

GAVeCeLT 2017

X Congresso GAVeCeLT XI PICC Day



Firenze
4-5-6 dicembre 2017
Palazzo dei Congressi



Venous Access in ICU

Insertion technique of CICC and FICC in the critically ill patient: state of the art

Antonio La Greca
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Gemelli



Tecnica impianto CICC/FICC in ICU



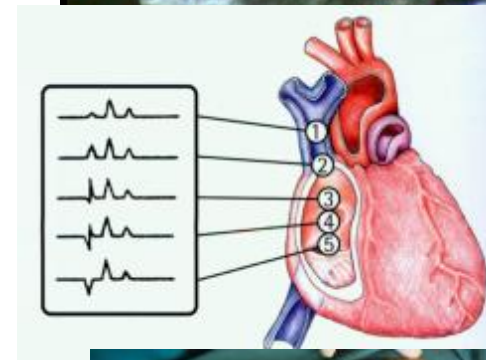
Dallo standard di cura ...

... allo stato dell'arte



Standard di cura

- ECO guida (global use – fase 1)
- ECG guida
- Asepsi e massimi presidi di barriera
- Scelta accurata dei materiali
- Standardizzazione di metodi e percorsi



Massimo Lamperti
Andrew R. Bodenham
Mauro Pittiruti
Michael Blaivas
John G. Augoustides
Mahmoud Elbarbary

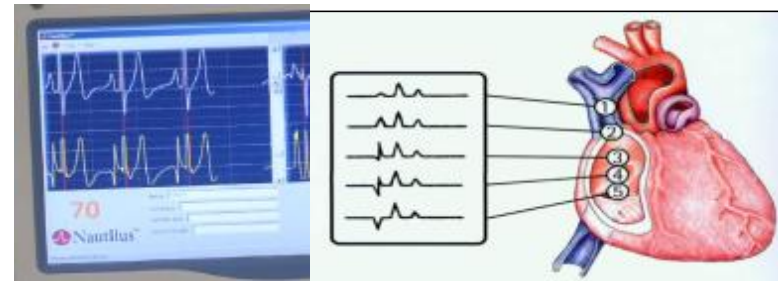
International evidence-based recommendations on ultrasound-guided vascular access

Table 4 Recommendations on ultrasound vascular access in adults and cost-effectiveness

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

Available technology and technique for ultrasound vascular access

Domain code	Suggested definition	Level of evidence	Degree of consensus	Strength of recommendation
D2.S1	The frequencies of ultrasound transducers for vascular access range from 5 to 15 MHz. This broad range of frequencies may be incorporated into a single broad frequency probe	B	Very good	Strong
D2.S2	Probes may have a linear or curvilinear scanning surface (footprint). Small curvilinear probes may fit well within anatomically confined areas in children or adjacent to the clavicle. The footprint of the probe is important and typically ranges from 20 to 50 mm in length. Smaller footprint probes may be preferable for a paediatric patient	C	Very good	Strong
D2.S3	2D imaging is currently the standard technology for ultrasound-guided vascular access	B	Very good	Strong
D2.S4	Doppler functions during ultrasound vascular imaging require advanced competence from the operator	B	Very good	Strong
D2.S5	Needle guides can be used to improve the cannulation success for novice ultrasound users	B	Very good	Strong
D2.S6	The screen of the US machines should be placed in the line of sight of the needle insertion	B	Very good	Strong
D2.S7	US devices should have the ability to record and save images/loops for documentation and teaching. Ideally these should be stored on the hospital picture archiving and communication system (PACS) or similar along with other imaging. This is particularly important if abnormal pathology is seen, e.g. thrombus, or if complications have occurred	B	Very good	Strong
D3.S3	The utilisation of the in-plane technique, usually associated with a long-axis visualisation of the vessel, leads to higher precision and fewer complications. It should be used when possible, although it is more challenging	B	Very good	Strong



- 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.

Standard di cura

GAVECELT 2012 – **PROTOCOLLO ISAC** IMPIANTO SICURO DELL'ACCESSO CENTRALE

1. **Scelta ragionata della vena mediante esame ecografico sistematico (RaCeVA)**
2. **Tecnica asettica appropriata: lavaggio delle mani, massime protezioni di 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 della 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 trasparente semipermeabile.**



Standard di cura

Uso ragionevole e ragionato dei device “medicati”

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY JULY 2014, VOL. 35, NO. 7

SHEA/IDSA PRACTICE RECOMMENDATION

Strategies to Prevent Central Line–Associated Bloodstream Infections in Acute Care Hospitals: 2014 Update

Jonas Marschall, MD;^{1,2a} Leonard A. Mermel, DO, ScM;^{3a} Mohamad Fakih, MD, MPH;⁴

1. Use antiseptic- or antimicrobial-impregnated CVCs in adult patients (quality of evidence: I).^{29,30,146–152}
 - a. The risk of CLABSI is reduced with some currently marketed antiseptic-impregnated (eg, chlorhexidine–silver sulfadiazine) catheters and antimicrobial-impregnated (eg, minocycline-rifampin) catheters. Use such catheters in the following instances.
 - i. Hospital units or patient populations have a CLABSI rate above institutional goals despite compliance with basic CLABSI prevention practices. Some evidence suggests that use of antimicrobial CVCs may have no additional benefit in patient care units that have already established a low incidence of catheter infections.¹⁵³
 - ii. Patients have limited venous access and a history of recurrent CLABSI.
 - iii. Patients are at heightened risk of severe sequelae from a CLABSI (eg, patients with recently implanted intravascular devices, such as a prosthetic heart valve or aortic graft).



