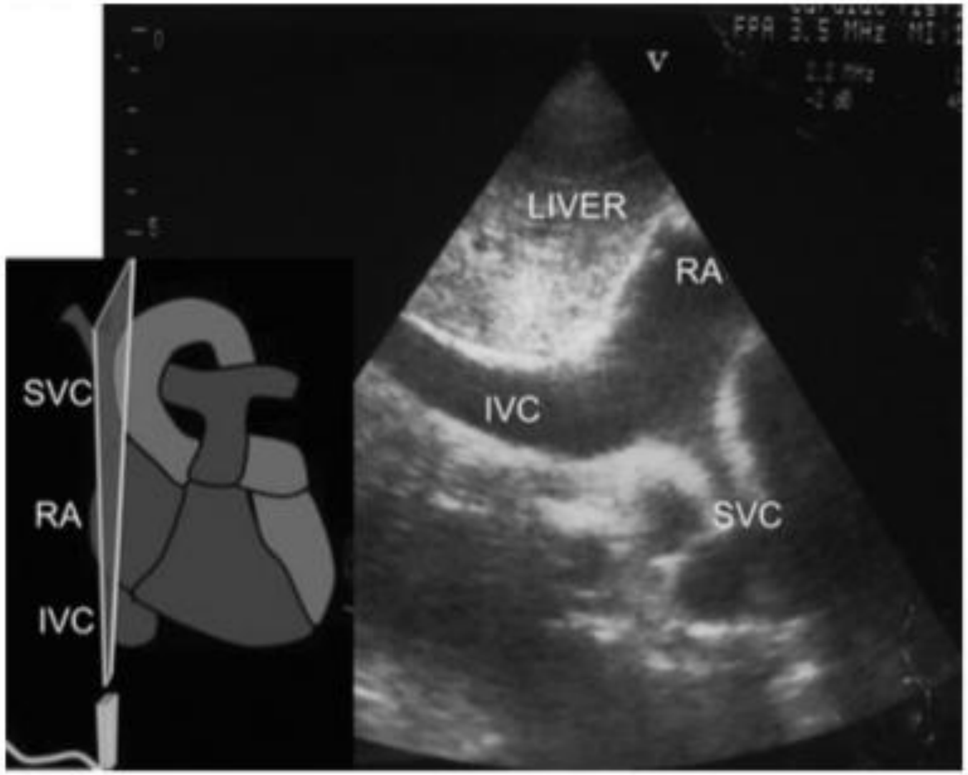
Vena cava inferior view

Sottocostale 4 camere

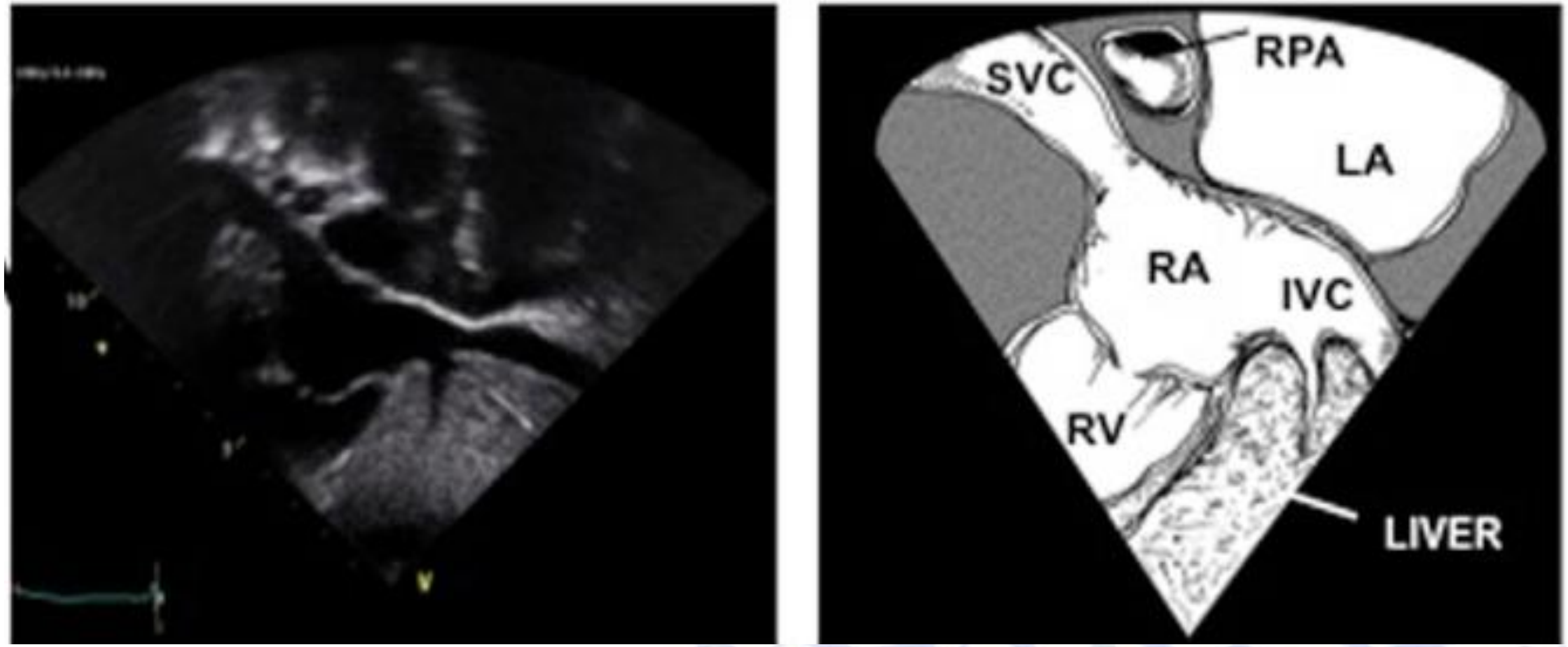
- Nessun vantaggio rispetto alla sottocostale bicavale
- E’ necessario però conoscere come ottenerla al fine di acquisire correttamente la scansione sottocostale bi-cavale

