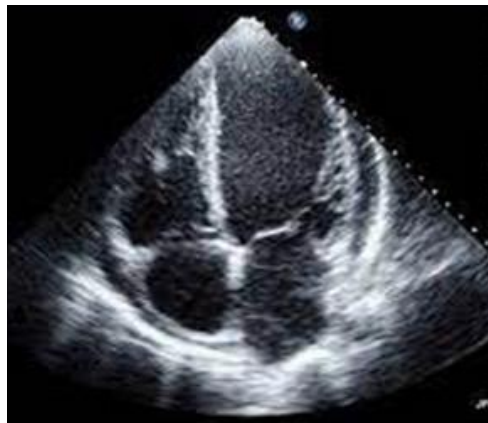


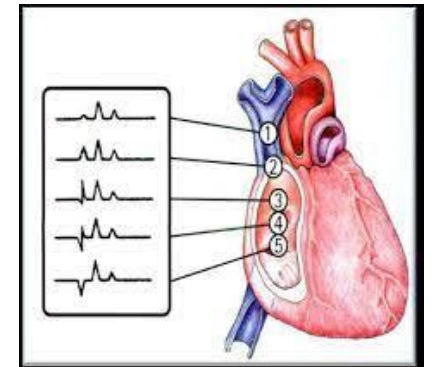


Qual'è la migliore strategia di tip location oggi per i PICC?

Roma 6 dicembre 2022



Sonia D'Arrigo
Istituto di Anestesia e Rianimazione
Fondazione Policlinico Universitario Agostino Gemelli-
IRCCS



ECOCARDIOGRAFIA



Accessi venosi centrali CICC, PICC, FICC

EJA

Eur J Anaesthesiol 2020; **37**:344–376

GUIDELINES

European Society of Anaesthesiology guidelines on peri-operative use of ultrasound-guided for vascular access (PERSEUS vascular access)

Massimo Lamperti, Daniele Guerino Biasucci, Nicola Disma, Mauro Pittiruti, Christian Breschan, Davide Vailati, Matteo Subert, Vilma Traškaitė, Andrius Macas, Jean-Pierre Estebe, Regis Fuzier, Emmanuel Boselli and Philip Hopkins

European
Society of
Anaesthesiology **ESA**

ECOCARDIOGRAFIA:

- rapida
- bedside
- accurata
- intraprocedurale

Editorial

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

Antonio La Greca¹, Emanuele Iacobone² , Daniele Elisei², Daniele Guerino Biasucci³ , Vito D'Andrea⁴ , Giovanni Barone⁵, Geremia Zito Marinosci⁶ and Mauro Pittiruti¹ 

JVA | The Journal of
Vascular Access

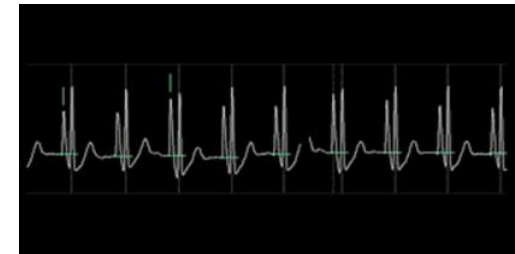
The Journal of Vascular Access
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DOI: 10.1177/11297298211044325
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**Infusion Therapy
Standards of Practice**

GUIDELINES**2020****European Society of Anaesthesiology guidelines on peri-operative use of ultrasound-guided for vascular access (PERSEUS vascular access)**

Massimo Lamperti, Daniele Guerino Biasucci, Nicola Disma, Mauro Pittiruti, Christian Breschan, Davide Vailati, Matteo Subert, Vilma Traškaitė, Andrius Macas, Jean-Pierre Estebe, Regis Fuzier, Emmanuel Boselli and Philip Hopkins

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When an intracavity electrocardiogram is not applicable, we recommend using real-time ultrasound to detect and prevent central venous catheter malposition, as it has been shown to be well tolerated, feasible, quickly performed and interpreted at the bedside, and it is more accurate and faster than chest radiograph (1C).