Tecnica impianto CICC/FICC in ICU

... quali problemi aperti ?





Tecnica impianto CICC/FICC in ICU

Complicanze CVC-relate: nessuna novità

- Alta incidenza
- Aumento Mortalità
- Aumento morbilità
- Aumento degenza in ICU
- Aumento costi degenza in ICU



Tecnica impianto CICC/FICC in ICU

Complicanze CVC-relate: nessuna novità

EARLY ONSET (up to 2%)

- Pneumothorax
- Hemothorax
- Local hematoma (airway compression)
- Arterial cannulation
- Primary malposition
- Air embolism
- Arrhythmias
- Nerve injury

LATE ONSET

- Accidental Removal
- Accidental Rupture
 - Intra-vascular or Extra-vascular
- Occlusion
- **Thrombosis**
- **Infection**
 - CR-BSI or CLABSI
 - Catheter Colonization



Tecnica impianto CICC/FICC in ICU

Mancano le risorse evidence-based o
le risorse non vengono applicate ?

**IL CENOZOICO NON
RECEDE**

Emerg Med Clin N Am ■ (2017) ■-■
<http://dx.doi.org/10.1016/j.emc.2017.06.004>
0733-8627/17/Published by Elsevier Inc.

Vascular Access Complications An Emergency Medicine Approach

Erica Marie Simon, DO, MHA*, Shane Matthew Summers, MD

KEYWORDS

- Central venous catheterization • Arterial catheterization • Vascular hemorrhage
- Central line infection • Dialysis access complications
- Central catheterization and anticoagulation

KEY POINTS

- Central venous catheterizations and arterial catheterizations are frequently used in the emergency setting to establish invasive hemodynamic monitoring, perform acute resuscitation, and facilitate the initiation of specialty-directed therapies (hemodialysis and extracorporeal membranous oxygenation).
- Morbidity and mortality associated with vascular access attempts occur secondary to infection, thrombosis, embolism, and iatrogenic injury.
- As the prevalence of chronic kidney disease continues to increase, emergency physicians must be aware of complications associated with hemodialysis vascular access.
- When obtaining central venous access or arterial access in an anticoagulated patient, experts recommend catheterization of a directly compressible vessel.
- Vascular access complications may be limited by the employment of aseptic technique, choice of appropriate cannulation site, operator training, and the utilization of ultrasound.



Tecnica impianto CICC/FICC in ICU

Guidelines for Performing Ultrasound Guided Vascular Cannulation: Recommendations of the American Society of Echocardiography and the Society of Cardiovascular Anesthesiologists

January 2012 • Volume 114 • Number 1

ANESTHESIA & ANALGESIA

Christopher A. Troianos, MD, Gregg S. Hartman, MD, Kathryn E. Glas, MD, MBA, FASE,

Practice Guidelines for Central Venous Access

A Report by the American Society of Anesthesiologists Task Force on Central Venous Access

Anesthesiology 2012; 116:539-73

Mancano le risorse evidence-based o
le risorse non vengono applicate ?

**GLI EQUIVOCI
SULL'ECOGUIDA**



Tecnica impianto CICC/FICC in ICU

One step forward



One step forward

L'esempio dei PICC

- 1) Esplorazione ecografica sistematica di tutte le vene del braccio (dal gomito all'ascella) e delle vene maggiori della zona sottoclaveare e sopraclaveare, seguendo il protocollo RaPeVA (*Rapid Peripheral Vein Assessment*)
- 2) Igiene delle mani, disinfezione cutanea con clorexidina 2% in soluzione alcolica e utilizzo delle massime protezioni di barriera (mascherina e berretto non sterili, guanti sterili, camice sterile, ampio campo sterile sul paziente e coprisonda lungo per la sonda ecografica)
- 3) Scelta della vena più appropriata in termini di profondità e di calibro, a seconda del calibro del catetere pianificato (rapporto 1:3 tra diametro esterno del catetere e diametro interno della vena), utilizzando il sistema ZIM: se il sito di venipuntura ideale è situato nella zona gialla di Dawson, tunnellizzare il PICC in modo da ottenere il sito di emergenza nella zona verde
- 4) Chiara identificazione ecografica della arteria brachiale e del nervo mediano prima di procedere alla venipuntura (e quindi utilizzo quindi di ecografi che permettano la chiara identificazione del nervo)
- 5) Venipuntura ecoguidata *out-of-plane* in asse corto utilizzando appropriati kit di microintroduzione (ago 21G ecogenico, microguida in nitinol *soft straight tip*, microintroduttore-dilatatore di buona qualità)
- 6) Controllo e direzionamento del catetere (*tip navigation*) mediante ecografia della regione sopraclaveare (visualizzazione del catetere nella vena succlavia e nella vena anonima), particolarmente nei casi in cui vi siano ostacoli alla progressione o quando non si apprezzano modifiche dell'onda P all'ECG intracavitario
- 7) Controllo della posizione centrale della punta (*tip location*) mediante il metodo dell'ECG intracavitario, nella variante modificata per i pazienti in fibrillazione atriale, eventualmente corroborato dalla *tip location* mediante ecocardiografia transtoracica (CEUS: *contrast enhanced ultrasonography*)
- 8) Apposizione di colla in cianoacrilato al sito di emergenza + fissaggio con sistemi *sutureless* (preferendo i sistemi ad ancoraggio sottocutaneo nei pazienti ad alto rischio di dislocazione) + copertura con medicazione trasparente semipermeabile con buona traspirabilità (alto MVTR – *moisture vapor transfer rate*).

