



Controllo della punta del Catetere Centrale in Terapia Intensiva



GAVeCeLT 2017
10th GAVeCeLT Congress - 11th PICC Day



December 4-5-6, 2017
Florence Congress Center
Florence, Italy

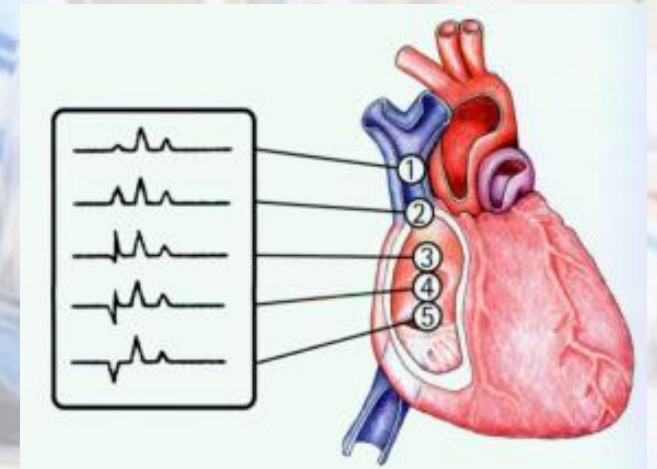
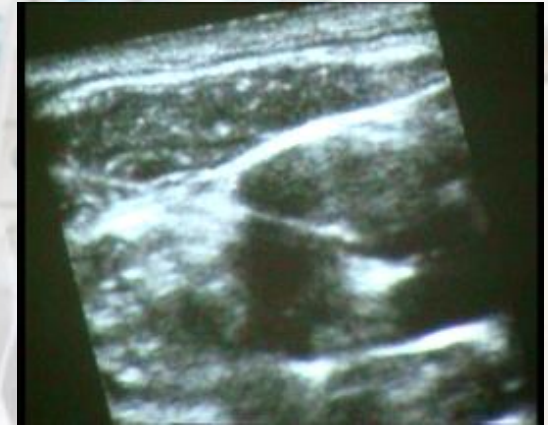
Dott. Elisei Daniele
U.O. Anestesia e Rianimazione
AREA VASTA 3, MACERATA



Impianto del Catetere Venoso Centrale

Una vera rivoluzione negli ultimi anni

- Tecnica della ECOGUIDA: uso globale dell'Ecografo
- Tecnica del posizionamento ECG guidato, sistemi di *tip-location* e *tip-navigation*
- Massimi presidi di barriera
- Materiali sempre più sicuri e biocompatibili
- Standardizzazione delle procedure di posizionamento e di gestione



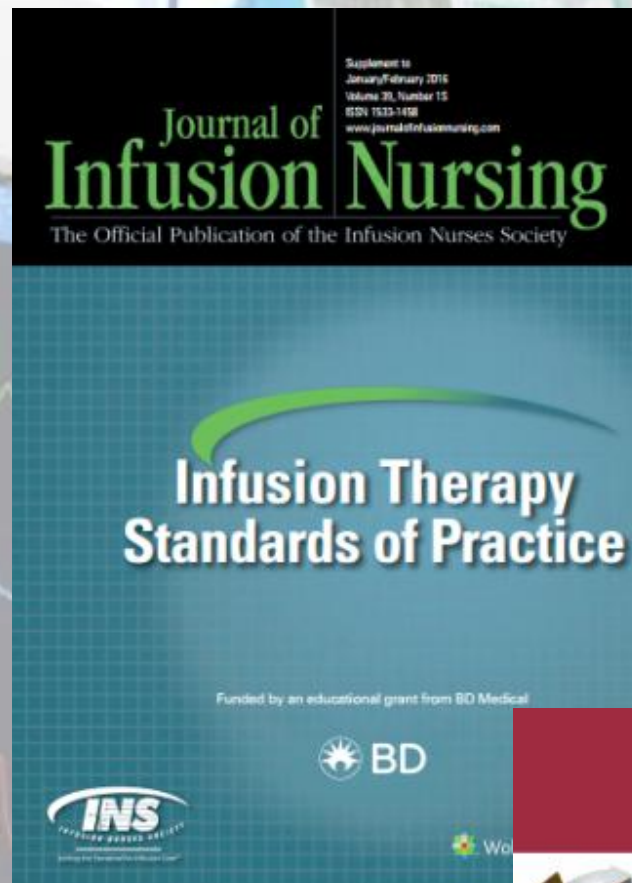
Best Practice Guidelines

in the Care and Maintenance of
Pediatric Central Venous Catheters

SECOND EDITION



Association for Vascular Access



Caratteristiche del Paziente Critico

➤ Fluidoterapia

- Infusione di farmaci, anche con $\text{pH} < 5$ o $\text{pH} > 9$
- Nutrizione Parenterale o farmaci ad alta osmolarità
- Emocomponenti
- Mdc
- Chemioterapici

➤ Monitoraggio dei parametri vitali (PVC, SCVO_2)

➤ Monitoraggio emodinamico

- Infusione di inotropi e/o vasocostrittori
- Introduuttore SG e misure di Termodiluizione

➤ Prelievi ematici

➤ Supporto extracorporeo

- CRRT
- Supporto epatico
- Supporto respiratorio (ECCO2R; NovaLung; ECMO)

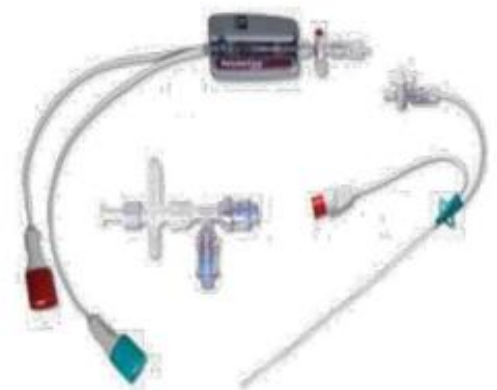
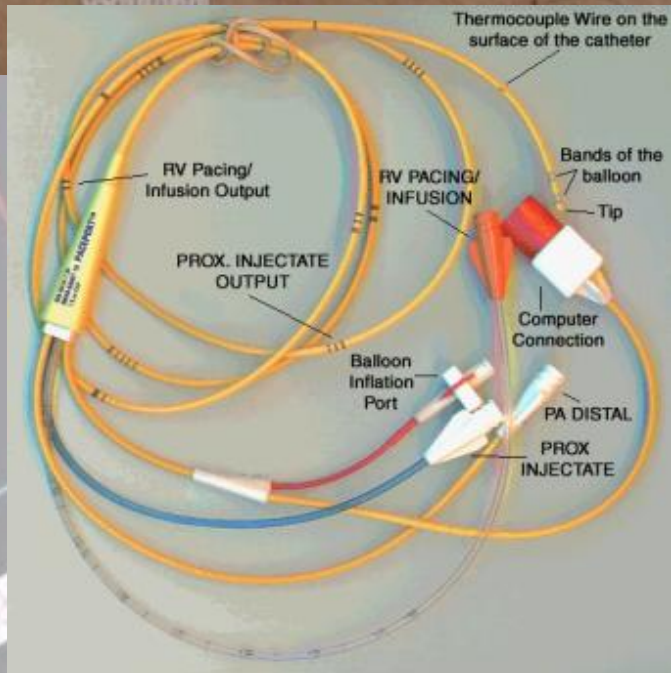
Accesso venoso ideale in ICU

- **Sicuro e affidabile**

**Catetere Centrale subito
funzionante ed
utilizzabile:
paziente critico in MOF!!!**

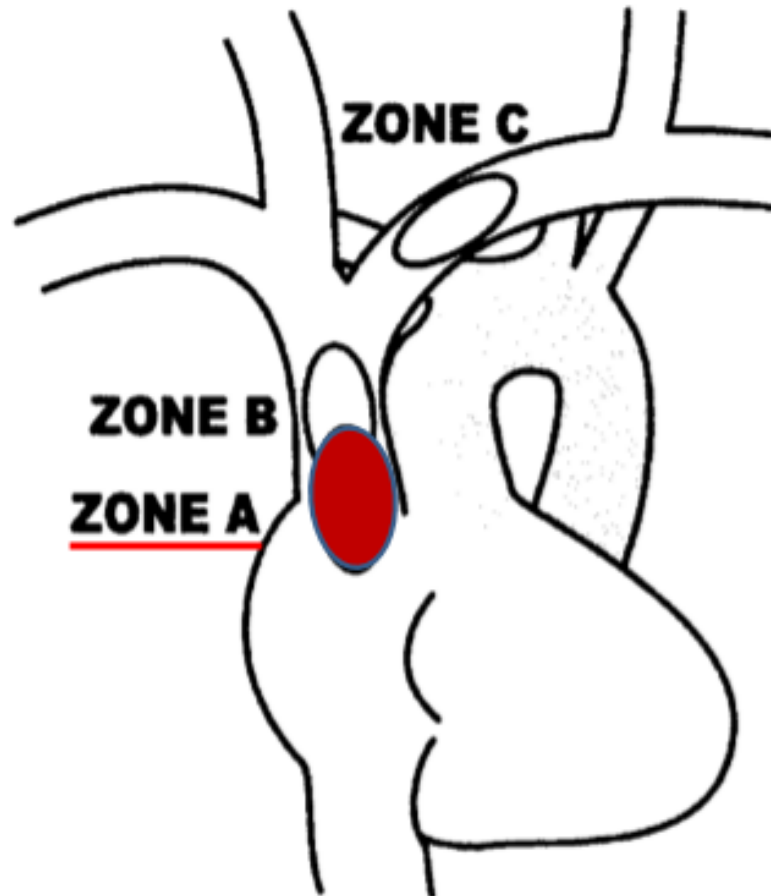
- **Costo efficacia**

Accesso venoso ideale in ICU



TIP LOCATION...PERCHE'?

