



IL PUNTO SUI METODI DI TIP LOCATION

XI PICC DAY 6 DICEMBRE 2017 FIRENZE

EMANUELE IACOBONE

ASUR MARCHE

OSPEDALE DI MACERATA

DIPARTIMENTO ANESTESIA E RIANIMAZIONE



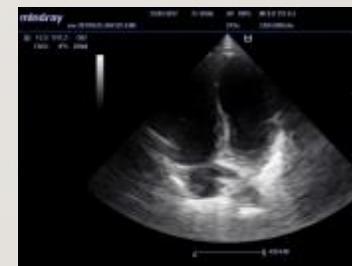
TECNICHE DI TIP LOCATION

INTRAPROCEDURALI

ECG intracavitario
Fluoroscopia
Ecocardiografia transtoracica -
transesogagea

POST-PROCEDURALI

Radiografia del torace
Ecocardiografia
TC, RM, angiografia.....



PROTOCOLLO ISAC

1. Scelta ragionata della vena mediante esame ecografico sistematico (RACEVA)
2. Tecnica asettica appropriata: lavaggio delle mani, massime protezioni barriera e antisepsi cutanea con clorexidina 2%
3. Utilizzo dell'ecografo per la venipuntura ecoguidata della vena prescelta e per il successivo controllo ecografico della corretta direzione della guida e dell'assenza di pneumotorace
- 4. Verifica intraprocedurale della posizione centrale della punta mediante la tecnica dell'ECG intracavitario**
5. Eventuale protezione del sito di emergenza dal rischio di sanguinamento (mediante colla istoacrilica) e/o dal rischio di contaminazione (mediante feltrino alla clorexidina)
6. Stabilizzazione adeguata del catetere mediante sutureless device e membrana semipermeabile



PROTOCOLLO ISP

- 1) Lavaggio delle mani tecnica asettica e massime protezioni barriera
- 2) Esplorazione ecografica di tutte le vene del braccio e del collo
- 3) Scelta della vena più appropriata quanto a calibro, posizione e profondità
- 4) Chiara identificazione ecografica del nervo mediano e dell'arteria brachiale
- 5) Venipuntura ecoguidata
- 6) Controllo ecografico della vena giugulare durante la progressione del catetere
- 7) Utilizzo del metodo ECG intracavitario per
verificare la posizione della punta
- 8) Fissaggio del catetere mediante sutureless device

CORRETTA POSIZIONE DELLA PUNTA DEL CVC

IL CONTROLLO RX

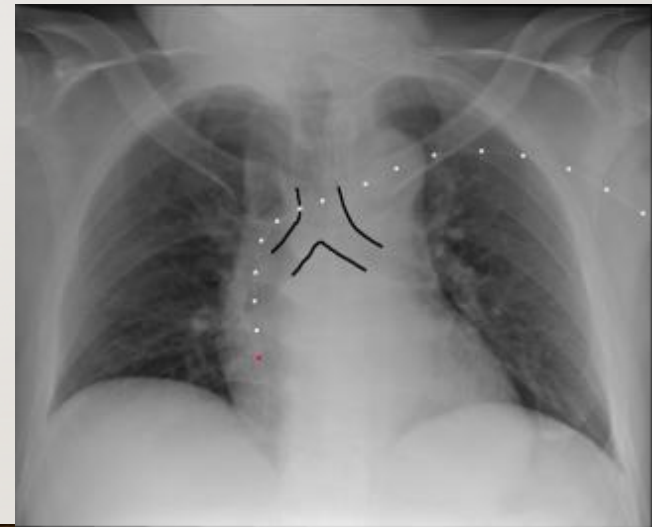
NORTH AMERICAN GUIDELINES

at the lower third of the SVC or at the caval-atrial junction (1)



EUROPEAN GUIDELINES

in the mid to lower portion of the SVC, at the caval-atrial junction or in the upper portion of the right atrium (2)

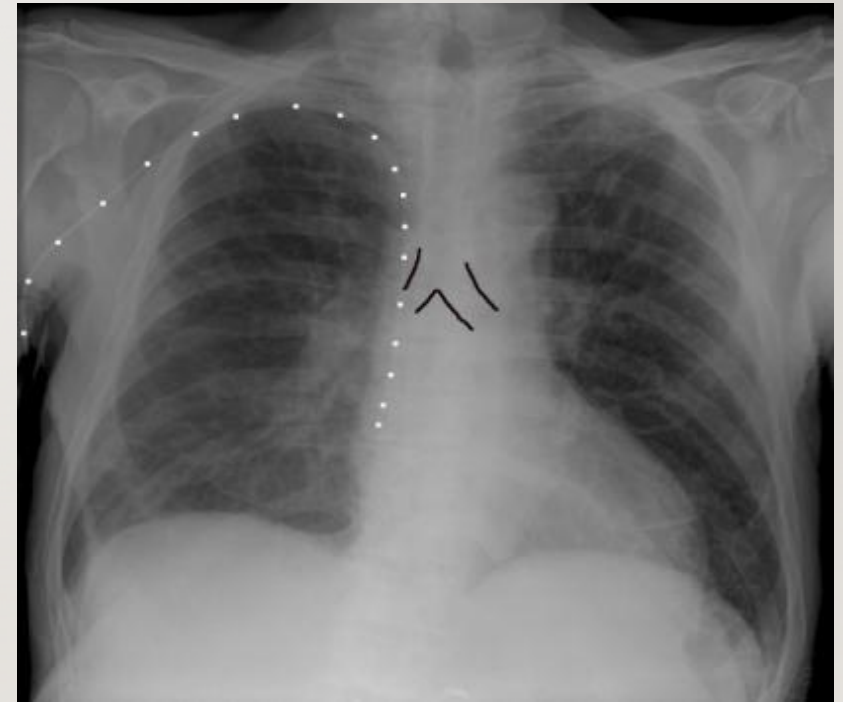
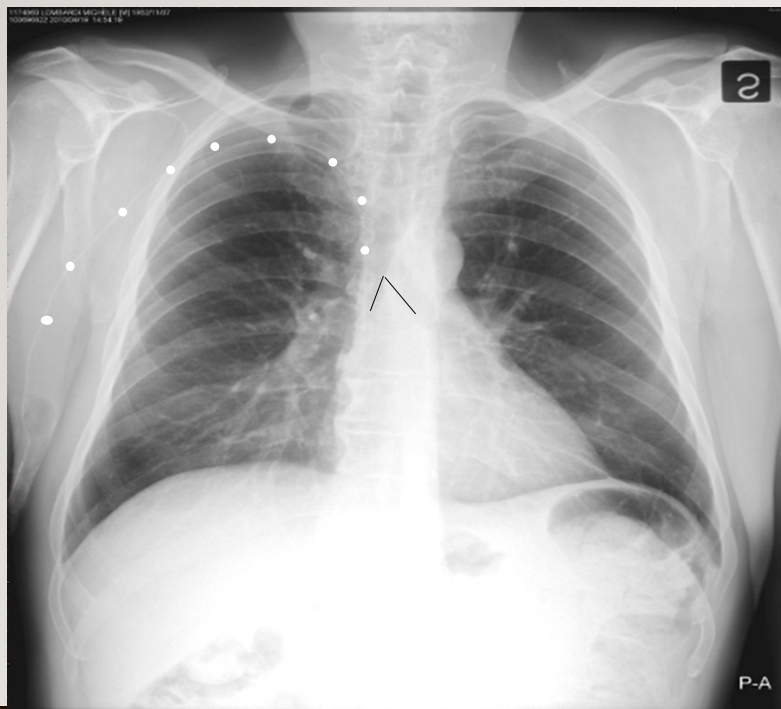