Stato dell'Arte - Materiali

- Cateteri medicati (uso “esteso” ragionato)
- Power injectability
- Cateteri “all in one”
- Dal catetere all-in-one al KIT ALL IN ONE
- Microintroduttori, guide sottili straight, cateteri lunghi (non vincoli di lato, tunnellizzabilità)



Antimicrobial-coated catheters and catheter-over-guidewire exchange in patients with severe catheter-related bloodstream infection: Old procedure, new indications?



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Uso ESTESO e ragionato dei device "medicati"

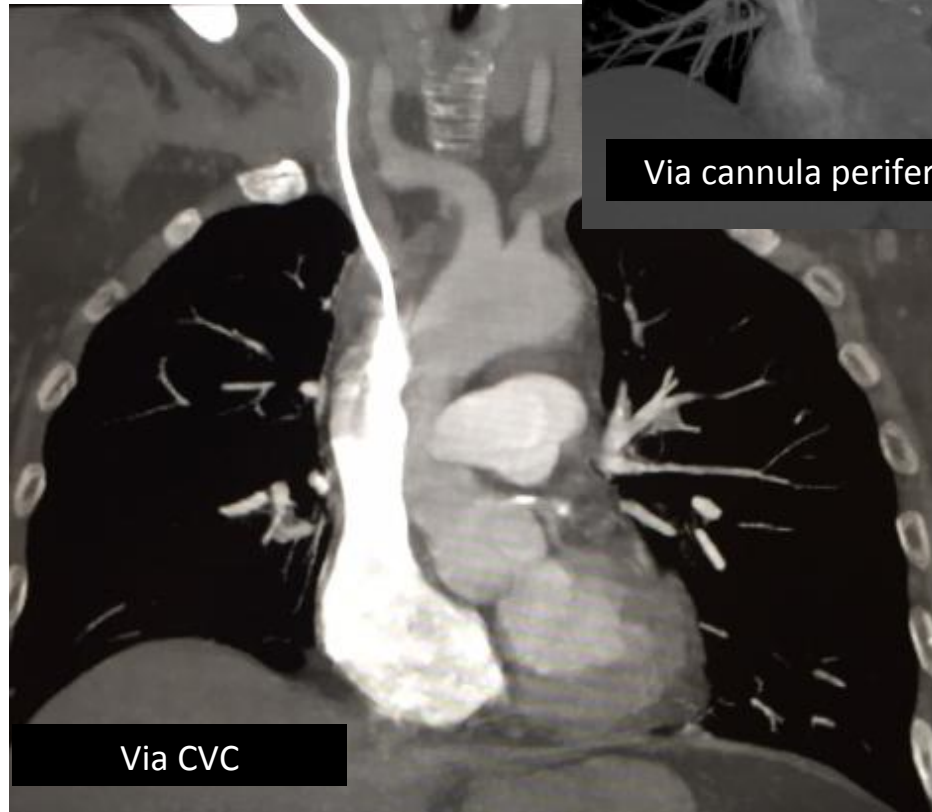
Letters to the Editor / American Journal of Infection Control 44 (2016) 612-8

In our institution, we have used chlorhexidine-silver sulfadiazine-impregnated catheters with extended indications since 2012. Our protocol includes the 3 above-mentioned points now approved by the Society for Healthcare Epidemiology of America and Infectious Diseases Society of America, with an extensive application of the point about patients with recently implanted orthopedic prosthesis, and a fourth indication that we believe is reasonable, beneficial, and safe: Patients with fungal or bacterial hospital-acquired bloodstream infection, irrespective of the primary source, who have a standard CVC and the absolute need of stable central venous access. In fact, chlorhexidine-silver sulfadiazine coating may prevent early colonization of the device by the hematogenous route, thereby avoiding the new catheter becoming a secondary source of sepsis and, thus, protecting this fragile subgroup of critically ill patients from a new iatrogenic complication.^{2,5}