La posizione corretta della punta del CVC



“Safe placement of CVCs: where should the tip of the catheter lie?”

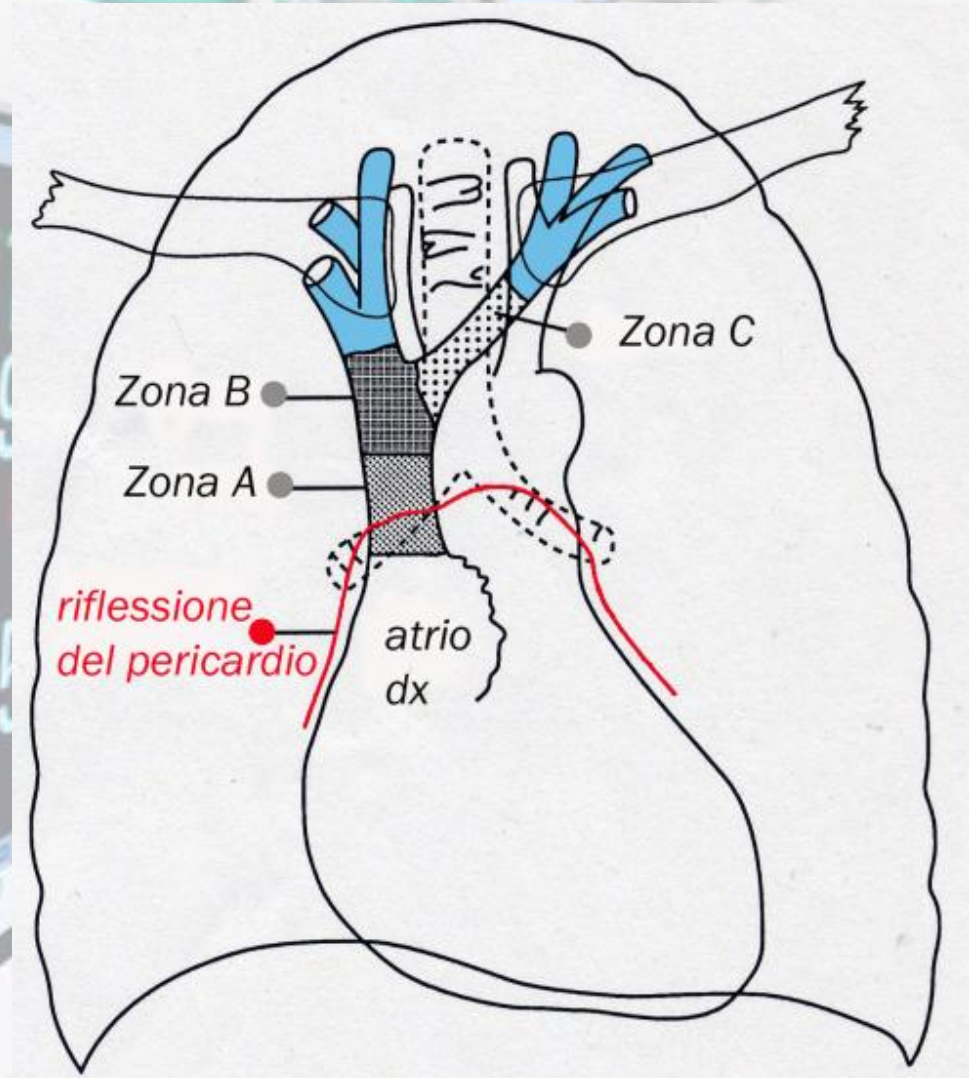
Fletcher & Bodenham- BJA 2000

Schema: divisione delle grandi vene in 3 zone

A) porzione inferiore della VCS e la porzione superiore dell'atrio dx

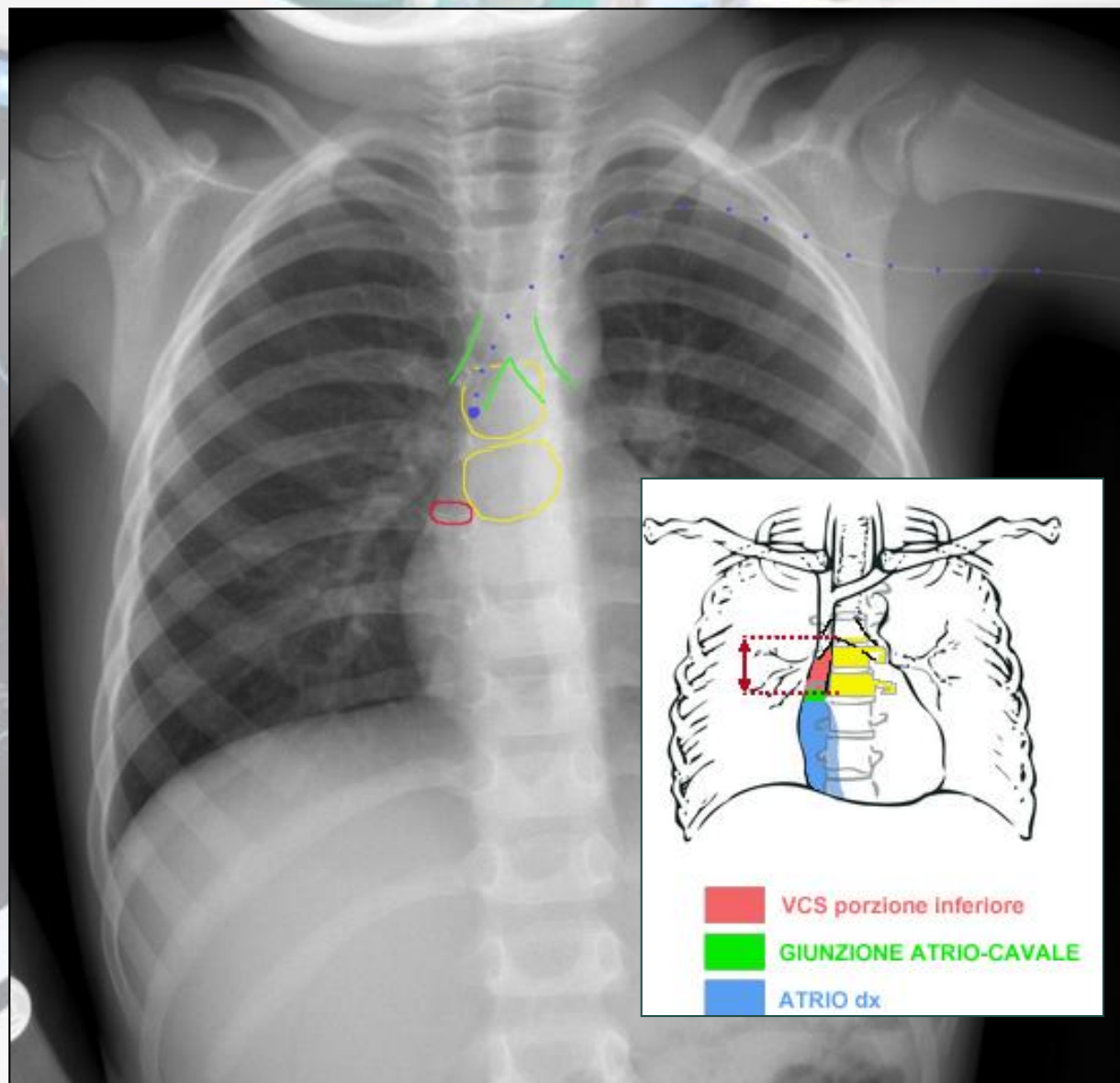
B) zona di giunzione tra vena anonima dx e sx e la porzione superiore della VCS