- E. Use methods for identifying CVAD tip location during the insertion procedure (ie, “real-time”) due to greater accuracy, more rapid initiation of infusion therapy, and reduced costs.³⁸⁻⁴⁷ (III)
1. Use electrocardiogram (ECG) methods with either a metal guidewire or a column of normal saline inside the catheter lumen and observe the ECG tracing to place the CVAD tip at the CAJ. Follow manufacturers’ directions for use with other ECG-based technology using a changing light pattern to detect tip location.^{1,2,4,11,23,24,26,27,43,44,48-61} (II)
 3. Consider the use of ultrasound for CVAD tip location. The clinical applicability of this is currently limited by the small sample sizes used to demonstrate its efficacy as a reliable and safe method to replace chest radiographs in all ages, and its usefulness is limited by the knowledge, skill, and experience of the operator.^{36,43,44,46,63-65} (III)

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REVISED 2021



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

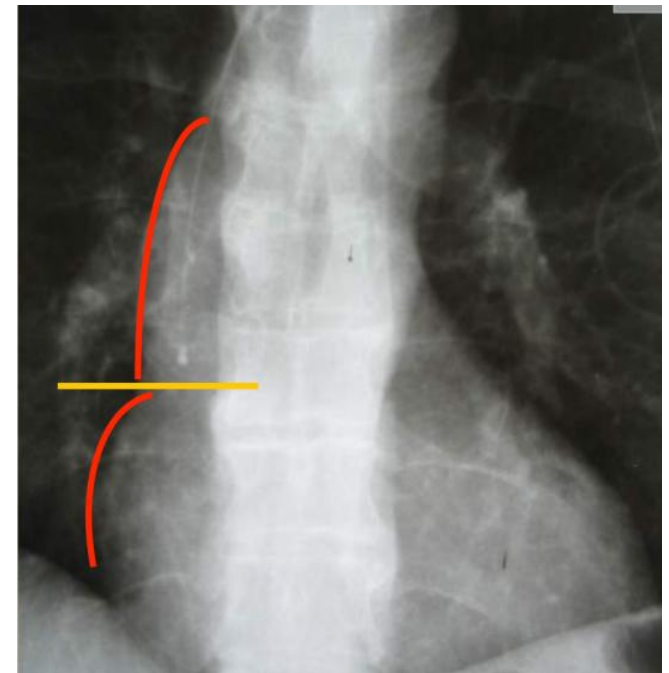
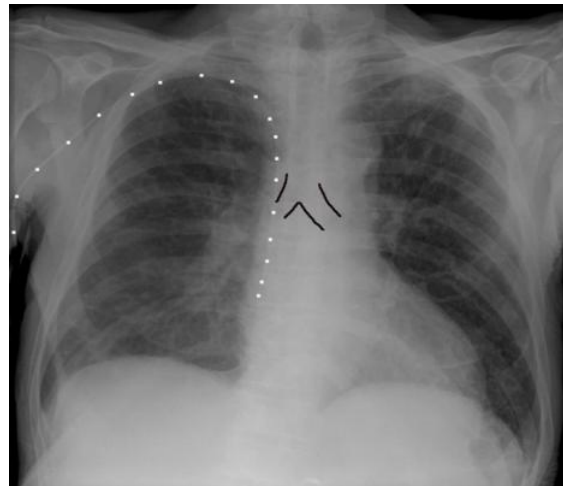
Antonio La Greca¹, Emanuele Iacobone² , Daniele Elisei²,
Daniele Guerino Biasucci³ , Vito D'Andrea⁴ ,
Giovanni Barone⁵, Geremia Zito Marinosci⁶
and Mauro Pittiruti¹ 

2021



1. Tip navigation: ultrasound-based visualization of the guidewire and/or of the catheter to verify the correct direction into the superior vena cava (SVC) or inferior vena cava (IVC).
2. Tip location by direct visualization of the final position of the tip of the catheter, usually at the junction between right atrium and SVC or between right atrium (RA) and IVC.
3. Tip location by indirect visualization of the final position of the tip of the catheter, using the so-called “bubble test” (visualization of micro-bubbles inside the vasculature after injection of saline or saline/air mixture into the catheter).