Furthermore, patients with documented CRBSI whose CVC must be removed in agreement with 2009 Infectious Diseases Society of America guidelines,⁶ but with a compelling need of stable vascular access (eg, critical care, complete superficial peripheral vein exhaustion, and contraindications to peripherally inserted central catheters) and coexisting serious difficulties in cannulating a new vein (eg, morbid obesity, tracheostomy, and multiple previous cannulations), may benefit from a catheter-over-guidewire exchange with an antimicrobial-coated catheter, according to recent experiences.² Standard measures of CRBSI prevention do not include

Stato dell'Arte - Materiali

Cateteri Power Injectable



C.Fiscale	C.Sanitario 27857820		Telefono
Ricovero attivo			
C.Nosografico	0915006296735	Unità di cura	RIANIMAZIONE (00J1)
Fase	ricovero in corso	Diagnosi	malessere in neoplasia cerebrale di n.d.d.
Attività	dal	13/09/2015	al 13/10/2015
Lista Esami	Con Referto ☒	Referto esame di radiodiagnostica	In Attesa ☐
Esami con referto			
	data esame	descrizione esame	descrizione referto
☒	12/10/2015 23:38	TAC addome	Referto esame di radiodiagnostica
☐	11/10/2015 09:31	RX torace (una proiezione - a letto)	Referto esame di radiodiagnostica
☐	10/10/2015 03:37	RX torace (una proiezione - a letto)	Referto esame di radiodiagnostica
☒	10/10/2015 01:56	TAC addome (con MDC)	Referto esame di radiodiagnostica
☐	09/10/2015 16:04	RX torace (una proiezione - a letto)	Referto esame di radiodiagnostica
☐	07/10/2015 16:08	RX torace (una proiezione - a letto)	Referto esame di radiodiagnostica
☒	05/10/2015 20:28	RM cuore con MDC	Referto esame di radiodiagnostica
☒	03/10/2015 13:35	Drenaggio cavit peritoneale con guida ecografica	Referto esame di radiodiagnostica
☒	02/10/2015 18:50	RM cranio con MDC	Referto esame di radiodiagnostica
☒	28/09/2015 17:43	TAC addome (con MDC)	Referto esame di radiodiagnostica
☒	27/09/2015 23:49	TAC cranio	Referto esame di radiodiagnostica
☒	27/09/2015 17:43	TAC cranio	Referto esame di radiodiagnostica
☐	26/09/2015 10:40	RX torace (una proiezione - a letto)	Referto esame di radiodiagnostica
☐	24/09/2015 10:52	Eco doppler vasi collo	Referto esame di radiodiagnostica
☒	21/09/2015 10:33	TAC addome (con MDC)	Referto esame di radiodiagnostica
☐	18/09/2015 14:29	Eco doppler arti inferiori	Referto esame di radiodiagnostica
☒	18/09/2015 11:00	TAC cranio	Referto esame di radiodiagnostica
☒	15/09/2015 16:22	TAC torace (con MDC); TAC collo con mdc; TAC pelvi masch. (con MDC); TAC addome (con MDC)	Referto esame di radiodiagnostica
☒	15/09/2015 13:31	RM cranio con MDC	Referto esame di radiodiagnostica





Stato dell'Arte - Materiali

Device Power Injectable

1. Esigenze diagnostiche in ICU: consentono le infusioni a pressione di mdc
2. Altre esigenze in ICU: resistenza meccanica ai traumi e possibilità di flussi elevati ...

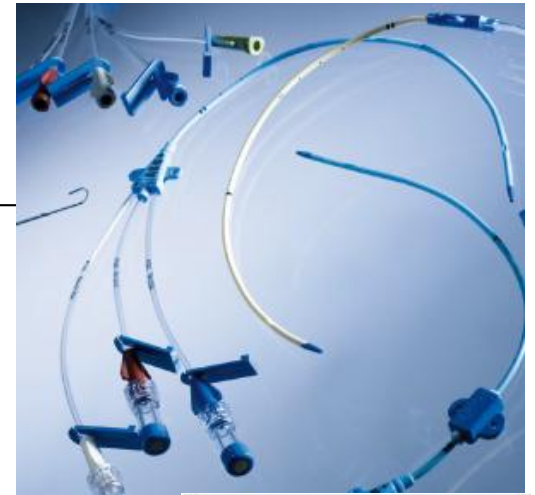


Stato dell'Arte - Materiali

Device Power Injectable

Risposta a tutte le esigenze extra-diagnostiche:

- Flussi più alti (da 2 a 10 ml/sec)
 - Anche per i cateteri multilume
 - Anche per procedure di feresi/diafiltrazione
- Minor rischio di ostruzione
- Più facile disostruzione (idraulica)
- Maggiore affidabilità delle misurazioni pressorie (PVC)



Stato dell'Arte – Materiali “AVANZATI”

- Power injectable
 - Antisettico
 - Antitrombotico e anti-sleeve



An all-in-one tool ...