C) vena anonima sx prossimalmente alla VCS

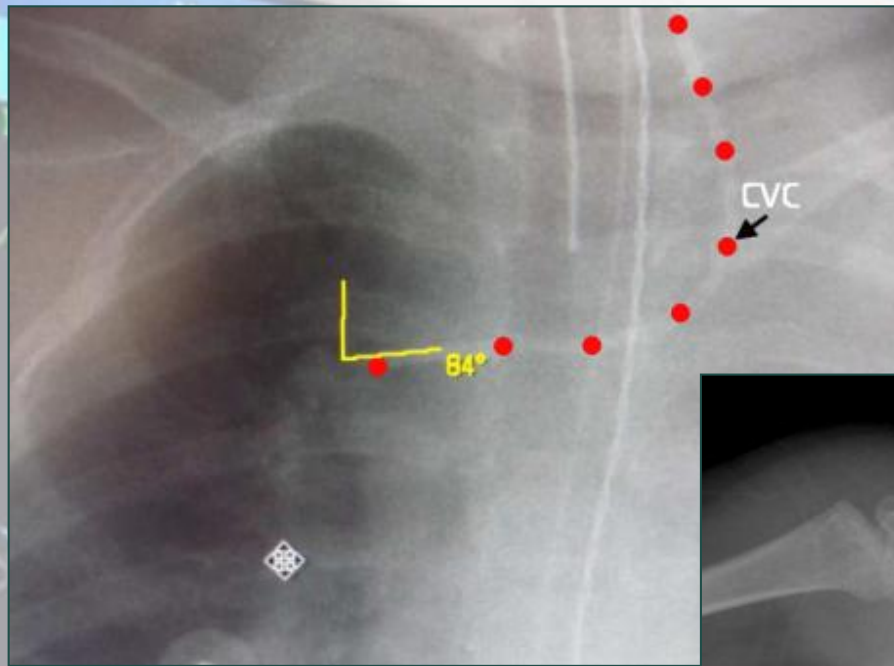


Posizione ideale della punta del CVC

- Porzione inferiore della VCS
- Al di fuori del cuore
- Decorso parallelo alla parete venosa
- Collocazione della giunzione atrio-cavale ⁽¹⁾

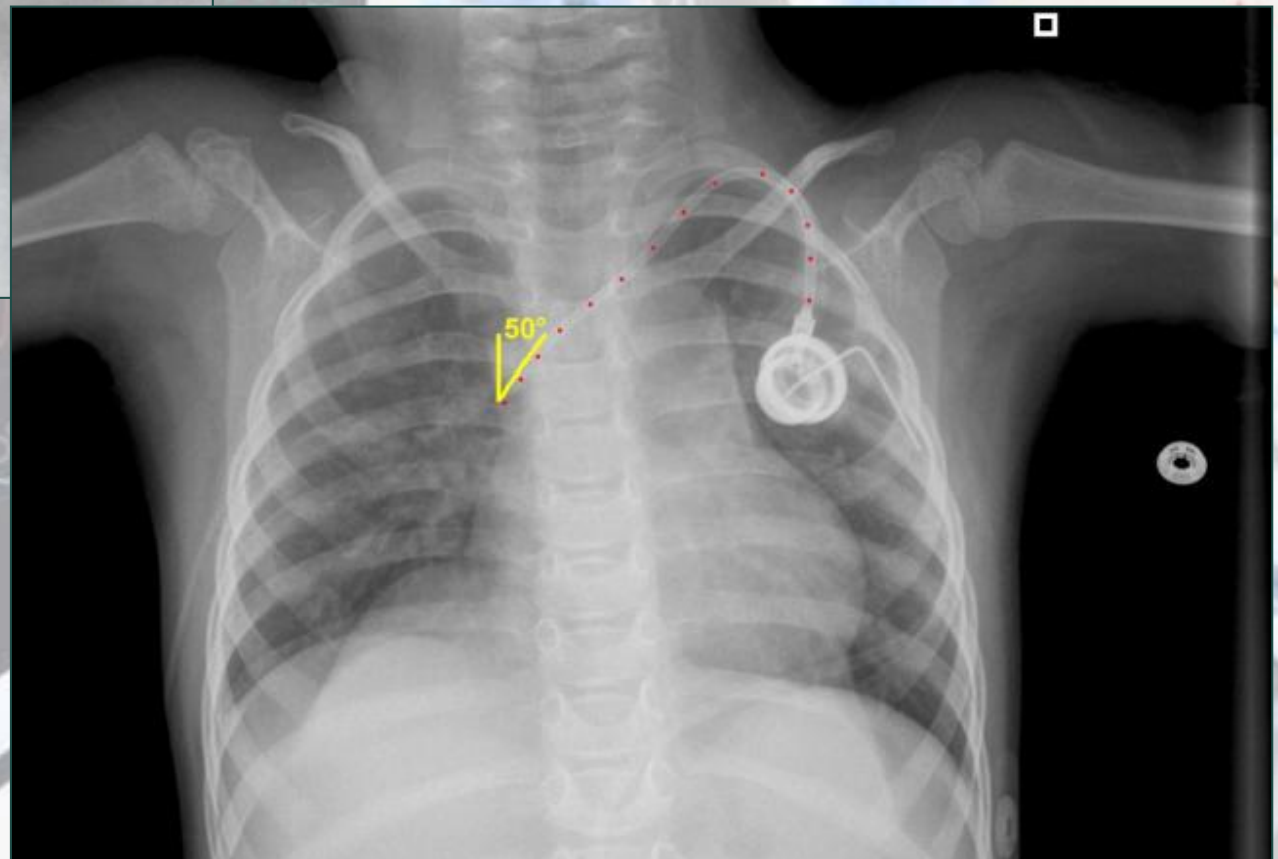


Angolo tra punta del CVC e parete cavale laterale



In letteratura ^(1, 2, 3):
< 40°

1. Gravenstein N. In vitro evaluation of relative perforating potential of central venous catheters: comparison of materials, selected models, number of lumens, and angles of incidence to simulated membrane. J Clin Monit. 1991 Jan;7(1):1-6.
2. Mukau L. Risk factors for central venous catheter-related vascular erosions. JPEN J Parenter Enteral Nutr. 1991 Sep-Oct;15(5): 513-6.
3. Dailey RH. Late vascular perforations by CVP catheter tips. J Emerg Med. 1988 Mar- Apr; 6(2):137-40.
4. Schuster M. The carina as a landmark in central venous placement. Br J Anaesth. 2000 Aug; 85 (2): 192-194.



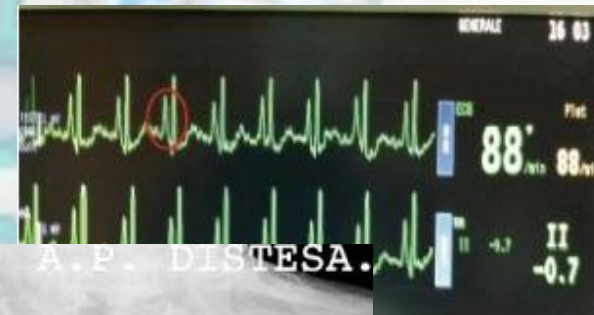
METODI PER LA TIP LOCATION

INTRAPROCEDURALI

- ECG INTRACAVITARIO
- FLUOROSCOPIA
- TTE, TEE

POSTPROCEDURALI

- RX TORACE
- TTE, TEE
- CT, MRI





Contents lists available at ScienceDirect

Clinical Nutrition

journal homepage: <http://www.elsevier.com/locate/clnu>

ESPEN Guidelines on Parenteral Nutrition: Central Venous Catheters
(access, care, diagnosis and therapy of complications)

Mauro Pittiruti^a, Helen Hamilton^b, Roberto Biffi^c, John MacFie^d, Marek Pertkiewicz^e

Journal of
Infusion Nursing

The Official Publication of the Infusion Nurses Society

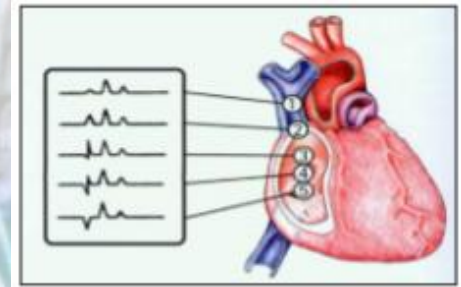
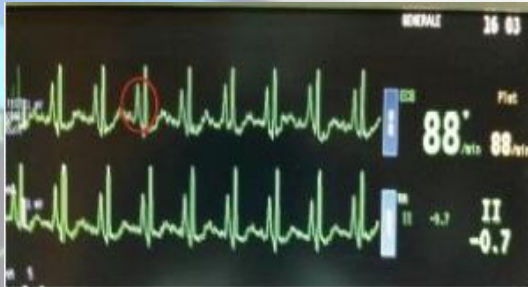
2016

**Infusion Therapy
Standards of Practice**

“Ideally, the position of the tip should be checked **during** the procedure”

“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”

TIP LOCATION intraprocedurale ECG-intracavitario



J Vasc Access 2011; 12 (4): 280-291
DOI: 10.5301/JVA.2011.8381

REVIEW

The electrocardiographic method for positioning the tip of central venous catheters

J Vasc Access 2012; 13 (3): 357-365
DOI: 10.5301/JVA.2012.9020

ORIGINAL ARTICLE

The intracavitary ECG method for positioning the tip of central venous catheters: results of an Italian multicenter study

Mauro Pittiruti¹, Daniele Bertollo², Ermanno Briglia³, Massimo Buononato⁴, Giuseppe Capozzoli⁵,