- 1) Infusion nursing standard of practice. Journal of infusion Nursing. 2006; 29:S1/92
- 2) Pittiruti M, Hamilton H, Biffi R, MacFie J, Pertkiewicz M. ESPEN guidelines on parenteral nutrition: central venous catheters (access, care, diagnosis and therapy of complications). Clin Nutr. 2009;28:365-377.

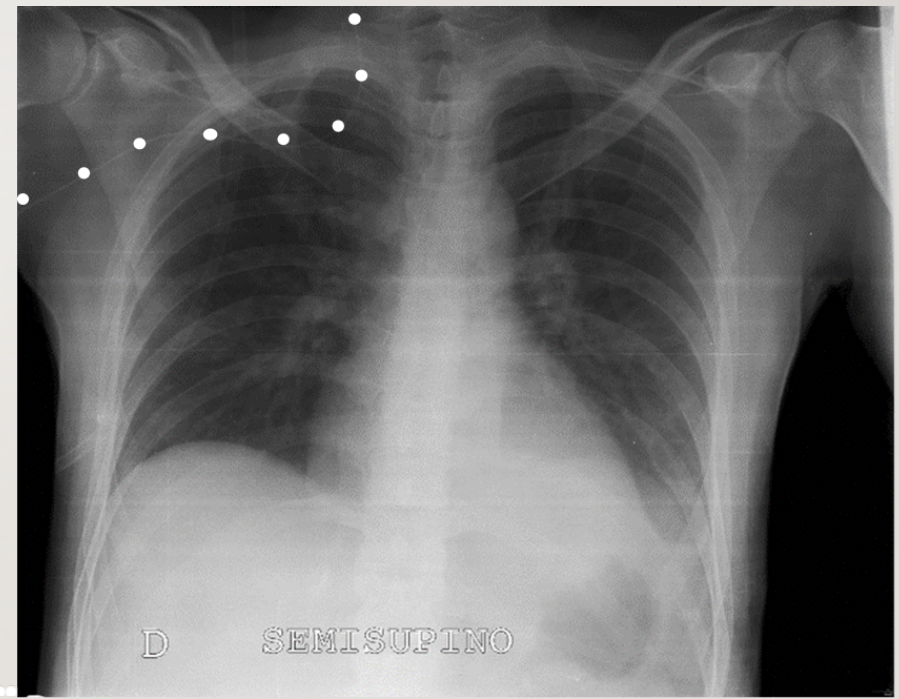
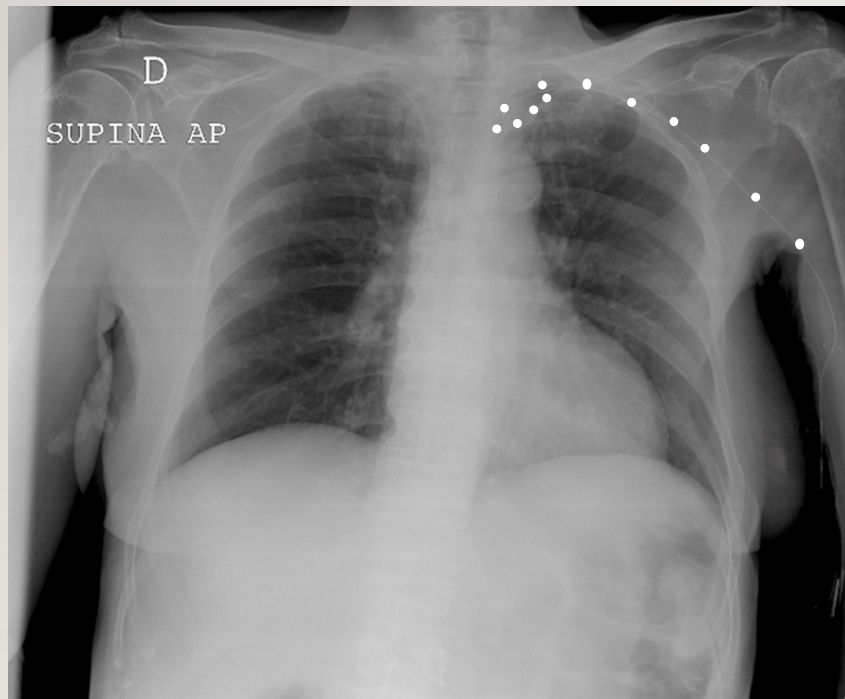
Late Cardiac Tamponade in Adults Secondary to Tip Position in the Right Atrium: An Urban Legend? A Systematic Review of the Literature