Stato dell'Arte - Materiali

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY JULY 2014, VOL. 35, NO. 7

SHEA/IDSA PRACTICE RECOMMENDATION

Strategies to Prevent Central Line–Associated Bloodstream
Infections in Acute Care Hospitals:
2014 Update

4. Use an all-inclusive catheter cart or kit (quality of evidence: II).⁴⁵
 - a. A catheter cart or kit that contains all necessary components for aseptic catheter insertion has to be available and easily accessible in all units where CVCs are inserted.

- Standardizzazione procedure
- Profilassi degli errori procedurali
- Contributo alla prevenzione di specifiche complicanze

... IN ALL-IN-ONE KITS



One step forward



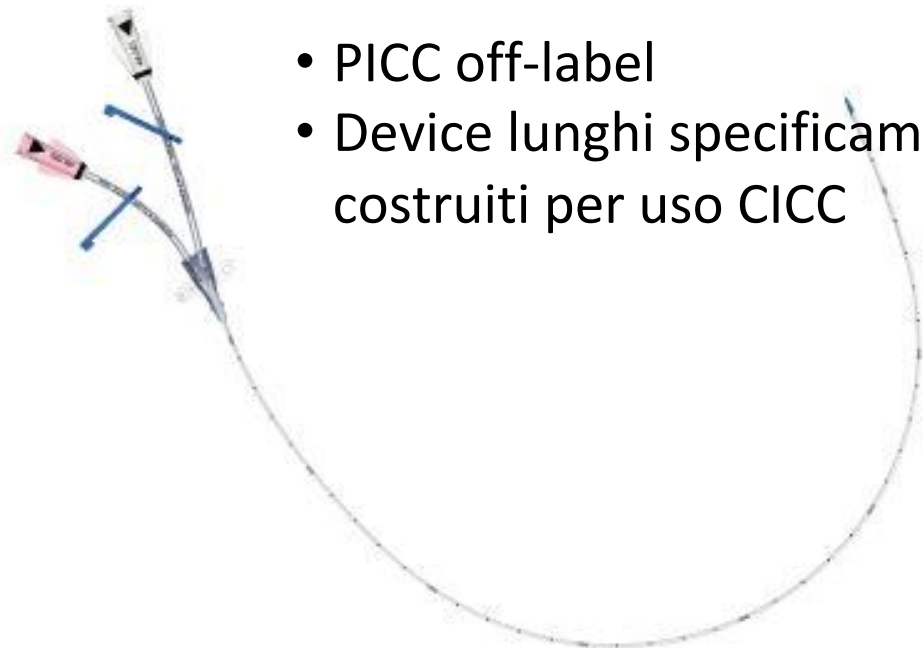
MADNESS

Stato dell'Arte - Materiali

Micro-introduzione (con Seldinger modificato)



Cateteri “lunghi” (> 20 cm)



- PICC off-label
- Device lunghi specificamente costruiti per uso CICC

One step forward



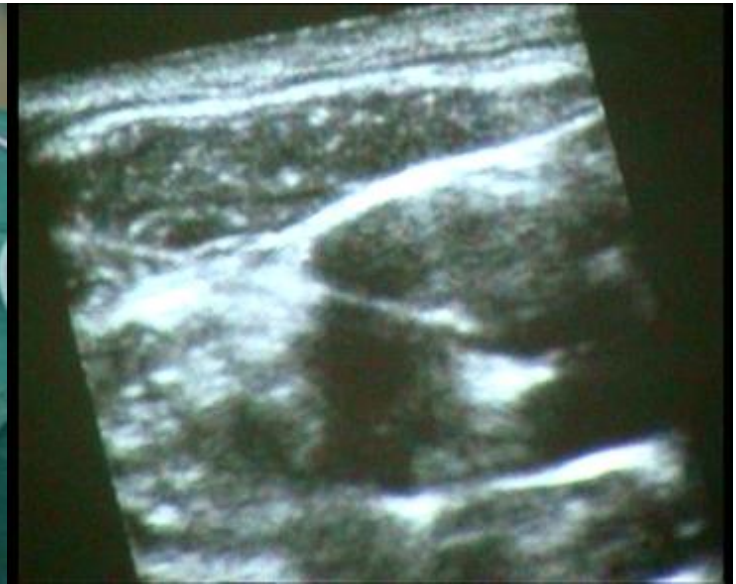
MADNESS

Stato dell'Arte – Valutazione e planning



ECOGUIDA
guidiamo l'ago o l'operatore ?

UNA NUOVA SPINTA VERSO L'OPERATORE

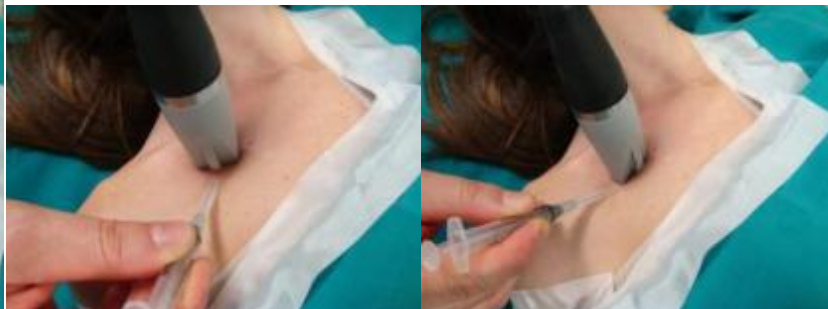




Stato dell'Arte – Valutazione e Planning

Six steps RaCeVA (Rapid Central Vein Assessment)

- Mid neck – IJV / CA
- Lower neck – Lower IJV (valve) + SA
- Tilting – BCV
- Lateralization – SV and SA (more laterally)
- Below clavicle (lateral 1/3) – AV+cephalic / AA (short axis)
- Anticlockwise rotation – AV (long axis)



Dal RaCeVA ...