JVA
ISSN 1129-7298

J Vasc Access 2015; 16 (2): 137-143
DOI: 10.5301/jva.5000281

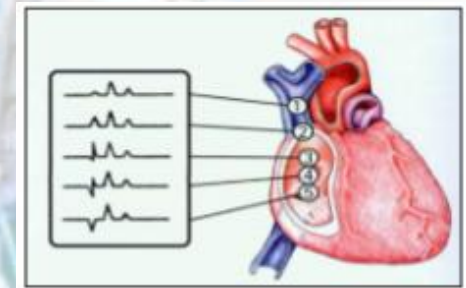
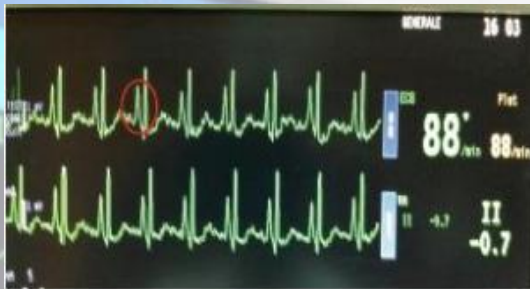
ORIGINAL ARTICLE

The intracavitary ECG method for positioning the tip of central venous access devices in pediatric patients: results of an Italian multicenter study

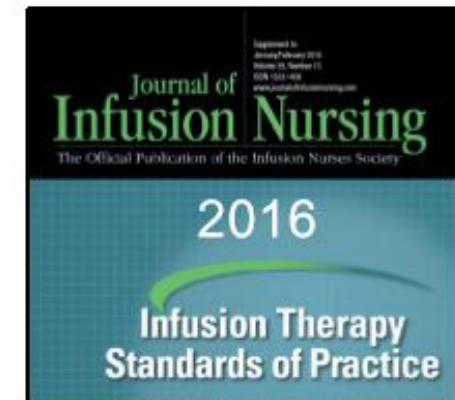
Francesca Rossetti¹, Mauro Pittiruti², Massimo Lamperti³, Ugo Graziano⁴, Davide Celentano⁵, Giuseppe Capozzoli⁶



TIP LOCATION intraprocedurale ECG-intracavitario



Non solo come alternativa ai controlli
basati su X-Ray ma anche come
metodo di prima scelta



ESPEN Guidelines on Parenteral Nutrition: Central Venous Catheters
(access, care, diagnosis and therapy of complications)

Mauro Pittiruti^a, Helen Hamilton^b, Roberto Biffi^c, John MacFie^d, Marek Pertkiewicz^e

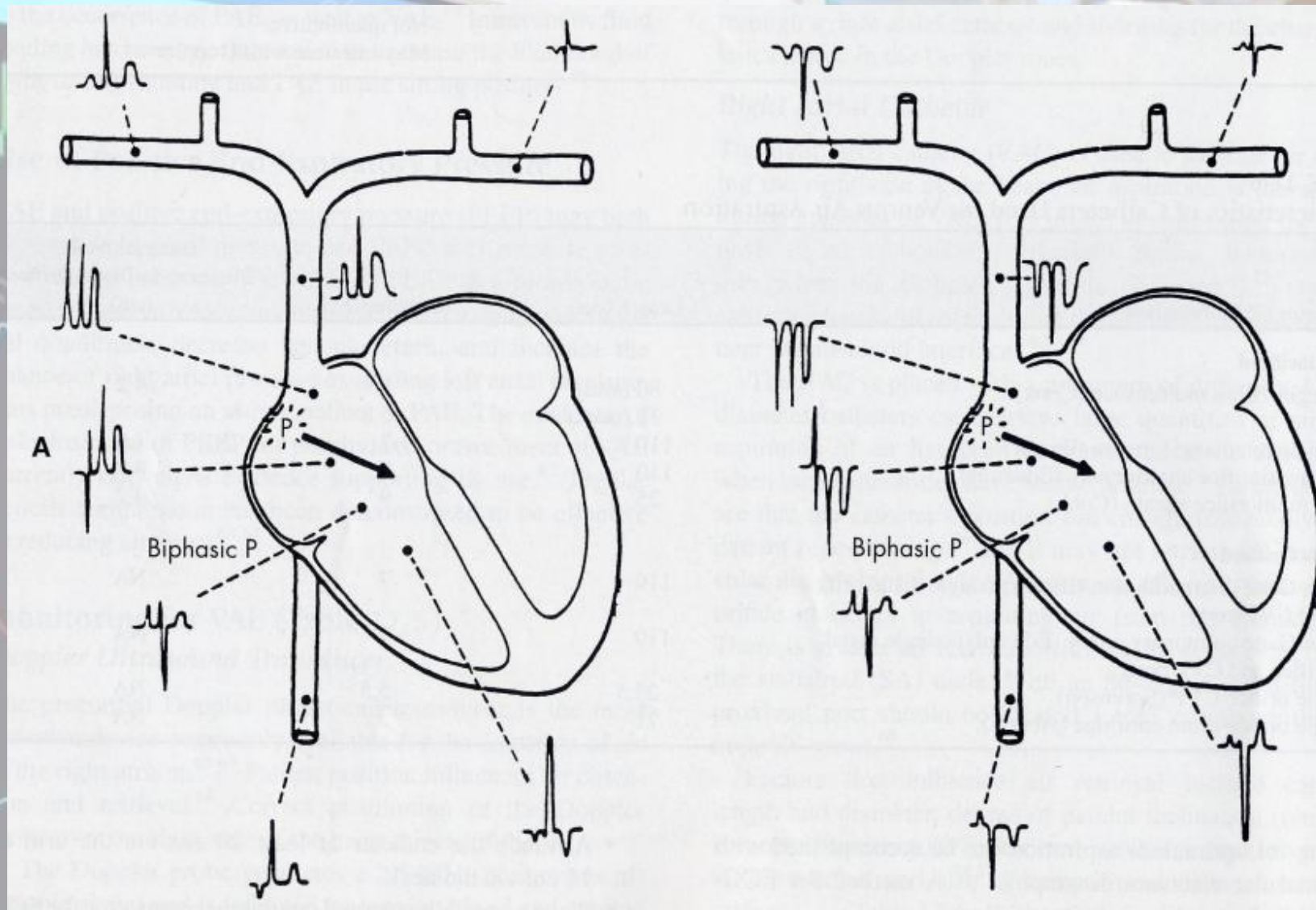
of malposition may be minimized by using a technique for intra-operative control of the position of the catheter tip (including fluoroscopy and ECG-based methods).

Ideally, the position of the tip should be checked during the procedure,² either by fluoroscopy or by the ECG method.^{28,29} If the

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.

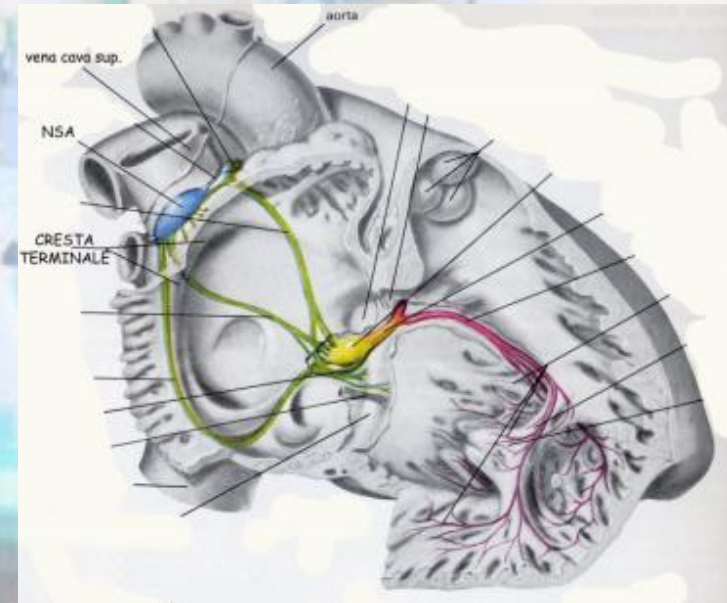
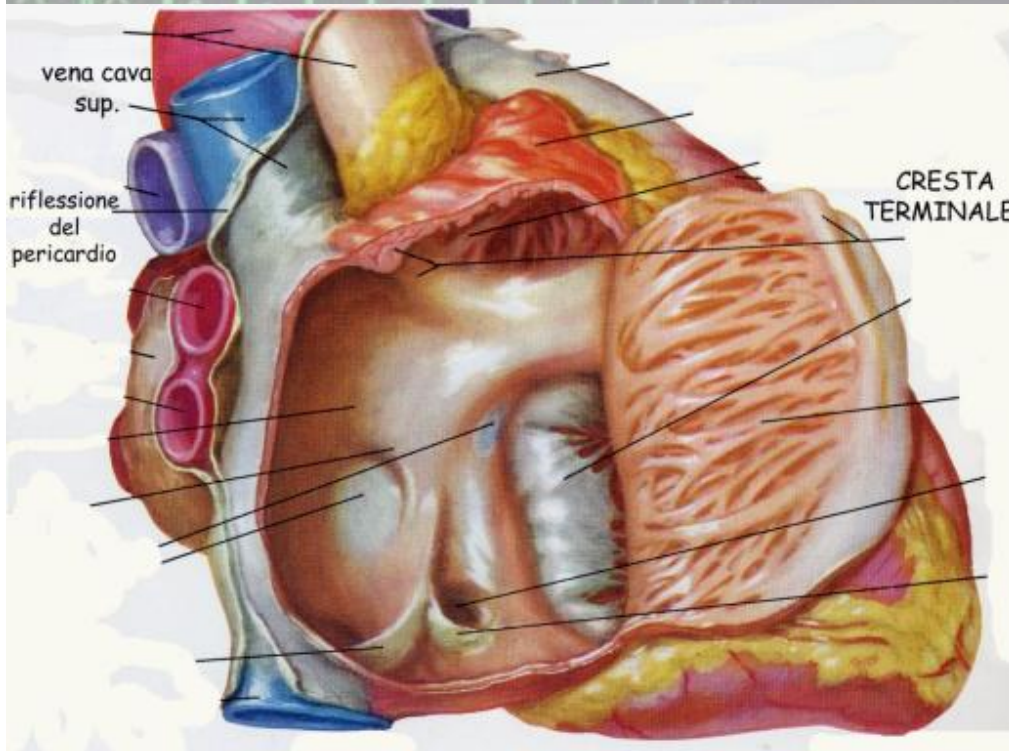
1. Use electrocardiogram (ECG) methods with either a metal guidewire or a column of normal saline inside the catheter lumen and observe the ECG tracing to place the CVAD tip at the CAJ. Follow manufacturers’ directions for use with other ECG-based technology using a changing light pattern to detect tip location.