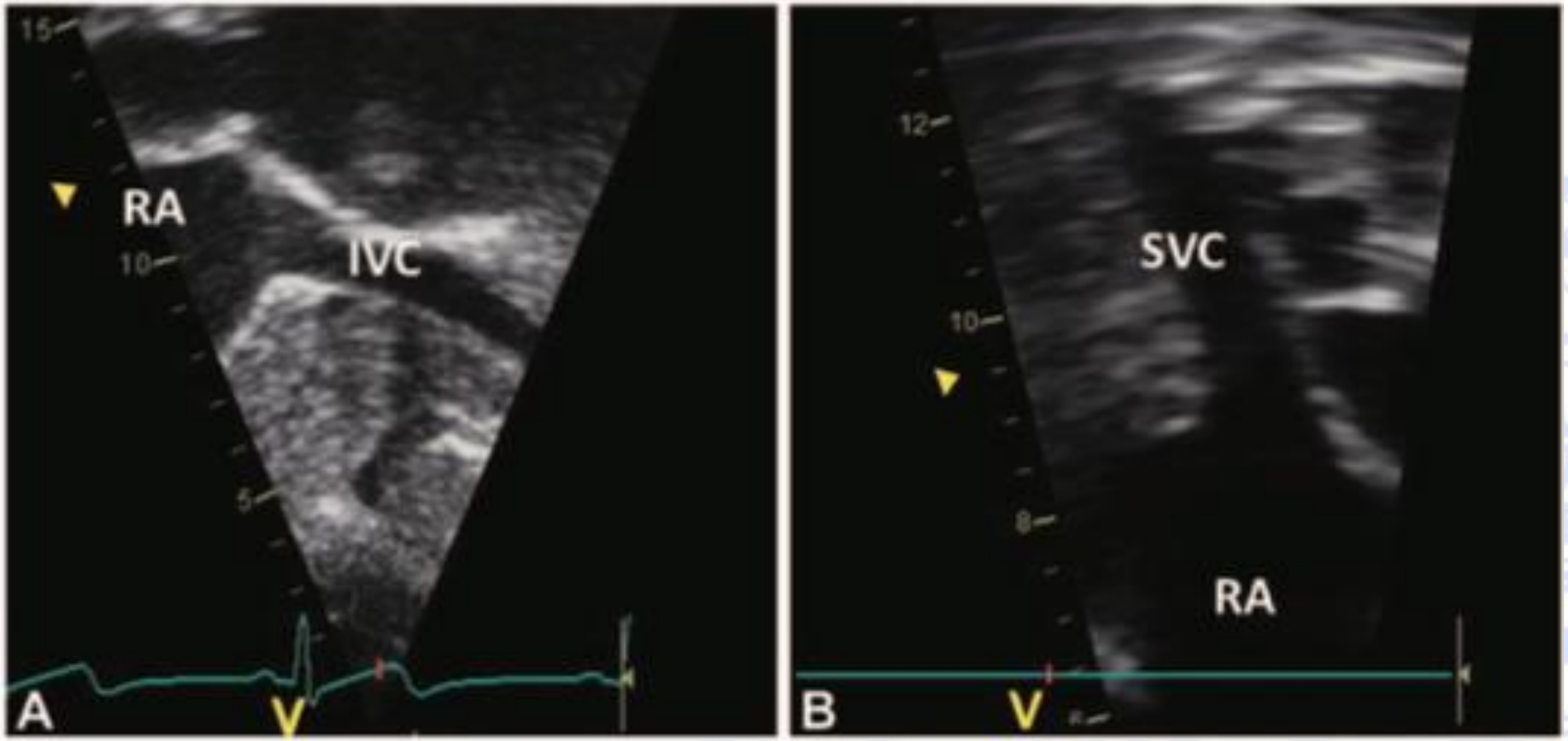


Bedel et al. Intensive Care Med (2013) 39:1932–1937

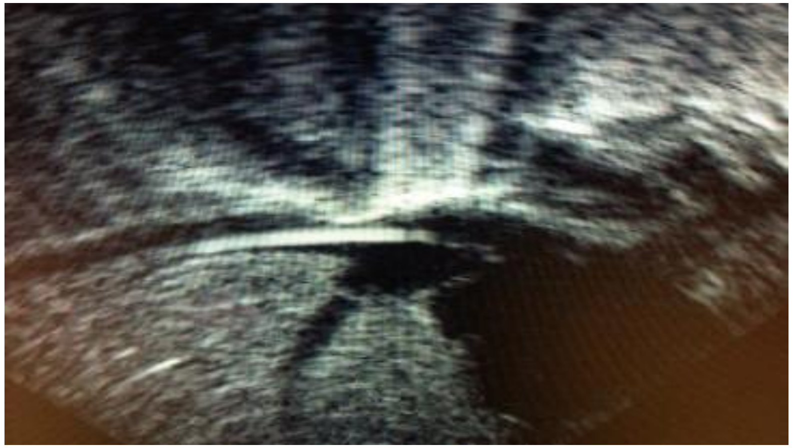

V
LIVER
RA
IVC
SVC
SVC
RA
IVC


V


SVC