Mauro Pittiruti, MD,* and Massimo Lamperti, MD†

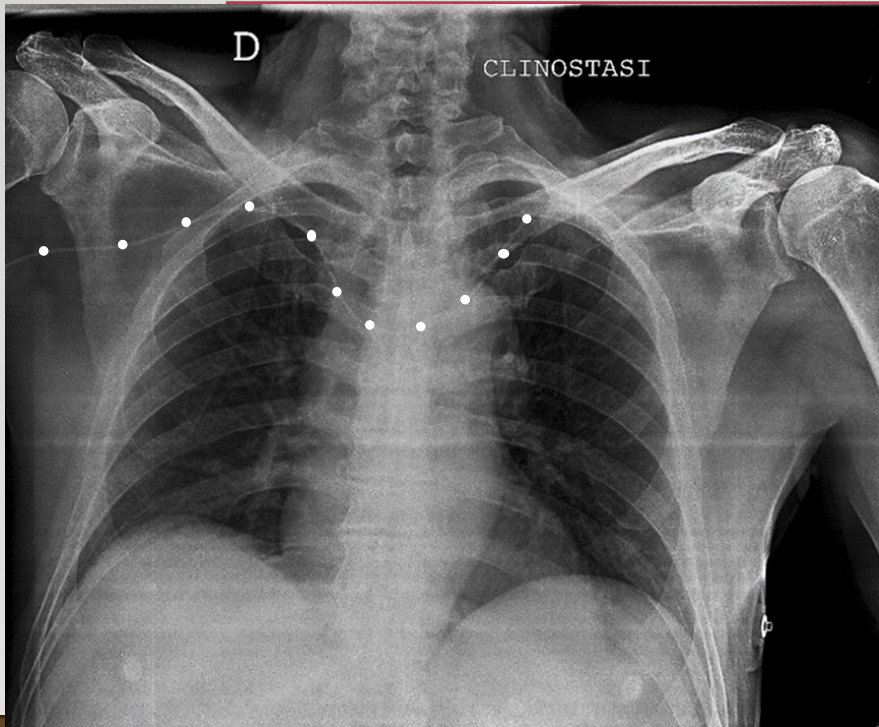
Journal of Cardiothoracic and Vascular Anesthesia, Vol 29, No 2 (April), 2015: pp 491–495



MALPOSIZIONAMENTI



MALPOSIZIONAMENTI



Original Article

Defining peripherally inserted central catheter tip position and an evaluation of insertions in one unit

Anaesthesia 2013

A. J. Johnston,¹ S. M. Bishop,² L. Martin,³ T. C. See⁴ and C. T. Streater⁵

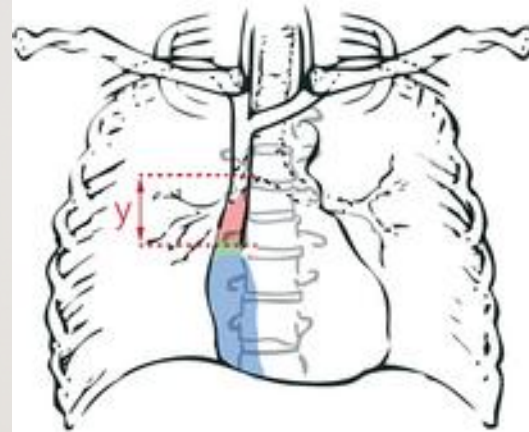
Tip position	Chest radiograph interpretation of tip position
Axillary vein*	Between the lateral borders of the rib cage and the lateral border of the first rib
Internal jugular vein*	Above the superior border of the clavicle
Subclavian vein*	Medial to the axillary vein, but above the inferior border of the medial end of the clavicle
Brachiocephalic vein*	Below the inferior border of the medial end of the clavicle but above the superior vena cava
High superior vena cava	Within one posterior rib height distance (fifth, sixth or seventh rib measured at the mid-clavicular line) of the superior border of the origin of the right main bronchus down to the right main bronchus. In addition, for left-sided catheters, the tip had to have crossed the right border of the trachea
Mid superior vena cava	Superimposed over the right main bronchus
Low superior vena cava	Below the right main bronchus, but above the caval-atrial junction
Caval-atrial junction	Two vertebral body units (one vertebral body unit equal to vertebral body plus vertebral disc) below the lower border of the carina
Right atrium	Between the caval-atrial junction and either the right ventricle or the inferior vena cava. When the tip was positioned in the right atrium, the distance between the caval-atrial junction and the tip was determined
High right atrium	Within the right atrium and ≤ 2 cm from the caval-atrial junction
Right ventricle	Past the caval-atrial junction and crossing the midline
Inferior vena cava	Past the caval-atrial junction and below the diaphragm
Other (for example, coiled)	Unable to determine tip position due to catheter coiling or other abnormalities

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Anaesthesia 2013



- Low superior vena cava
- Caval-atrial junction
- Right atrium

Y = 2 corpi vertebrali
(1 unità = 1 corpo vertebrale + disco)

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

Position of CVC tip

High osmolarity PN requires central venous access and should be delivered through a catheter whose tip is in the lower third of the superior vena cava, at the atrio-caval junction, or in the upper portion of the right atrium (Grade A). The position of the tip should preferably be checked during the procedure, especially when an infraclavicular approach to the subclavian vein has been used.

Postoperative X-ray is mandatory (a) when the position of the tip has not been checked during the procedure, and/or (b) when the device has been placed using blind subclavian approach or other techniques which carry the risk of pleuropulmonary damage.