TIP LOCATION intraprocedurale ECG-intracavitario



TIP LOCATION intraprocedurale ECG-intracavitario

Cresta terminale

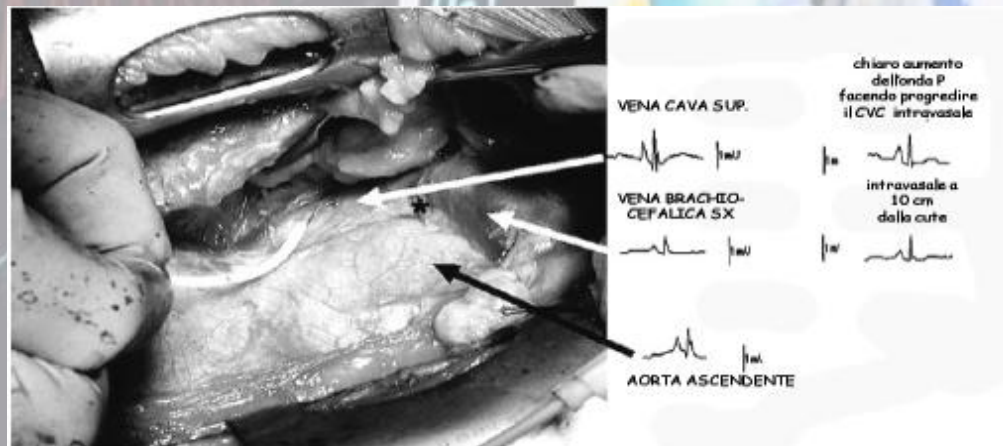


- **Un catetere posizionato dove viene rilevata la massima ampiezza dell'onda P si deve trovare in vicinanza della cresta terminale**

TIP LOCATION intraprocedurale ECG-intracavitario

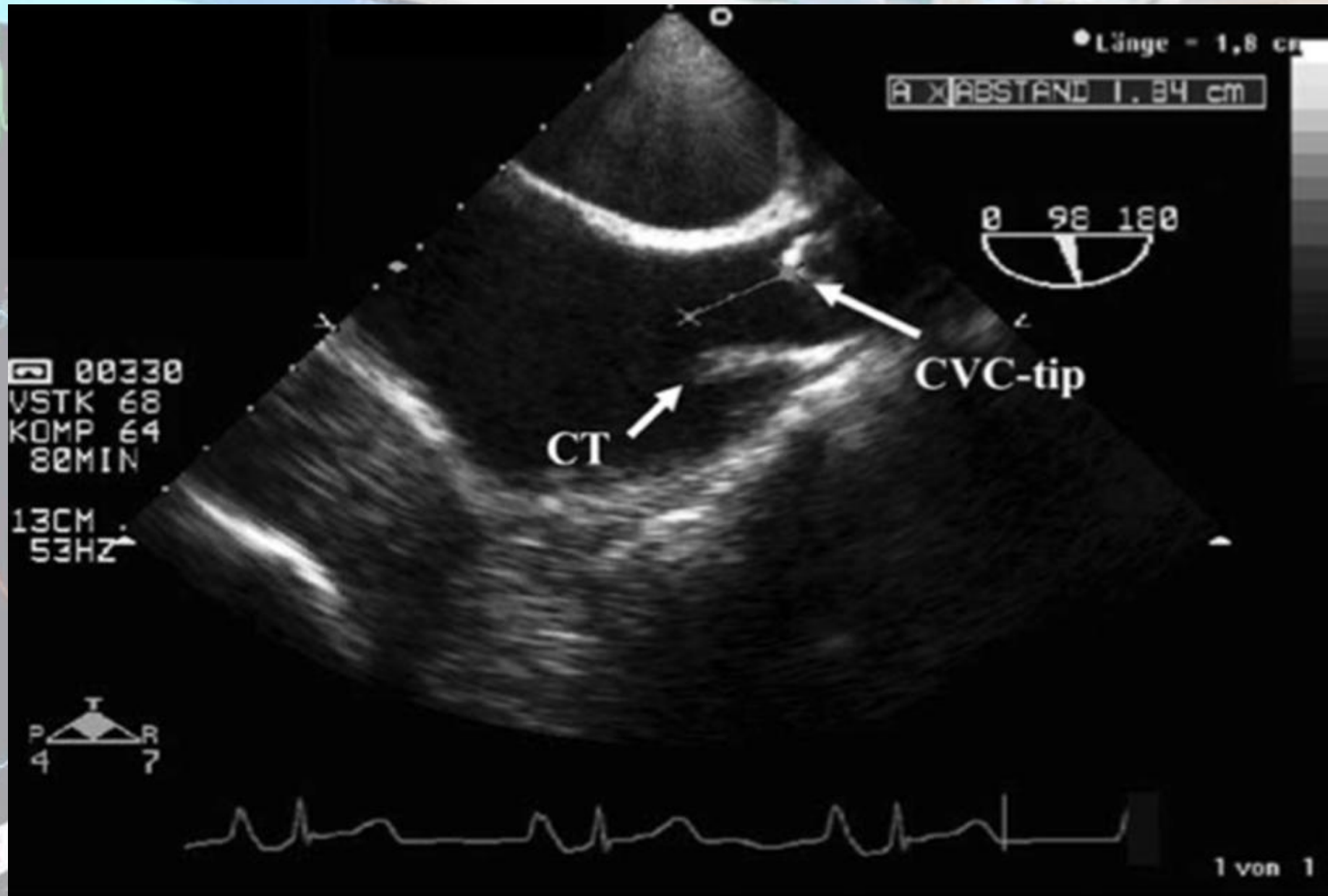
Limiti e vantaggi della tecnica ECG

- elevata affidabilità del metodo
- Facilità di esecuzione
- Scarso dispendio temporale
- Immediata possibilità di correzione
- Esposizione radiologica assente (includere le complicanze dovute ai m.d.c.)
- Bassi costi
- Alterazioni del ritmo cardiaco (fibrillazione atriale o altre aritmie sopraventricolari)
- Modificazioni ECG non evidenti
- Aumento dell'ampiezza dell'onda P anche nel posizionamento intra-aortico¹
- Aumento dell'ampiezza dell'onda P anche nel posizionamento extravasale¹
- Una considerevole percentuale (23%) di cateteri posizionati da sx con tecnica ECG urta la parete laterale della VCS²