Stato dell'Arte – Valutazione e planning

Approach choosing criteria

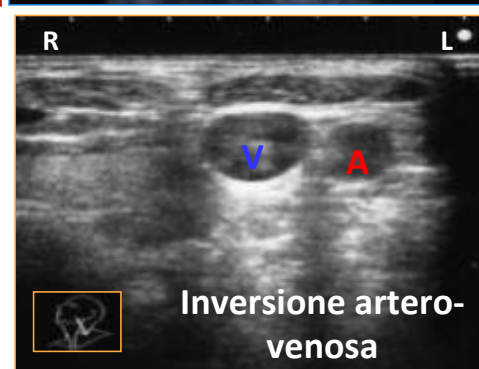
1. caliber of the vein
2. depth
3. collapse during breathing and/or compression by arterial pulsation
4. patency / abnormal structures
5. closeness to 'dangerous' structures (pleura)
6. convenience of the exit site in terms of management



Stato dell'Arte – Valutazione e planning



PREVENZIONE
COMPLICANZE
IMMEDIATE ...



Stato dell'Arte – Valutazione e planning

Vasi piccoli per cateteri grandi (**trombosi**)

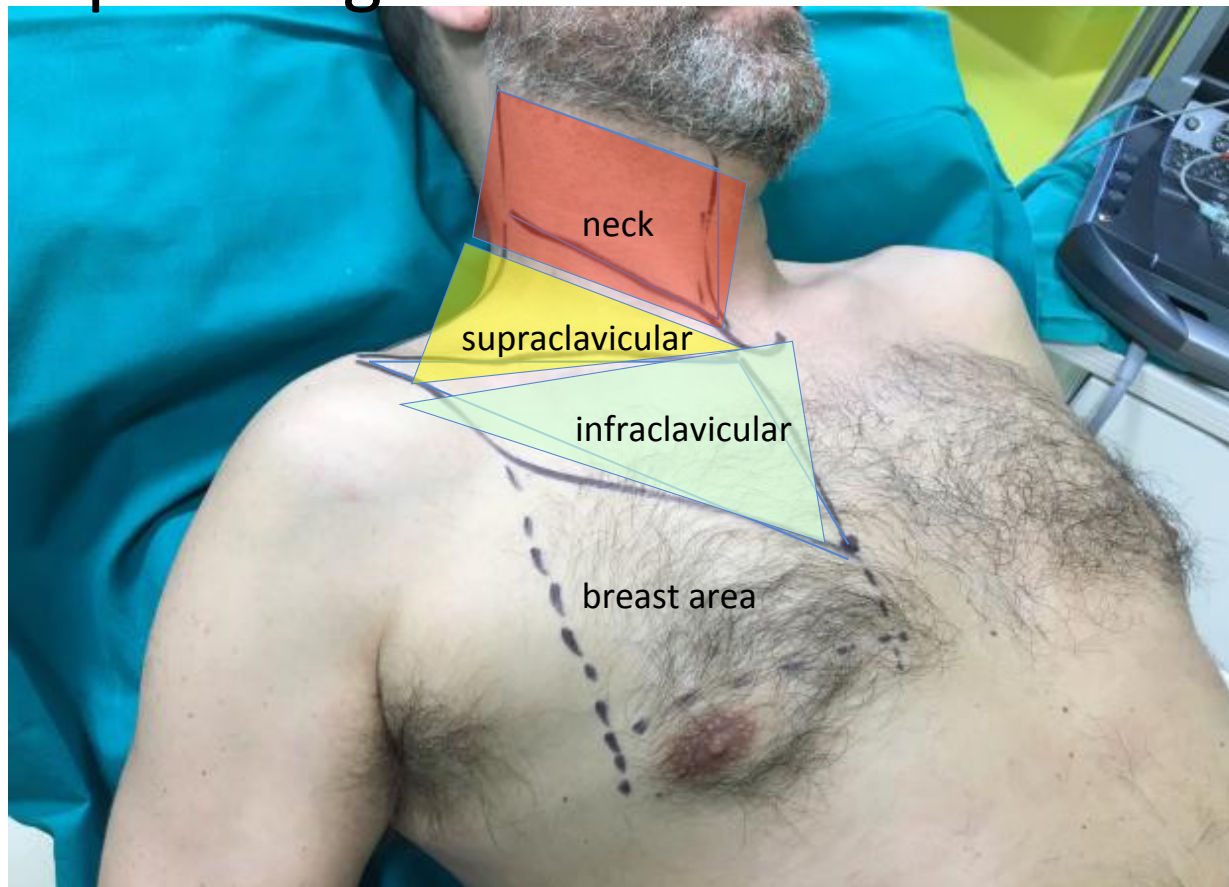
- Approccio alternativo
- Vasi approcciabili esclusivamente per vie che non garantiscono un adeguato exit-site (**infezione, malfunzionamento, dislocazione**)
 - (TUNNEL vs approccio alternativo)