RPA
LA
RA
IVC
RV
LIVER


15
RA
IVC
10
5
V
A
12
SVC
10
8
RA
V
B

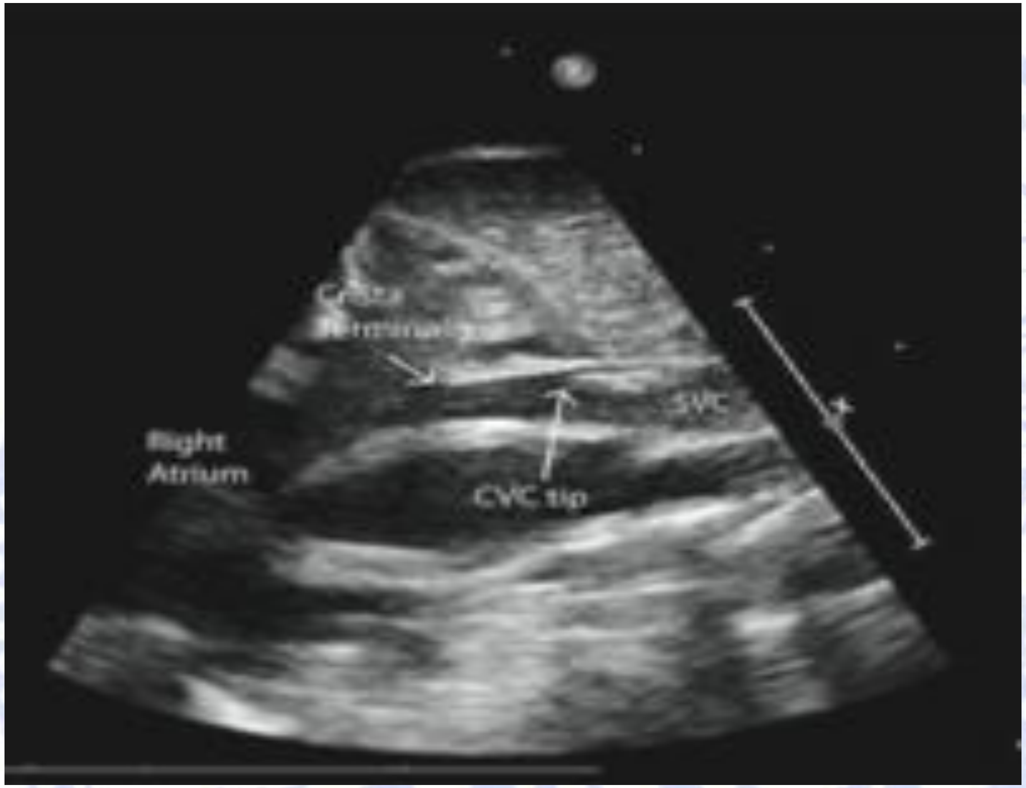
Ideale nei neonati…



Scansione Parasternale Dx

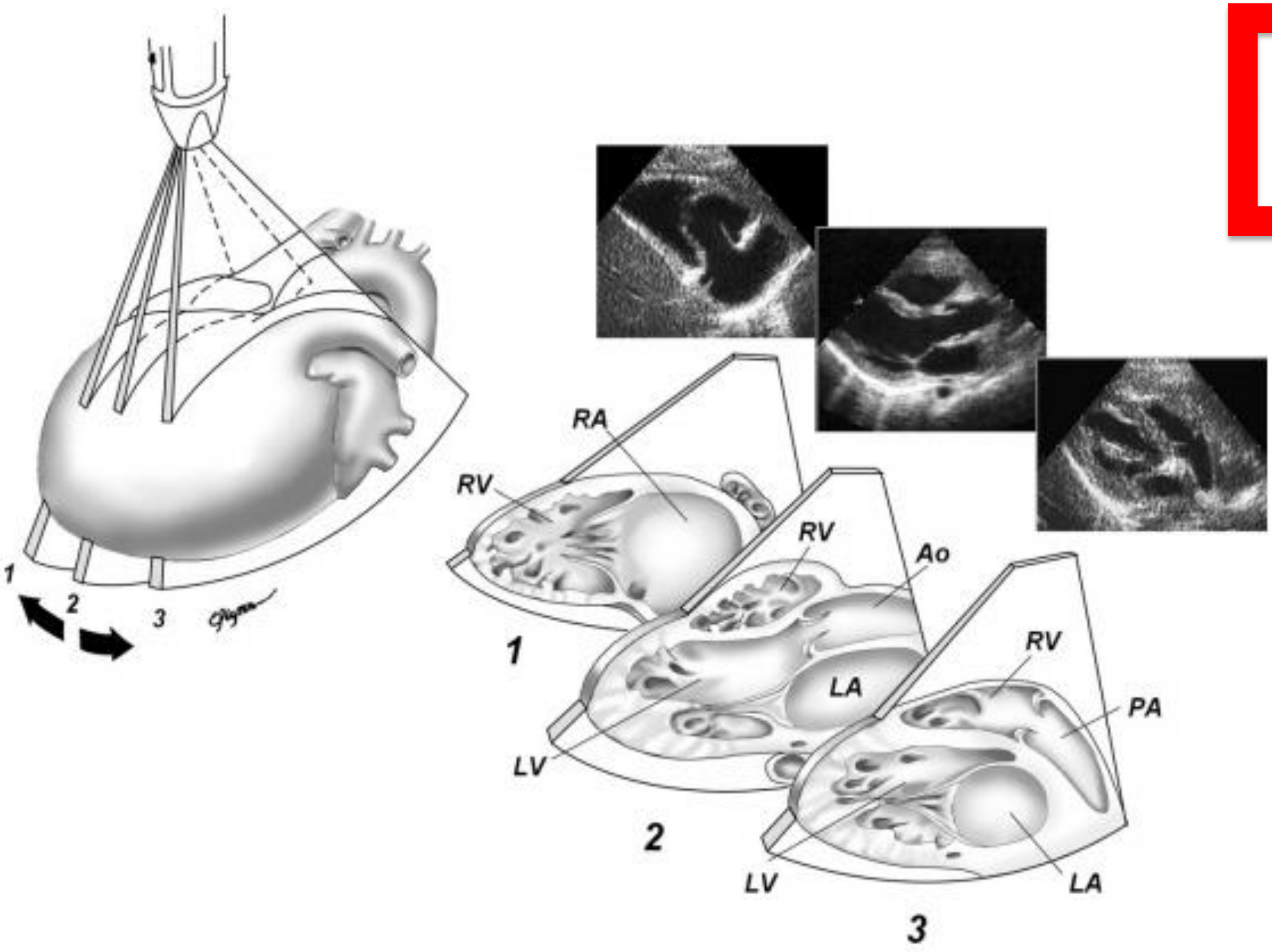
- Consigliata
  - *Skill avanzata*
  - *Necessità di training specifico*
- Include:
  - Valutazione Atrio destro, VCS, crista terminalis
- Sonde
  - Settoriale