Radiografia del torace



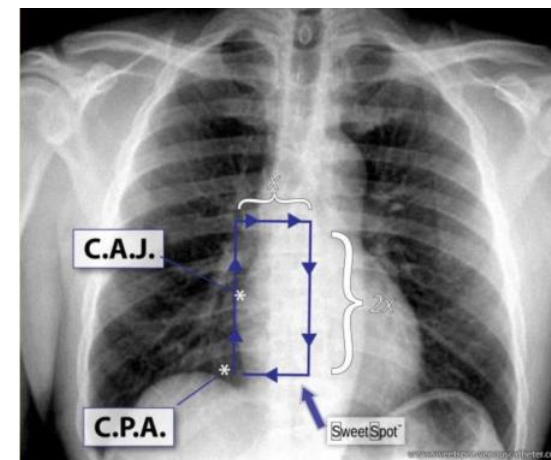
Radiazioni ionizzanti

Meno accurata

Post-procedurale

A comparison between two radiological criteria for verifying tip location of central venous catheters

Mauro Pittiruti¹ , Andrea Bilancia²,
Gloria Ortiz Miluy³ and Sonia D'Arrigo¹ 



The Sweet Spot™

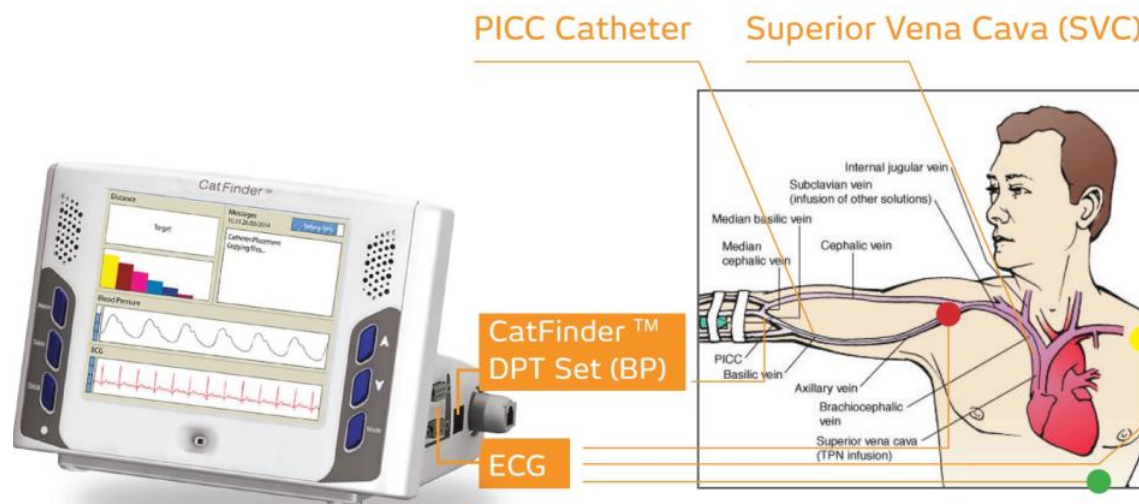
Results: We reviewed the CXR of 1116 PICCs successfully inserted by IC-ECG. CC was not feasible in 0.5% (impossible visualization of the carina) and difficult in 1.5%; in 97.7% of cases, the position of the tip was adequate (1–5 cm below the carina), in 0.6% too high (<1 cm), in 1.2% too low (6–9 cm). On the other hand, because of unclear visualization of radiological landmarks, SSC was not feasible in 0.9% and difficult in 10.5%; though, according to SSC the tip location was always acceptable (in 94.2% the tip was in the middle of the spot, in 2.5% close to the superior border, and in 2.3% close to the inferior border); no tip was visualized outside of the spot.

Conclusion: CC and SSC were similar in terms of feasibility (99.5% vs 99.1%) and accuracy (98.1% vs 100%), though CC was subjectively perceived to be easier and more rapid to perform.

A new pressure-based device for tip navigation and tip location during central venous catheterization: A prospective clinical study on a cohort of 136 adult patients

Sonia D'Arrigo¹ , Alessandro Emoli², Bruno Marche³
and Mauro Pittiruti⁴ 

The Journal of Vascular Access
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Conclusion: Applicability of CFS in patients with sinus rhythm was 96.3%, feasibility was 84.7%, and safety was 100%. If compared to IC-ECG, accuracy was 83.6% (accepting an error <2 cm) and 96.1% (for an error <3 cm). Unacceptable tip positions (>3 cm) were 3.8% (the tip was too high inside the SVC). This study confirms a possible future role of CFS for intra-procedural tip location and tip navigation, though its use cannot be currently recommended.