... E PREVENZIONE
COMPLICANZE TARDIVE



Stato dell'Arte – Valutazione e planning



One step forward



... alla Central
Zone Insertion Method

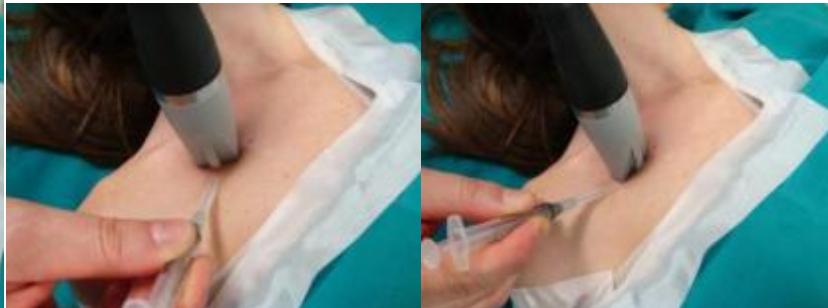
DALL'ECO AL
TUNNEL !!!



Stato dell'Arte – Tecniche di venipuntura



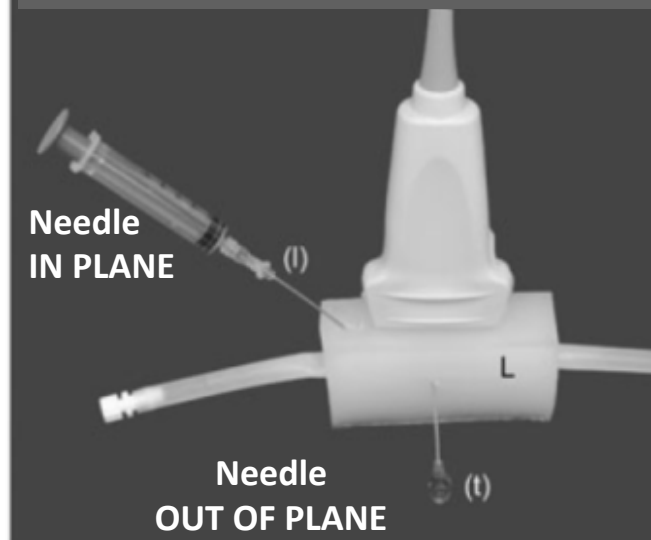
- Multipli approcci a disposizione dell'operatore
- OPERATOR VERSATILITY



Stato dell'Arte – Tecnica di venipuntura



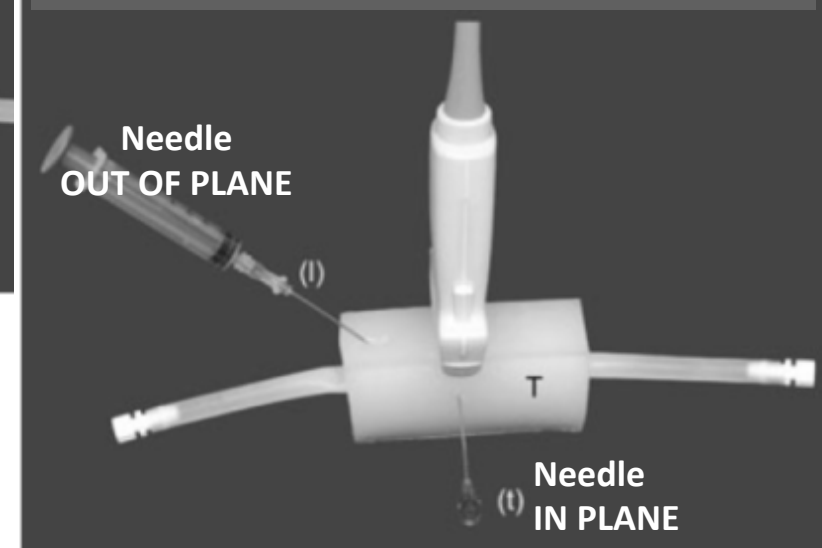
Vein visualization: LONG AXIS



Modified from Chapman G.A.,
Anaesthesia - 2006

Different US guided techniques of
venipuncture are classified combining
VEIN VISUALIZATION
(long axis / short axis)
and NEEDLE VISUALIZATION
(in plane / out of plane)