SVC
RA


SVC
Right
Atrium
CVC tip

Scansione Parasternale Sx

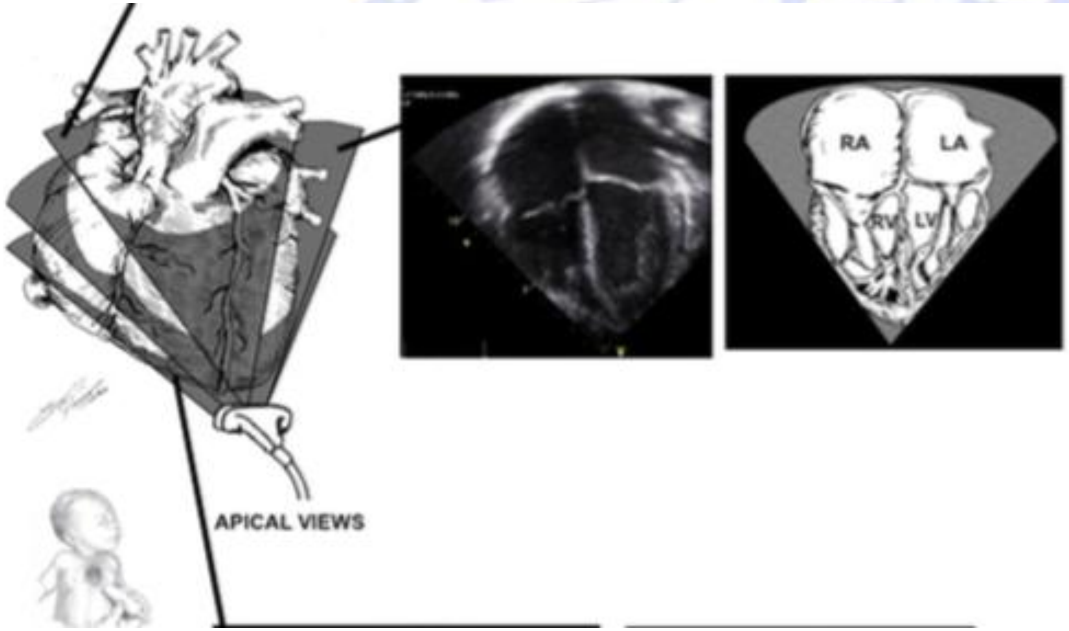
- Consigliata
  - *Skill avanzata*
  - *Necessità di training specifico*
- Include:
  - Valutazione Atrio destro, VCS, crista terminalis
- Sonde
  - Settoriale



Left parasternal views
Inferior vena cava
Superior vena cava
Left atrium
Right atrium
Atrial septum
Coronary sinus
Pulmonary veins
Mitral valve
Tricuspid valve
Left ventricle
Right ventricle
Ventricular septum
Left ventricular papillary muscles
Aortic valve
Pulmonary valve
Ascending aorta
Coronary arteries
Main and branch pulmonary arteries
Pericardium

Apicale 4 camere

- Nessun vantaggio rispetto alle altre proiezioni
- Necessità di training avanzato
- Difficile da ottenere, in particolare nel bambino critico in terapia intensiva



Color-Doppler?