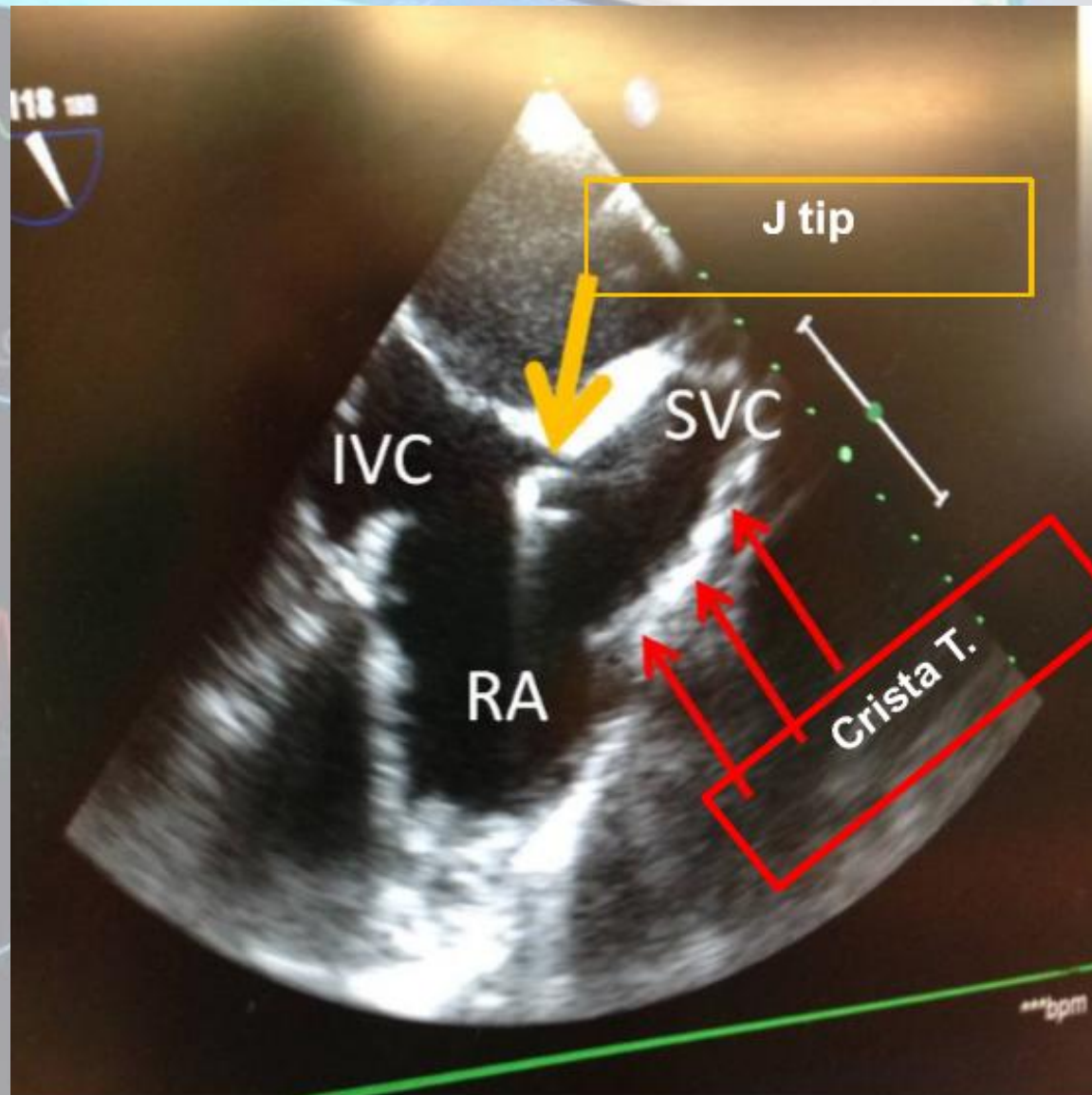


- 1) Schummer W et al. Extravasale Lage von zentralen Venenkathetern bei korrekter EKG-Ableitung. Anaesthesiol Intensivmed Notfallmed Schmerzther (2005) 40: 91-96.
- 2) Schummer W et al. Intra-atrial ECG is not a reliable method for positioning left internal jugular vein catheters. BJA 2003; 91 481-486.