C, B

5

LA FLUOROSCOPIA

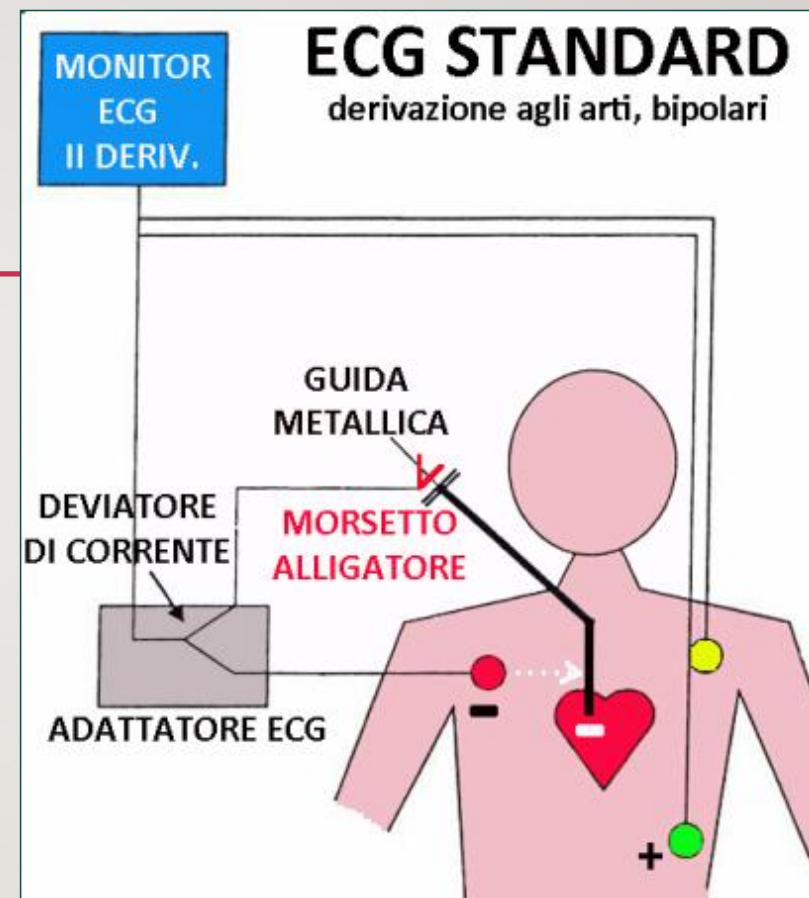
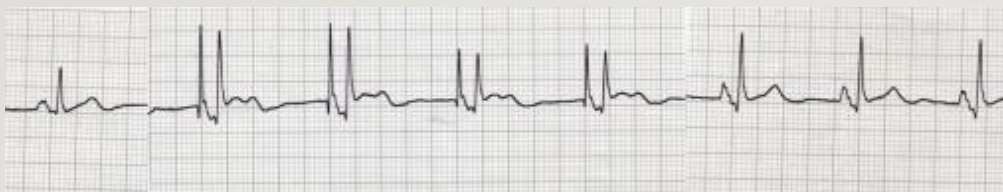