- Gli studi non ne documentano alcun vantaggio

Prospettive Future

- Necessità di nuovi studi condotti con metodologia rigorosa e corretta, possibilmente multicentrici:
  - Sensibilità e specificità: confronto con reference standard accurato (Ic-EKG o TEE)
  - Training: learning curve per ciascuna scansione raccomandata/consigliata
    - Impiantatore generico
    - Intensivista pediatra/pediatra/chirurgo pediatra
  - Varibilità inter-osservatore e intra-osservatore
  - …

Protocollo Echo Tip per il CVO

Il protocollo Echotip prevede il posizionamento ecoguidato del CVO mediante l'ausilio dell'ecografia sia come strumento di **tip navigation** che come strumento di **tip location**:

Tip navigation:

Sonda: microsettoriale, impostare una frequenza tra 7-8 MHz

Finestra acustica: sottocostale longitudinale sagittale: visualizzare il dotto venoso e la sua prosecuzione nella vena cava inferiore.

Procedura: Durante l'inserimento del CVO seguire l'avanzamento del CVO all'interno del dotto venoso e nella vena cava inferiore fino al raggiungimento della posizione ideale.

Protocollo Echo Tip per il CVO

Il protocollo Echotip prevede il posizionamento ecoguidato del CVO mediante l'ausilio dell'ecografia sia come strumento di **tip navigation** che come strumento di **tip location**:

Tip location:

Sonda: microsettoriale, impostare una frequenza tra 7-8 MHz

Finestra acustica: sottocostale longitudinale sagittale: visualizzare la vena cava inferiore, l'atrio di destra e la vena cava superiore.

Procedura: Una volta posizionata la punta del CVO all'interno della zona target eseguire un flush rapido di soluzione fisiologica da 0.5-1 ml al fine di confermare la posizione della punta.

Protocollo Echo Tip per il CVO

Il protocollo Echotip prevede il posizionamento ecoguidato del CVO mediante l'ausilio dell'ecografia sia come strumento di **tip navigation** che come strumento di **tip location**:

A distanza di 24-48 ore dalla posizionamento del CVO controllare la posizione della punta per escludere eventuali malposizioni secondarie.

Protocollo Echo Tip per gli ECC inseriti dagli arti superiori e dallo scalpo

Il protocollo Echotip prevede il posizionamento ecoguidato dell'ECC mediante l'ausilio dell'ecografia sia come strumento di **tip navigation** che come strumento di **tip location**:

Tip navigation:

Sonda: lineare hockey stick, impostare una frequenza di 10-14MHz

Finestra acustica: usare le finestre acustiche previste dal RaCeVa e dal RaPeVa.

Procedura:

Il RaPeVA va utilizzato in caso di difficile progressione del CVC nelle vene profonde dell'arto superiore.

In caso di ECC inserito dagli arti superiori il RaCeVa permette di fare una corretta tip navigation del CVC durante il suo passaggio dalla vena succlavia, nella vena anonima e da qui nella VCS. Consente inoltre di prevenire malposizioni primarie (es vena anonima controlaterale o vena giugulare interna).

In caso di ECC inserito dallo scalpo il RaCeVa permette di fare una corretta tip navigation del CVC durante il suo passaggio dalla vena giugulare interna, nella vena anonima e da qui nella VCS

Protocollo Echo Tip per gli ECC inseriti dagli arti superiori e dallo scalpo

Il protocollo Echotip prevede il posizionamento ecoguidato dell'ECC mediante l'ausilio dell'ecografia sia come strumento di **tip navigation** che come strumento di **tip location**:

Tip location:

Sonda: microsettoriale, impostare una frequenza tra 7-8 MHz

Finestra acustica: usare almeno 3 proiezioni: parasternale asse lungo della VCS; 4 camere apicale; sottocostale bicavale.