TIP LOCATION intraprocedurale ECOCARDIOGRAFIA TRANS-ESOFAGEA

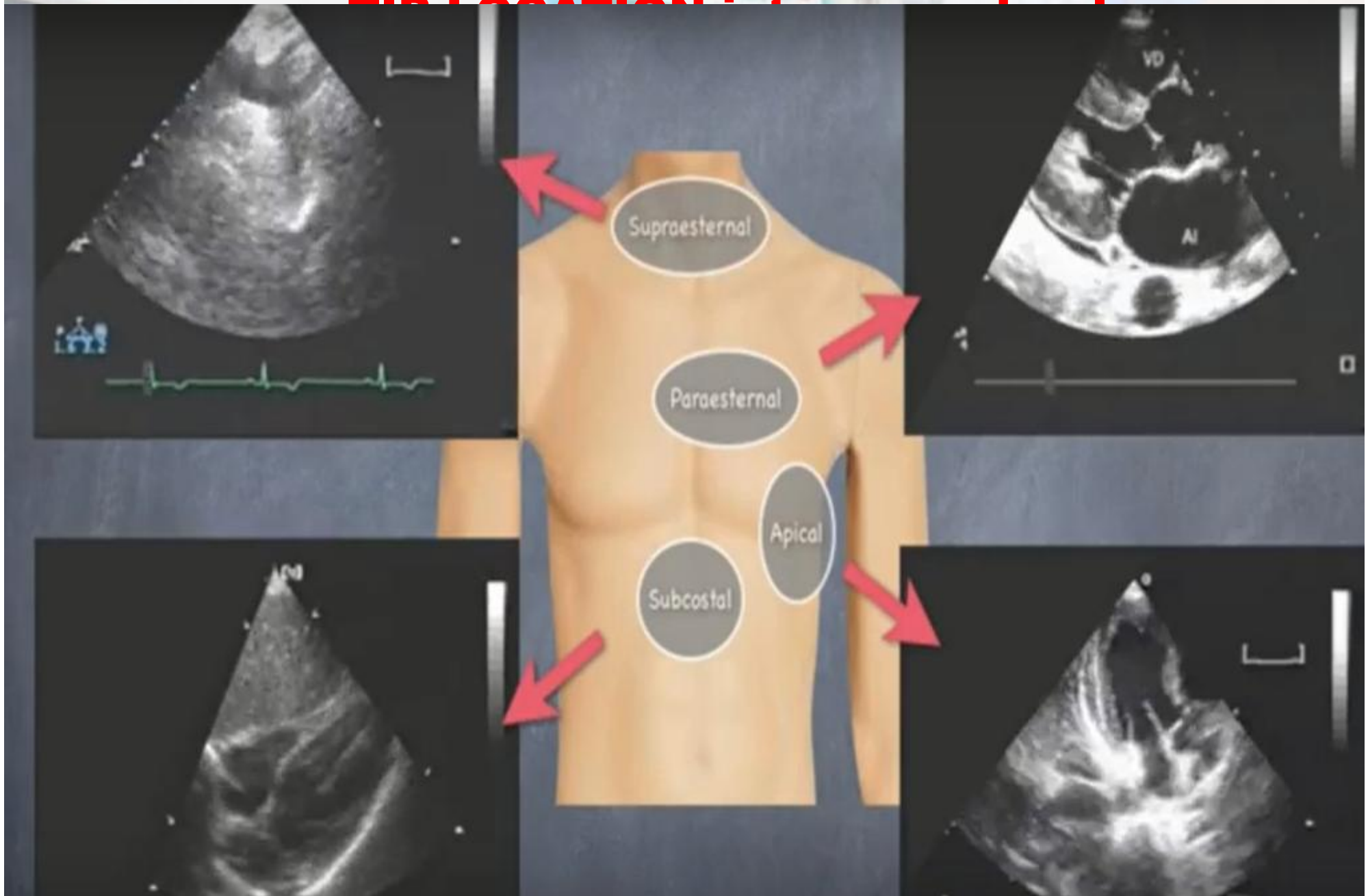


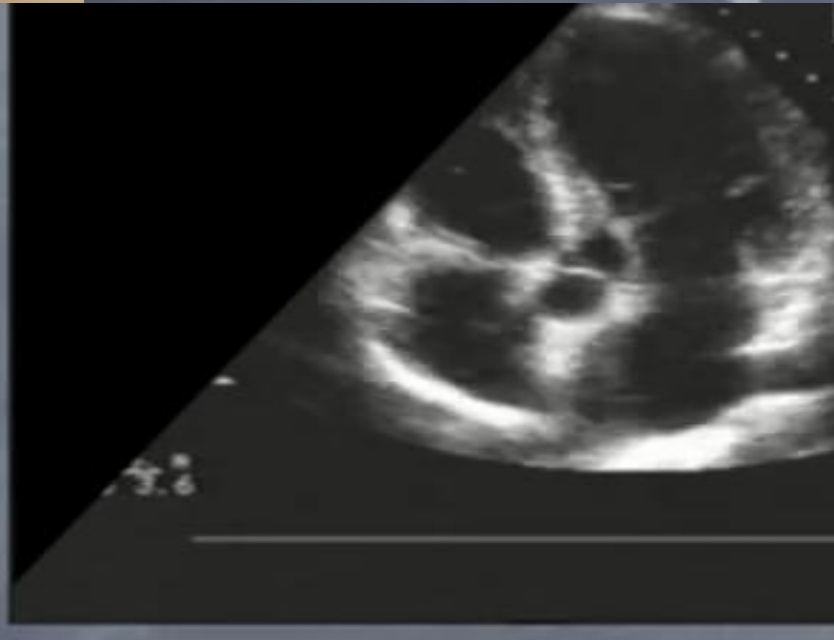
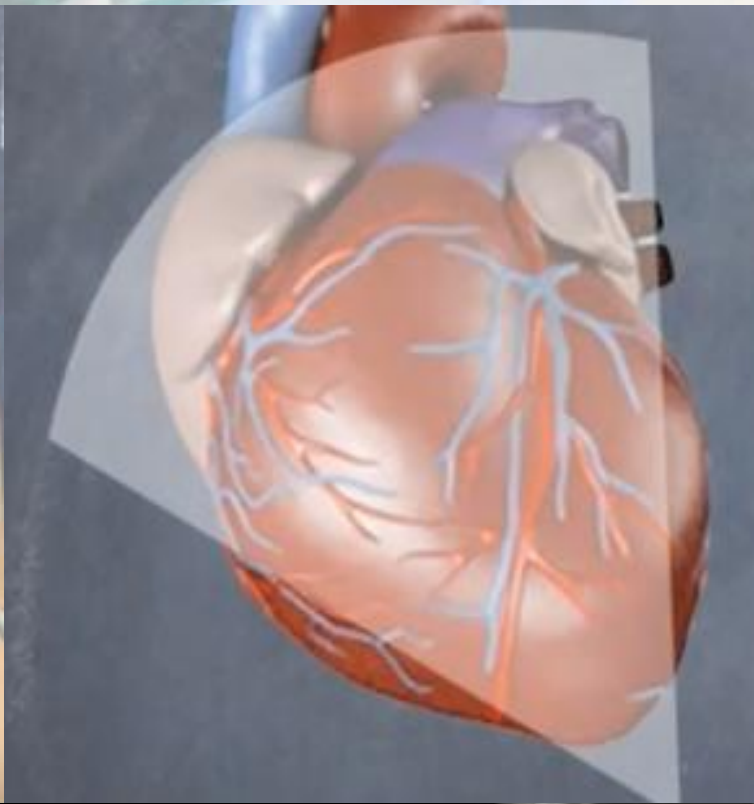
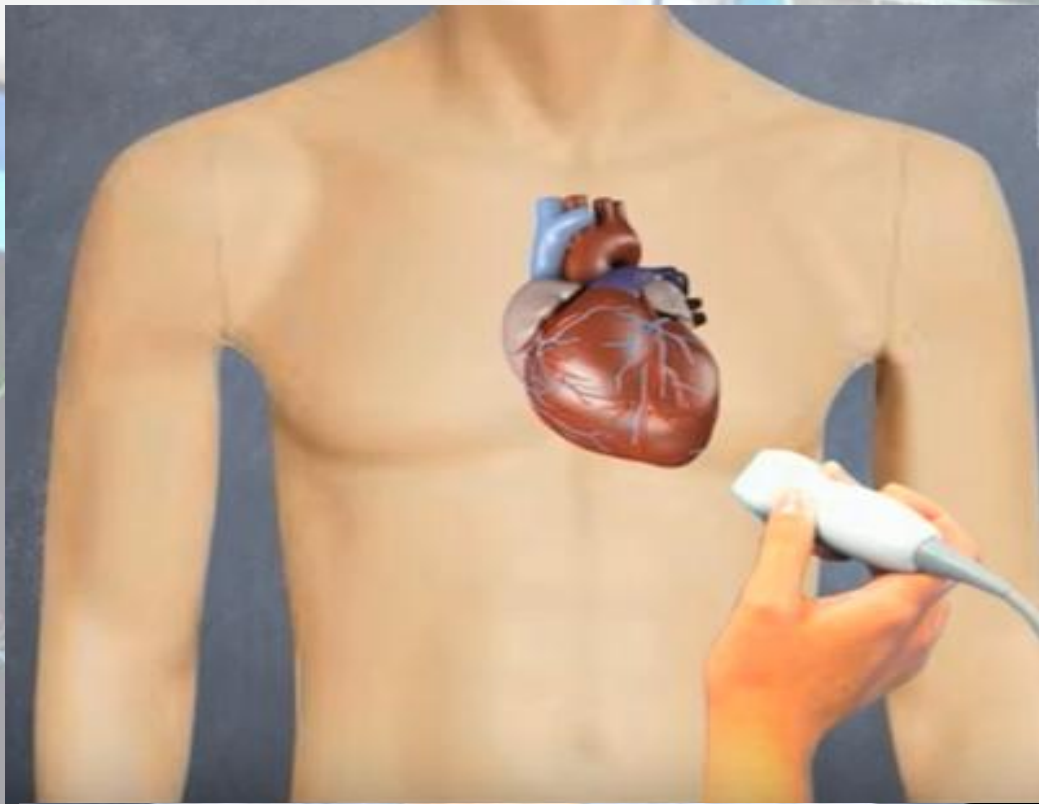
TIP LOCATION intraprocedurale ECOCARDIOGRAFIA TRANS-ESOFAGEA



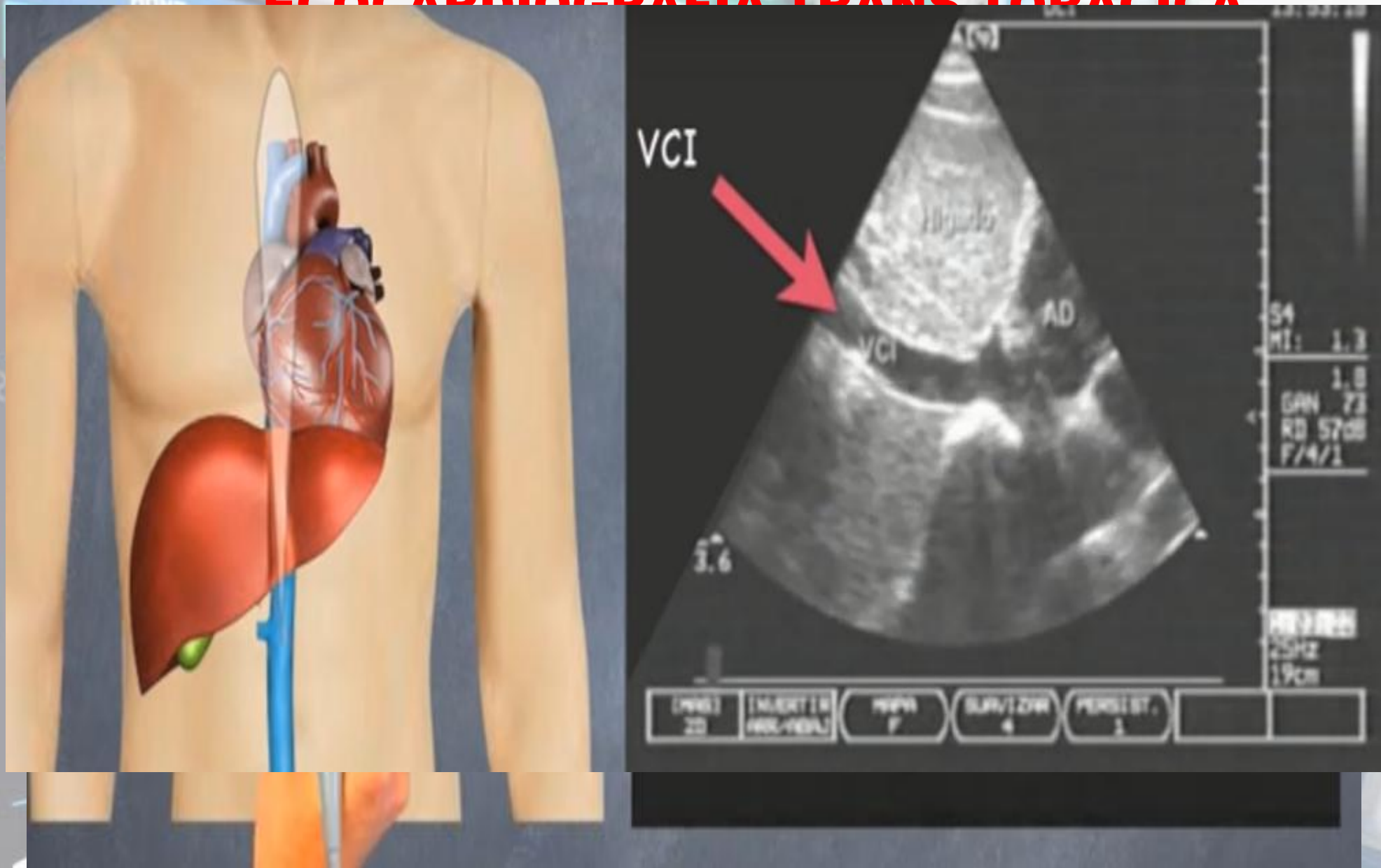
- **Il più accurato esame strumentale**
- **Invasivo**
- **Necessita di competenza specialistica cardiologica**
- **Solo per pazienti in anestesia generale e/o sedazione profonda**