TECNICA DELL'ECG INTRACAVITARIO

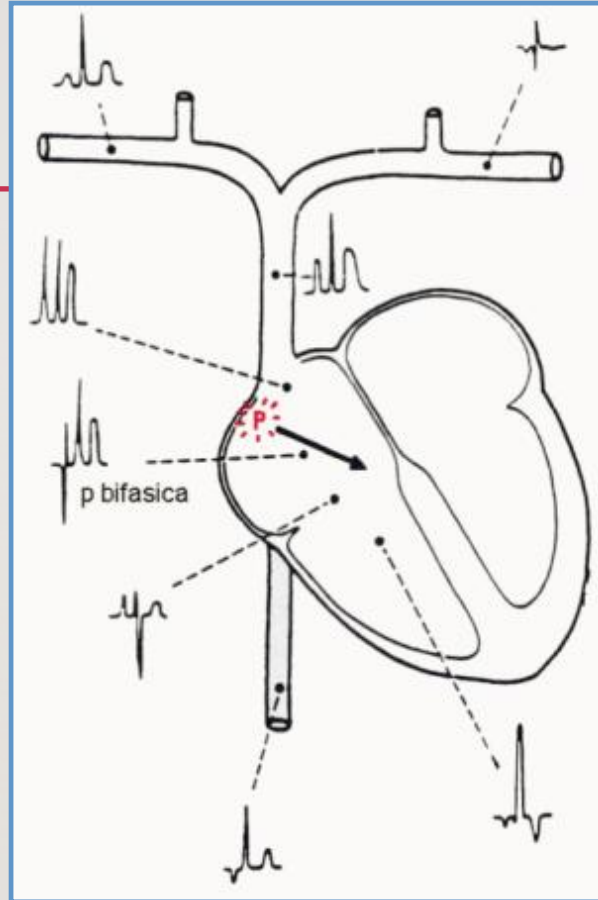
P basale

P max

P rise



Tecnica della colonna di soluzione salina



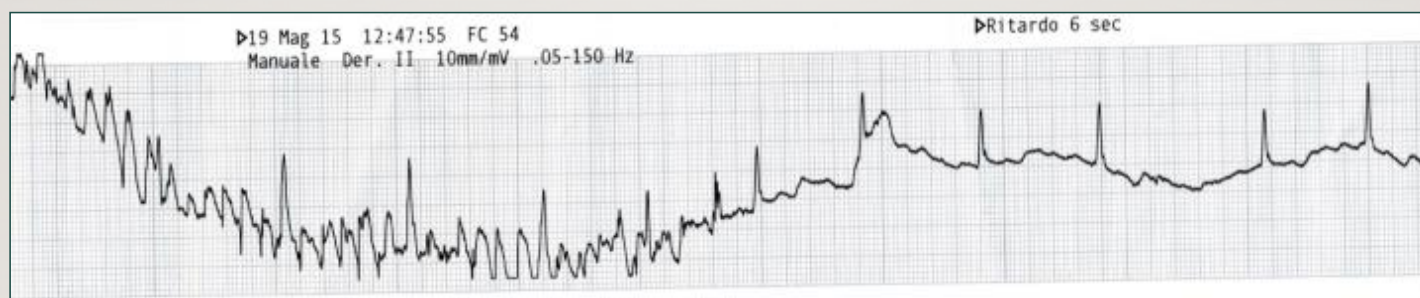
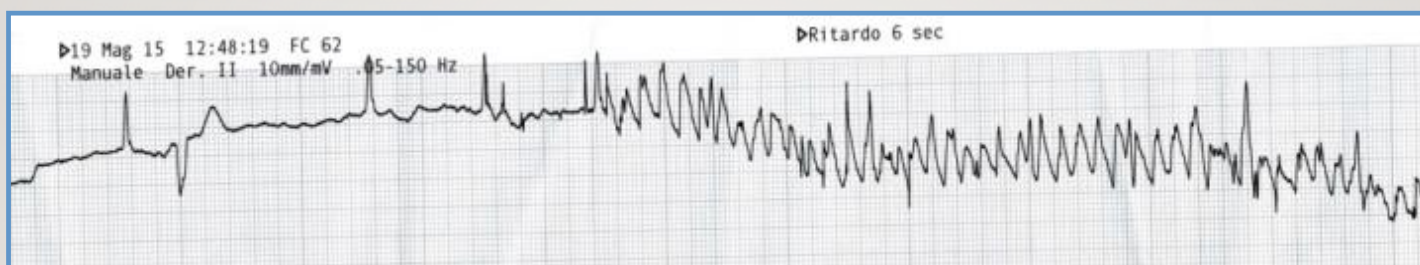
Tecnica della guida metallica



Martin JT et al. Neuroanesthetic adjuncts for surgery in the sitting position. Intravascular electrocardiography. Anesth Analg 49: 793-805, 1970.

LIMITI DELLA TECNICA ELETTROCARDIOGRAFICA

fibrillazioni, flutter e tachicardia atriale parossistica



Schummer W. Modified ECG-guidance for optimal central venous catheter tip positioning. A transesophageal echocardiography controlled study Anaesthesist. 2005.

17078. Recording of Intracavity Potentials Through a Single Lumen, Saline Filled Cardiac Catheter.

H. K. HELLERSTEIN,* W. H. PRITCHARD, AND D.

... position of peripherally
... landmark vs.

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

Francesco Baldinelli

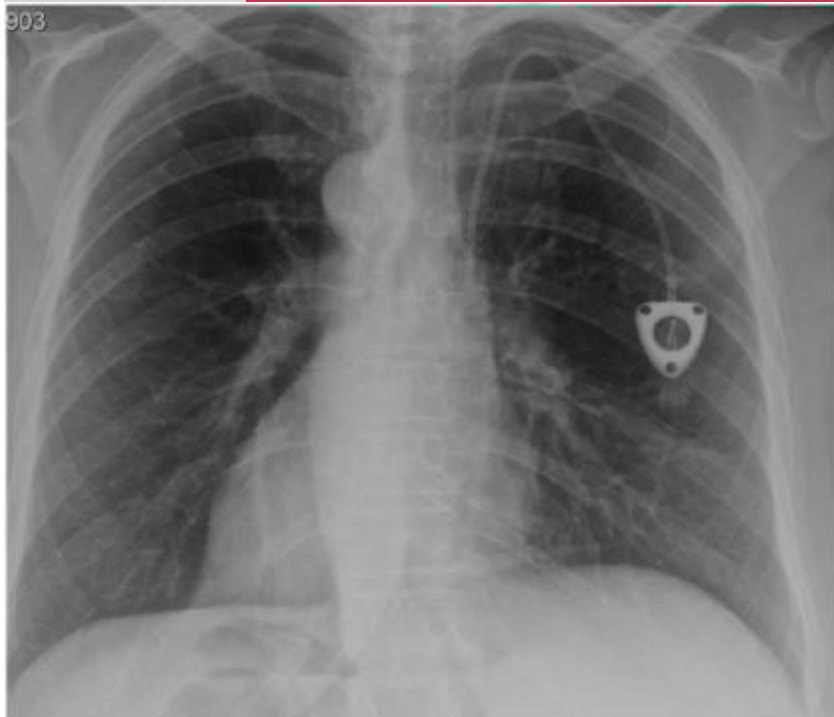


CASO CLINICO

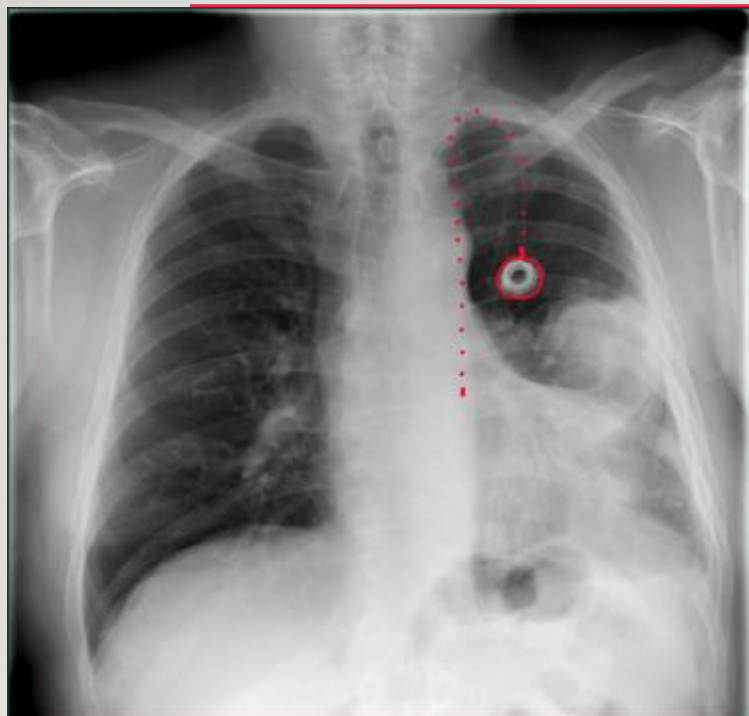
- Donna 30 anni al III mese di **gravidanza** affetta da stipsi cronica severa tipo “**slow transit**”.
- Indicazione per NP come supporto nutrizionale
- PICC 4 Fr,
- Periodicamente sono stati eseguiti controlli con tecnica ECG endocavitaria per confermare la corretta posizione della punta del PICC