Bubble test

S
A
E
M
Academic Emergency Medicine
Official Journal of the Society for Academic Emergency Medicine

ORIGINAL RESEARCH CONTRIBUTION

Central Vascular Catheter Placement Evaluation Using Saline Flush and Bedside Echocardiography

Anthony J. Weekes, MD, David A. Johnson, MD, Stephen M. Keller, MD, Bradley Efun, MD,
Christopher Carey, MD, Nigel L. Rozario, MS, and H. James Norton, PHD

2014



ORIGINAL ARTICLE

Confirmation of correct central venous catheter position in the preoperative setting by echocardiographic “bubble-test”

M. MEGGIOLARO¹, A. SCATTO¹, A. ZORZI², E. ROMAN-POGNUZ¹
A. LAURO³, C. PASSARELLA¹, G. BONACCORSO¹

2015

Original research article

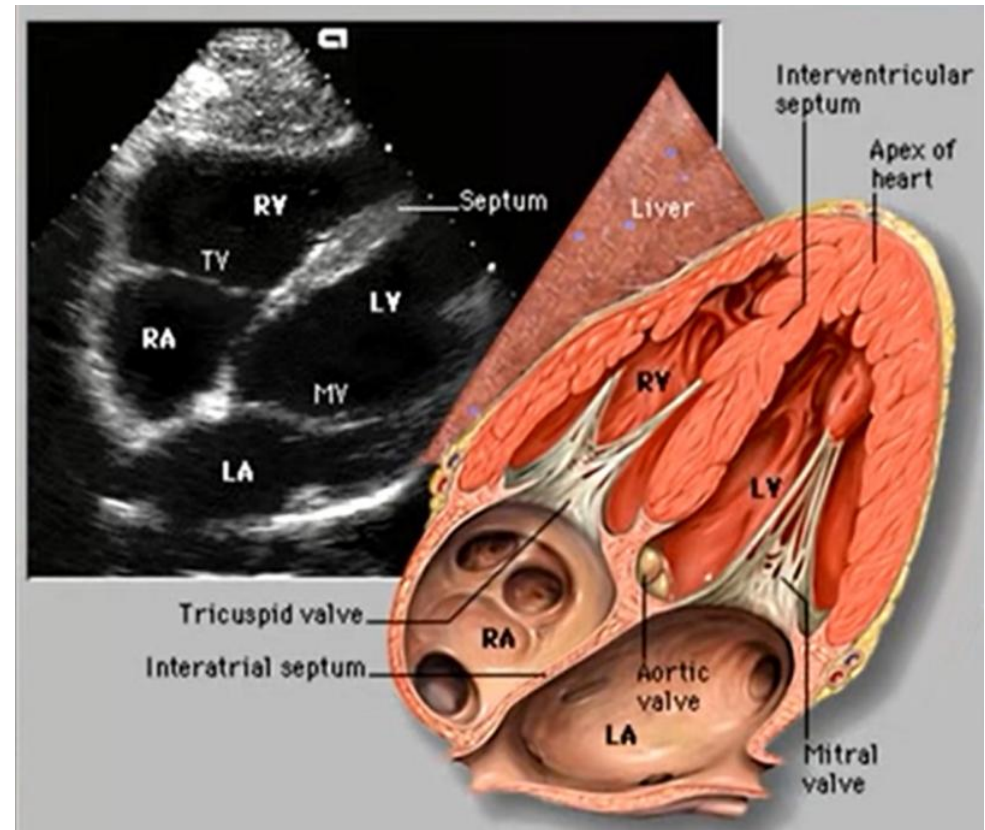
Transthoracic echocardiography as bedside technique to verify tip location of central venous catheters in patients with atrial arrhythmia