Procedura: Una volta posizionata la punta del catetere all'interno della zona target (giunzione tra VCS e atrio di destra) eseguire un flush rapido di soluzione fisiologica da 0.5-1 ml al fine di confermare la posizione della punta

Protocollo Echo Tip per gli ECC inseriti dagli arti inferiori

Il protocollo Echotip prevede il posizionamento ecoguidato dell'ECC mediante l'ausilio dell'ecografia sia come strumento di **tip navigation** che come strumento di **tip location**:

Tip navigation:

Sonda: lineare hockey stick, impostare una 10-14MHz; microsettoriale 7-8 MHz.

Finestra acustica: usare la visualizzazione in asse corto e asse lungo della vena femorale.

Procedura:

Durante il posizionamento di un ECC dagli arti inferiori è possibile seguire la progressione della punta nella vena femorale e nella vena iliaca

Protocollo Echo Tip per gli ECC inseriti dagli arti inferiori

Il protocollo Echotip prevede il posizionamento ecoguidato dell'ECC mediante l'ausilio dell'ecografia sia come strumento di **tip navigation** che come strumento di **tip location**:

Tip location:

Sonda: microsettoriale, impostare una frequenza tra 7-8 MHz

Finestra acustica: sottocostale longitudinale sagittale: visualizzare la vena cava inferiore, l'atrio di destra e la vena cava superiore.

Procedura: Una volta posizionata la punta dell'ECC all'interno della zona target eseguire un flush rapido di soluzione fisiologica da 0.5-1 ml al fine di confermare la posizione della punta

Protocollo Echo Tip per gli ECC

Il protocollo Echotip prevede il posizionamento ecoguidato dell'ECC mediante l'ausilio dell'ecografia sia come strumento di **tip navigation** che come strumento di **tip location**:

A distanza di 24-48 ore dalla posizionamento dell'ECC controllare la posizione della punta per escludere eventuali malposizioni secondarie.

Protocollo ECHOTIP per i CICC nel bambino e nel neonato

Tip navigation **(CICC)**:

Sonda: lineare hockey stick + micro-convex (oppure settoriale ‘phased array’)

Finestra:

-Visualizzazione dei vasi venosi centrali omolaterali (ed eventualmente controlaterali) con sonda lineare;

-Visualizzazione della confluenza delle vene anonime e della VCS con sonda microconvex

Procedura:

- Verifica della presenza della guida in VCS dall’anonima omolaterale
- Verifica della presenza del catetere in VCS dall’anonima omolaterale

Protocollo ECHOTIP per i PICC nel bambino

Tip navigation **(PICC)**:

Sonda: lineare hockey stick

Finestra:

- Visualizzazione dei vasi venosi profondi del braccio fino al cavo ascellare

-Visualizzazione dei vasi venosi centrali omolaterali (ed eventualmente controlaterali) con sonda lineare;

-Visualizzazione della confluenza delle vene anonime e della VCS con sonda microconvex

Procedura:

- Verifica della presenza della guida in vena ascellare omolaterale
- Verifica della progressione del catetere in VCS dall'anonima omolaterale
- Esclusione della presenza del catetere nei vasi controlaterali

Protocollo ECHOTIP per CICC e PICC nel bambino

<u>Tip location</u>:

Sonda: micro-convex

Finestra acustica:

usare le seguenti 2 proiezioni:

- sottocostale bi-cavale → raccomandata come prima scelta
- parasternale asse lungo della VCS

Procedura: Una volta posizionata la punta del catetere all'interno della zona target (giunzione tra VCS e atrio di destra) eseguire un flush rapido di soluzione fisiologica da 2-5 ml al fine di confermare la posizione della punta

Protocollo ECHOTIP per i FICC nel bambino e nel neonato

Tip navigation:

Sonda: lineare hockey stick, sonda micro-convex

Finestra acustica: visualizzazione in asse corto e asse lungo della vena femorale.

Procedura:

- Verificare la presenza della guida nella vena femorale visualizzata in asse lungo
- Seguire la progressione del catetere dalla vena femorale verso la vena iliaca
- Verificare la progressione del catetere attraverso la VCI visualizzata in asse lungo con la sonda microconvex

Protocollo ECHOTIP per i FICC nel bambino

Tip location:

Sonda: micro-convex

Finestra acustica:

sottocostale bi-cavale

Procedura: Una volta posizionata la punta del catetere all'interno della zona target (giunzione tra VCI e atrio di destra) eseguire un flush rapido di soluzione fisiologica da 2-5 ml al fine di confermare la posizione della punta

Thanks a lot