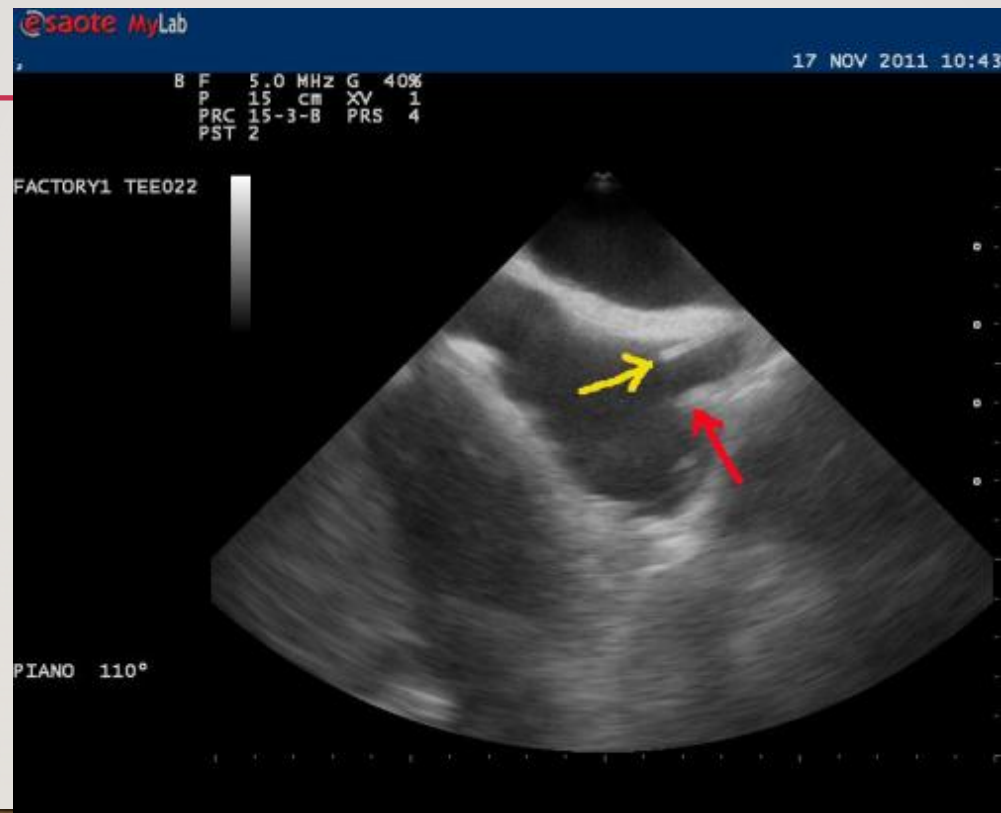
SITUS VISCERUM INVERSUS

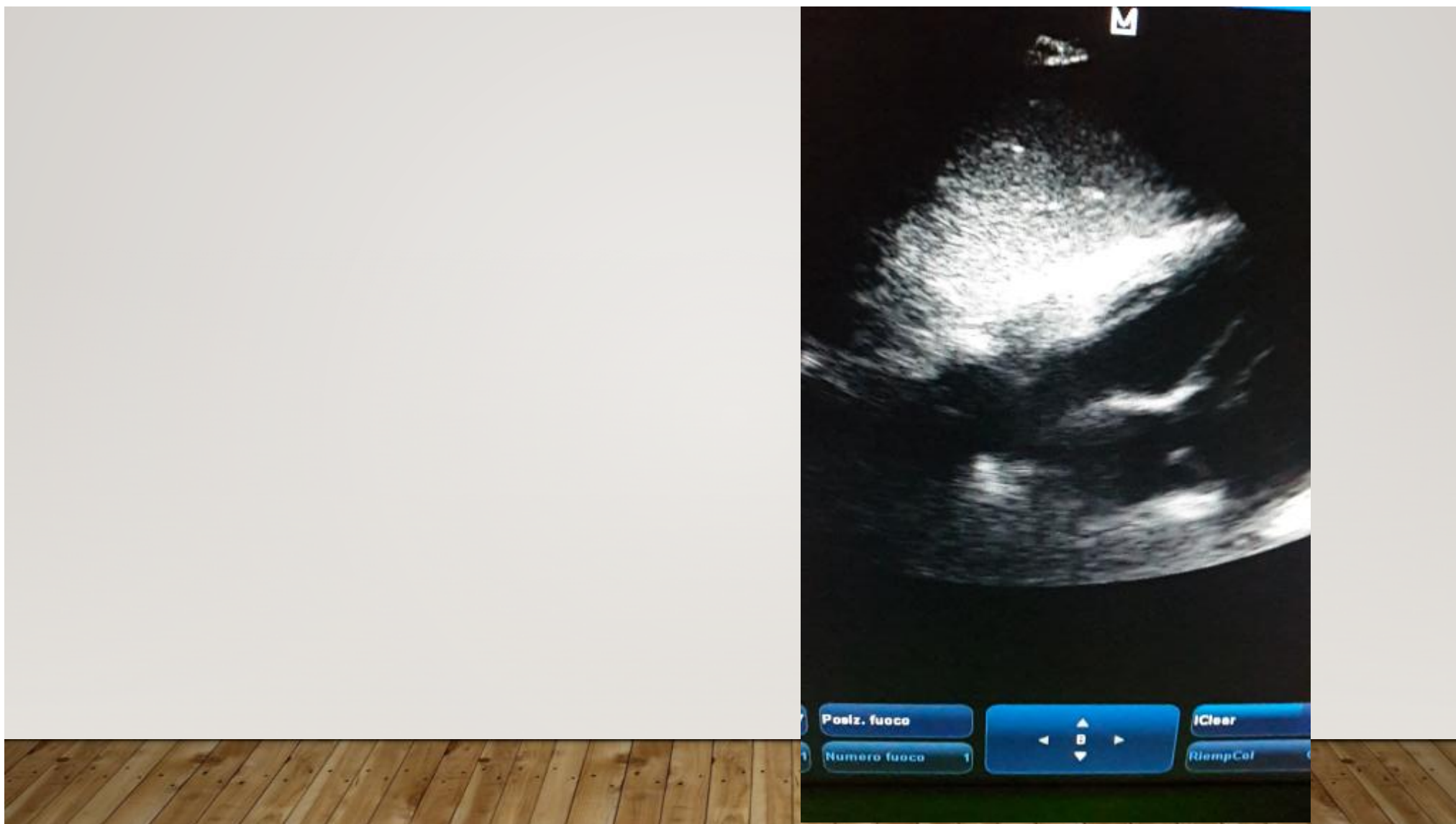


PERSISTENZA DELLA VENA CAVA SUPERIORE SINISTRA



ECOCARDIOGRAFIA TRANSESOFAGEA (ETE)





Brief Communication



Confirmation of endovenous placement of central catheter using the ultrasonographic “bubble test”

Ajit S. Baviskar, Khalid I. Khatib¹, Sanjeev Bhoi², Sagar C. Galwankar³, Harshad C. Dongare

Agitated Saline Bubble–Enhanced Transthoracic Echocardiography: A Novel Method to Visualize the Position of Central Venous Catheter

Ming Wen, MD; Konrad Stock, MD; Uwe Heemann, MD; Mario Aussieker, MD;
Claudius Küchle, MD

[*Crit Care Med* 2014; 42:e231–e233]

Figure 2. Ultrasonographic image of a central venous catheter (CVC) tip positioned in the internal jugular vein. The image shows the catheter tip (small arrow) and the internal jugular vein (large vessel). The image was taken at the 0.75-second mark of the video sequence. The image was considered a positive result for the bubble test.