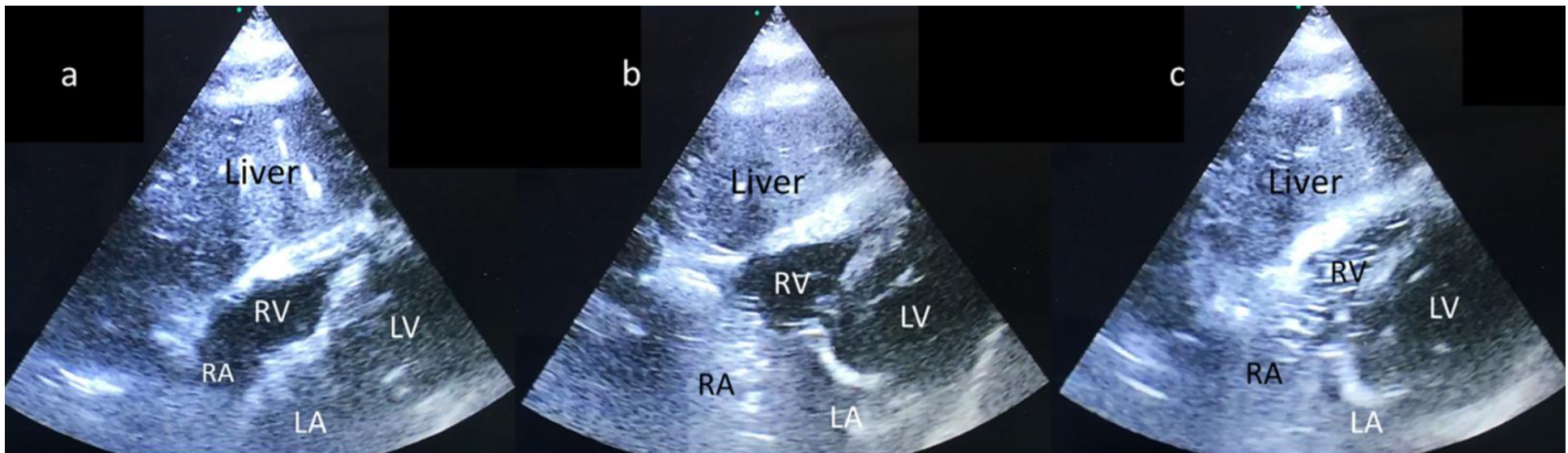
Emanuele Iacobone¹ , Daniele Elisei¹, Diego Gattari¹,
Luigi Carbone¹ and Giuseppe Capozzoli²

2020



Finestra sottocostale





Tecnica intraprocedurale

An ultrasound-based technique in the management of totally implantable venous access devices with persistent withdrawal occlusion

Sonia D'Arrigo¹ , Maria Giuseppina Annetta¹
and Mauro Pittiruti² 

Table 1. Patients characteristics

Patients (n°)	Age (years)	Gender	Site of TIVAD	Oncological disease	Problem	Mean time for BT (sec)	X-ray confirmation
1	49	F	Right basilic vein	Ovaric cancer in neoadjuvant chemotherapy	PWO	45	Yes
2	51	F	Right axillary vein	Ovaric cancer post surgery, in chemotherapy	PWO	50	Yes
3	65	M	Left basilic vein	Intestinal cancer post surgery, in chemotherapy	PWO	60	Yes
4	34	F	Left basilic vein	Breast cancer post surgery, in chemotherapy	PWO	40	Yes
5	37	F	Right basilic vein	Breast cancer in neoadjuvant chemotherapy	PWO	30	Yes
6	25	F	Right basilic vein	Ovaric cancer post surgery, in chemotherapy	PWO	45	Yes
7	68	F	Right axillary vein	Uterus cancer post surgery, in chemotherapy	PWO	40	Yes
8	69	M	Right axillary vein	Liver cancer in neoadjuvant chemotherapy	PWO	50	Yes
9	56	F	Right brachial vein	Ovaric cancer post surgery, in chemotherapy	PWO	55	Yes

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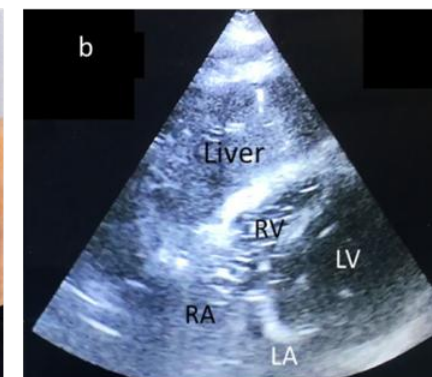
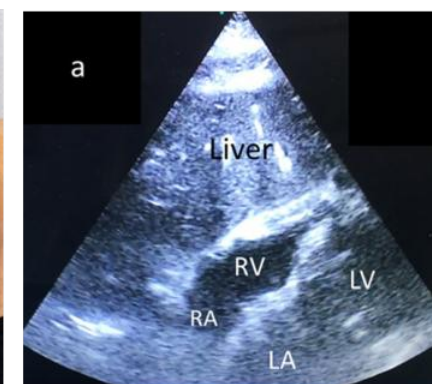
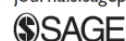
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Pulsed-wave Doppler for ultrasound-based tip location using bubble test: A pilot study