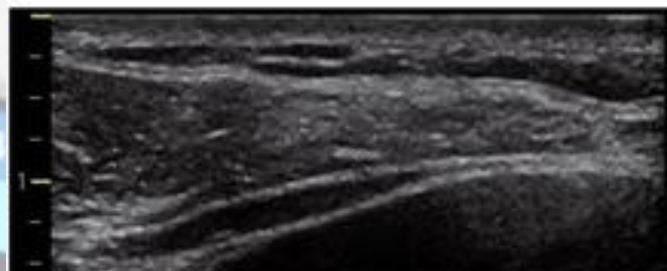
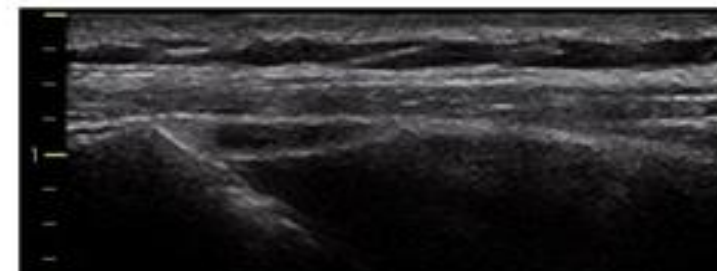
ECHOCARDIOGRAPHY





TIP LOCATION intraprocedurale ECOCARDIOGRAFIA TRANS TORACICA



a**b**

TICAL CARE

Saugel et al
DOI 10.1188

REVIEW

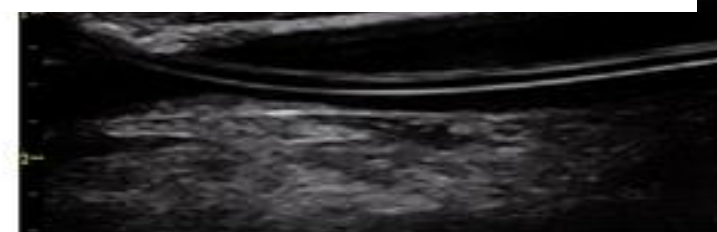
Ultra
plac
reco

Bernd Sa

c**e**

Conclusion

US guidance can improve patient safety and procedural quality during CVC placement in the IJV, FV, and SV. Based on evidence from clinical studies, several guidelines of medical societies strongly recommend the use of US for CVC placement in the IJV. Data from survey studies show that there is still a gap between the existing evidence and guidelines and the use of US in clinical practice. We recommend a six-step systematic approach for US-guided central venous access. To achieve the best skill level for CVC placement the knowledge from anatomic landmark techniques and the knowledge from US-guided CVC placement need to be combined and integrated.



Care

Access

CrossMark

Raccomandazioni nell'adulto...

Ultrasound vascular access in adults

Domain code	Suggested definition	Level of evidence
D4.SD2.S1	Ultrasound guidance should be routinely used for short-term central venous access in adults	A
D4.SD2.S2	Ultrasound guidance should be routinely used for long-term central venous access in adults	A
D4.SD2.S3	PICCs should be routinely inserted at mid arm level by ultrasound guidance using micro introducer technique	A
D4.SD2.S4	Use of ultrasound guidance should be taken into consideration for any kind of peripheral intravenous line when difficult access is anticipated	B
D4.SD2.S5	Ultrasound-guided arterial catheterization improves first-pass success and should be used routinely in adults	A
D4.SD2.S6	Ultrasound can accurately detect pneumothorax and should be routinely performed after central venous catheter cannulation when the pleura could have been damaged	B
D4.SD2.S7	CEUS (contrast-enhanced ultrasound) is a valid method for detecting a central venous catheter tip in the right atrium	B
Cost-effectiveness of the use of ultrasound for vascular cannulation		
D5.S1-3	Ultrasound-guided vascular access has to be used because it results in clinical benefits and reduced overall costs of care makes it cost-effective	A

CONCLUSIONS

The prompt appearance of fluid turbulence in the right atrium then into the right ventricle with a saline flush of central venous catheters was associated with central venous catheter tip placement near or within the superior vena cava in subclavian and internal jugular central venous catheters. The saline flush echocardiographic evaluation is moderately sensitive and highly specific when compared to chest x-ray for detecting adequate central venous catheter tip placement. Confirmation of venous placement of central venous catheters with the femoral approach is another potential use. This post-central venous catheter placement test is simple and feasible in the critical care setting. Our sensitivity results, however, suggest that further studies will be required to determine if the saline flush echo test can serve as an alternative to the chest x-ray for verifying central line placement.



Figure 2. Ultrasound blood vessel. taken at the 0.75- into the right ven was considered a x-ray.



l jugu-
frame,
nerves
t flush
chest

TABLE 3. Primary and Secondary Outcome Results of Included Studies

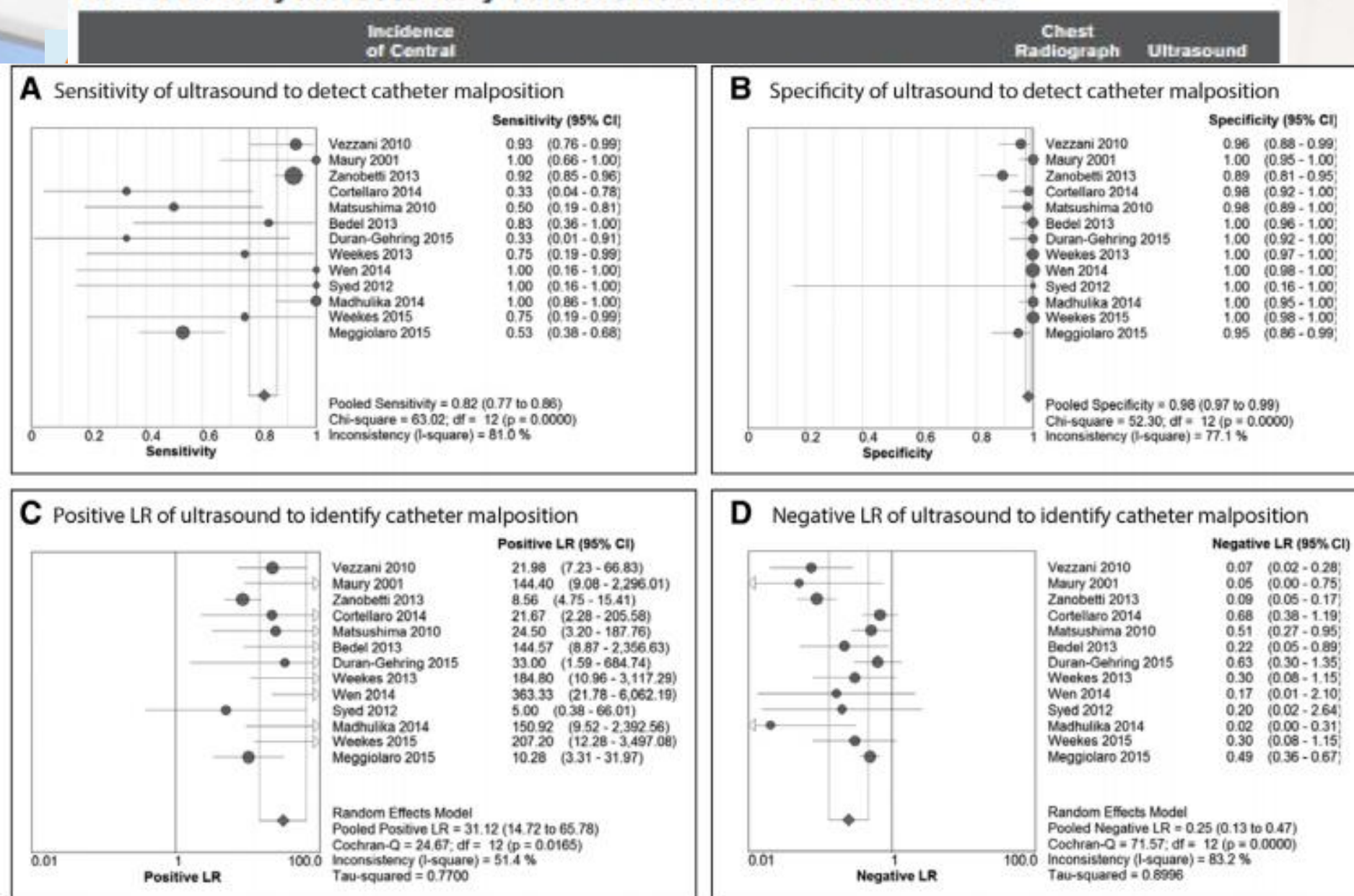


Figure 2. Pooled sensitivity, specificity, and likelihood ratio (LR) of included studies.

Meggiolaro et al (43)	100	0.45	0.53 (0.38-0.68)	0.95 (0.86-0.99)	0.00	670 (42.0-84.0)*	10.0 (7.0-20.0)
						median (IQR)	median (IQR)

TIP LOCATION intraprocedurale ECOCARDIOGRAFIA TRANS-TORACICA

The future (TTE)

Standardization of TTE for tip location:

1) *Tip to be placed in lower 1/3 of SVC:*

- Subcostal view: direct tip visualization in SVC
- Apical view: RA visualization + echo-contrast infusion (contrast appearing in RA within 1-2 sec) or saline infusion (color doppler changes in RA within 1-2 sec)
- Apical view: direct tip visualization in RA + pulling back the catheter until tip disappears

2) *Tip to be placed in RA:*

- Apical view: direct tip visualization in RA

#AVASM16



**Vi ringraziamo per aver ascoltato
il nostro babbo!!!!**



Buon GAveCeLT a tutti!!!!