DYNAMIC EMERGENCY MEDICINE

Rapid Confirmation of Central Venous Catheter Placement Using an Ultrasonographic “Bubble Test”

aimed at the internal jugular vein in A. The second frame, showing (small arrow) emergence of the catheter (CVC) port flush into the superior vena cava on chest



Contents lists available at ScienceDirect

American Journal of Emergency Medicine

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



Brief Report

Contrast enhanced ultrasound vs chest X-ray to determine correct central venous

Ultrasound as a Screening Tool for Central Venous Catheter Positioning and Exclusion of Pneumothorax*

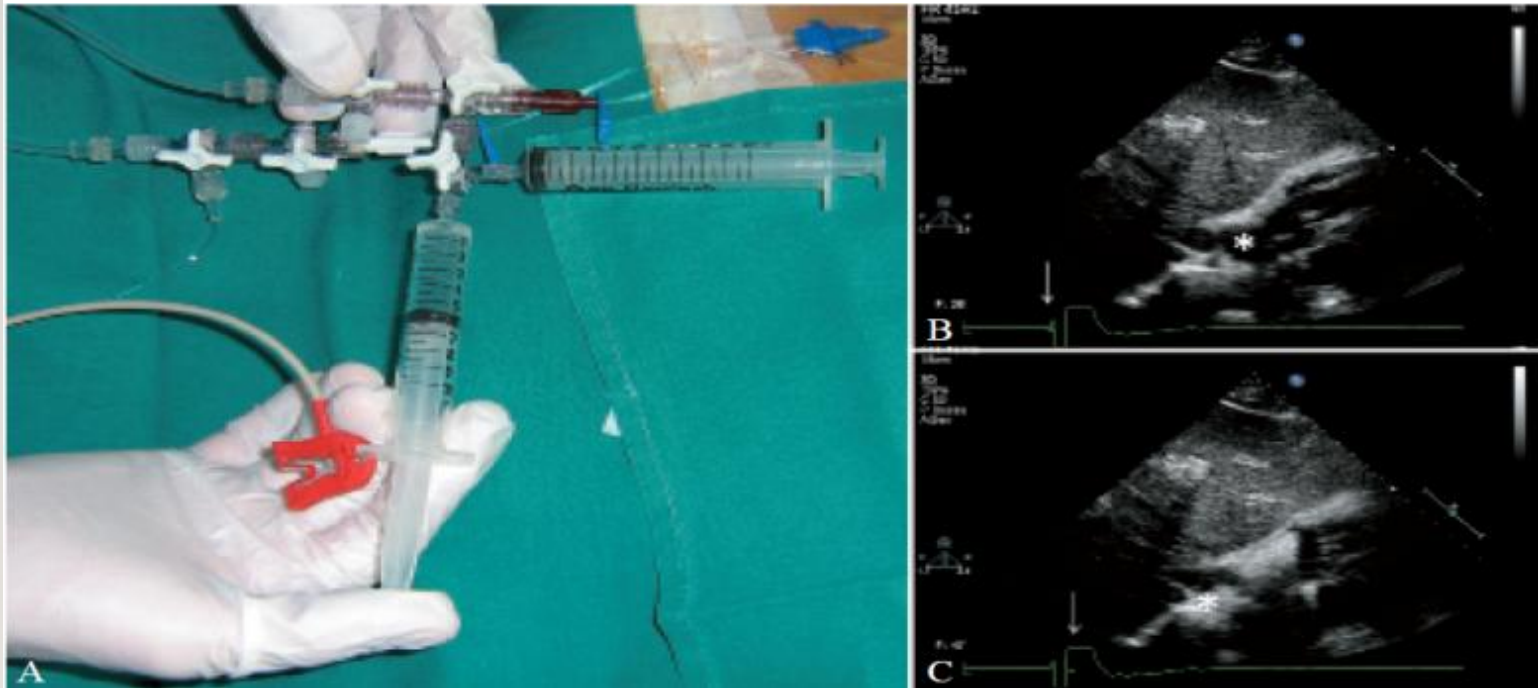
Rabia Amir, MD¹; Ziyad O. Knio, BS²; Feroze Mahmood, MD¹; Achikam Oren-Grinberg, MD¹; Akiva Leibowitz, MD¹; Ruma Bose, MD¹; Shahzad Shaefi, MD¹; John D. Mitchell, MD¹; Muneeb Ahmed, MD³; Amit Bardia, MD¹; Daniel Talmor, MD¹; Robina Matyal, MD¹