Antonio Gidaro¹ , Francesco Casella¹, Chiara Cogliati¹,
Antonio La Greca², Francesca Lugli¹, Chiara Trione¹,
Maria Calloni¹, Chiara Melchionda¹, Federica Samartin¹,
Emanuele Salvi¹ and Elisa Ceriani¹

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2022

Advantages:

Visual signal of MES (microembolic signals)

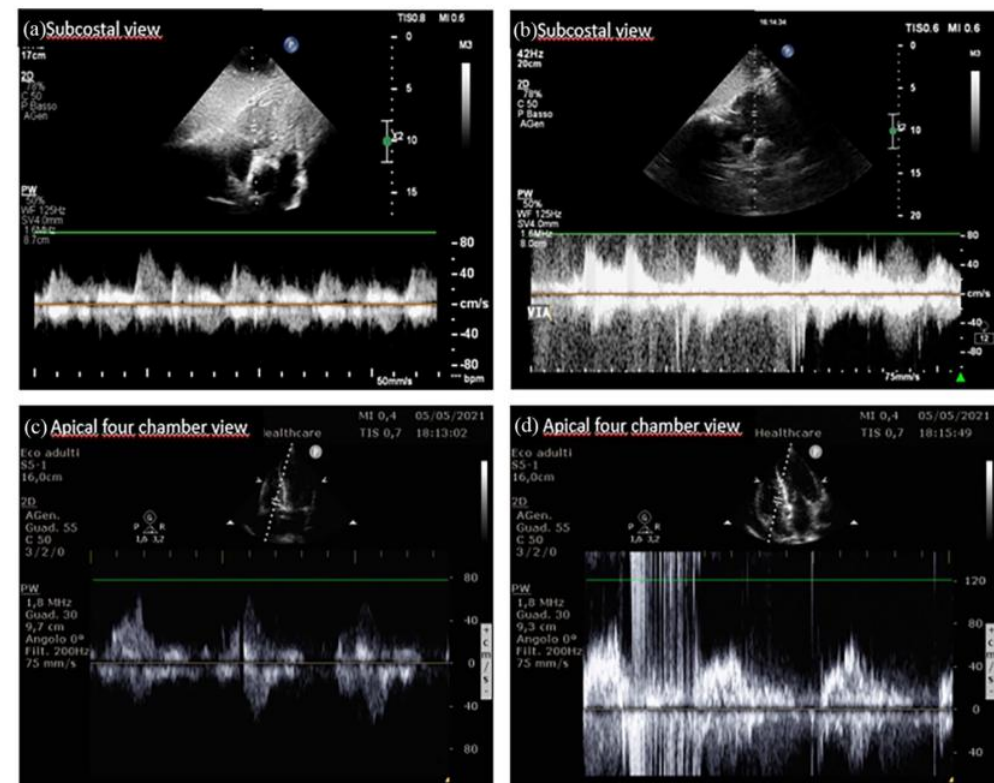
Production of a typical sound due to the alternation
of PW wave

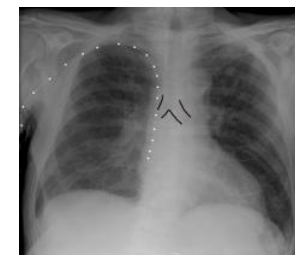
It is synchronous with cardiac flow and heart rate

Limitations:

Single center

Small sample size (n=9)





	ECOCARDIOGRAFIA	VYGOCARD	RX TORACE
TIP LOCATION INTRA-PROCEDURALE			
PICC	✓	✓	✗
CICC	✓	✓	✗
FICC	✓	✓	✗
PORT	✓	✓	✗
TIP LOCATION POST-PROCEDURALE			
PICC	✓	✓	✓
CICC	✓	✓	✓
FICC	✓	✓	✓
PORT	✓	✗	✓