catheter placement

Petra E. Duran-Gehring, MD ^{a,*}, Faheem W. Guirgis, MD ^a, Kristin C. McKee, DO ^a, Susan Goggans, MD ^a, Huynh Tran, MD ^b, Colleen J. Kalynych ^a, Robert L. Wears, MD, PhD ^a

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

M. MEGGIOLARO ¹, A. SCATTO ¹, A. ZORZI ², E. ROMAN-POGNOUZ ¹
A. LAURO ³, C. PASSARELLA ¹, G. BONACCORSO ¹



Diagnostic Confidence Radiology Review

Reference	Feasibility (%) ^a	Incidence of Central Venous Catheter Malposition	Sensitivity (95% CI) ^b	Specificity (95% CI) ^b	Incidence of Pneumothorax	Chest Radiograph time (Minutes), Mean (sd) ^c	Ultrasound time (Minutes), Mean (sd)
Vezzani et al (30)	89.2	0.28	0.93 (0.76–0.99)	0.96 (0.88–0.99)	0.04	83.0 (79.0) ^c	10.0 (5.0)
Maury et al (16)	98.8	0.11	1.00 (0.66–1.00)	1.00 (0.95–1.00)	0.01	80.3(66.7) ^d	6.8 (3.5)
Zanobetti et al (31)	100	0.55	0.92 (0.85–0.96)	0.89 (0.81–0.95)	0.02	65.0 (74.0) ^e	5.0 (3.0)
Cortellaro et al (32)	100	0.085	0.33 (0.04–0.78)	0.98 (0.92–1.00)	–	288.0 (216.0) ^e	4.0 (1.0)
Matsushima and Frankel (33)	71	0.17	0.50 (0.19–0.81)	0.98 (0.89–1.00)	0.00	75.3 (–) ^f	10.8
Bedel et al (34)	96	0.06	0.83 (0.36–1.00)	1.00 (0.96–1.00)	0.00	103.0 (81.0) ^f	1.76 (1.3)
Baviskar et al (35)	100	0.00	–	–	–	–	0.75
Duran-Gehring et al (36)	92	0.065	0.33 (0.01–0.91)	1.00 (0.92–1.00)	0.04	299.0 (–) ^e	5.0
Weekes et al (37)	96.6	0.03	0.75 (0.19–0.99)	1.00 (0.97–1.00)	–	–	–
Wen et al (38)	100	0.01	1.00 (0.16–1.00)	1.00 (0.98–1.00)	–	28.3 (25.7) ^c	3.2 (1.1)
Syed et al (39)	100	0.50	1.00 (0.16–1.00)	1.00 (0.16–1.00)	–	–	–
Madhulika et al (40)	100	0.24	1.00 (0.86–1.00)	1.00 (0.95–1.00)	0.00	–	–
Gekle et al (41)	100	0.00	–	–	–	30.0 (–) ^f	8.9
Weekes et al (42)	97.4	0.03	0.75 (0.19–0.99)	1.00 (0.98–1.00)	0.00	20.0 (30.0) ^c median (IQR)	1.1 (0.7) median (IQR)
Meggiolaro et al (43)	100	0.45	0.53 (0.38–0.68)	0.95 (0.86–0.99)	0.00	67.0 (42.0–84.0) ^e median (IQR)	10.0 (7.0–20.0) median (IQR)

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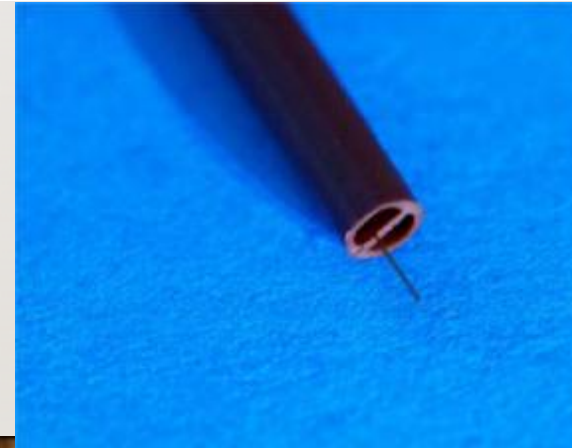
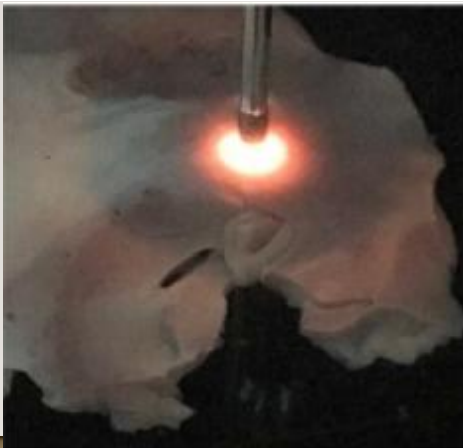
.....FUTURO

**Dual-wavelength Reflectance Spectroscopy of the Superior Vena Cava: A Method
for Placing Central Venous Catheters at the Cavoatrial Junction**

Bradley J. Stringer, Spencer B. Shumway, Matthew D. Holbrook, Cameron G. Copeland,

Alexander A. Gosch, Kai Kück

J Biophotonics. 2017



GRAZIE

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