Vein visualization: SHORT AXIS



Ultrasound Catheteriz Correct Te

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www.ccmjournal.org

Online Letters to the Editor

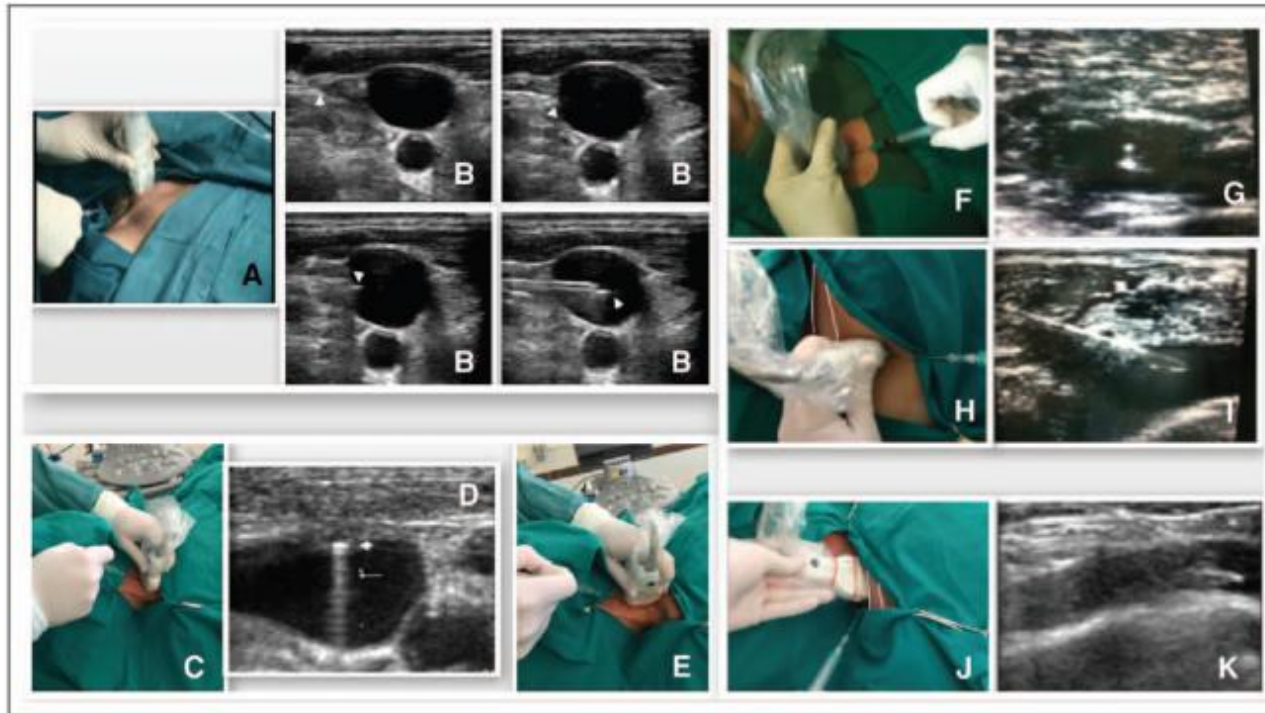


Figure 1. Ultrasound-guided venipuncture techniques. **A–E**, Ultrasound-guided puncture techniques of the internal jugular vein (IJV): in-plane (IP) puncture performed placing the probe perpendicular to the long axis (LA) of the IJV so to obtain a short-axis (SA) view of the target vessel and advancing the needle in a plane aligned with the LA of the probe, within the ultrasound beam (A); needle tip (*white arrowheads*) approaching and entering the target vein during real-time ultrasound-guided IP puncture of IJV visualized in its SA (B); out-of-plane (OP) puncture performed placing the probe perpendicular to the LA of the IJV so to obtain an SA view of the vein and advancing the needle in a plane perpendicular to the LA of the probe (C); needle tip visualized as a hyperechoic point entering the target vein during real-time ultrasound-guided OP puncture of IJV visualized in its SA (this approach is not recommended as first choice) (D); and IP puncture performed placing the probe parallel to the LA of the IJV so to obtain an LA view of the target vessel and advancing the needle in a plane aligned with the LA of the probe (E); this approach is absolutely not recommended and it must be avoided for the reasons explained in the text. **F–I**, Ultrasound-guided puncture techniques of the axillary vein: OP puncture performed advancing the needle perpendicular to the LA of the probe (F); needle tip visualized as hyperechoic spot into the target vessel, both needle tip and AV are visualized in their SA (G); IP puncture of the AV visualized in its LA advancing the needle within the LA of the probe (clavicle borders are highlighted by *white lines*) (H); and needle tip and shaft entering the AV, both are visualized in their LA (I). **J and K**, Ultrasound-guided puncture technique of the subclavian vein (ScV): IP puncture of the supraclavicular area (clavicle borders are highlighted by *white lines*) (J) and needle tip and shaft entering the ScV (K).

Stato dell'Arte - Tecnica di venipuntura



The Journal of Emergency Medicine, Vol. 37, No. 4, pp. 403-408, 2009
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0736-4679/09 \$-see front matter

doi:10.1016/j.jemermed.2008.02.061



**Ultrasound in
Emergency Medicine**

Versatilità o esercizio ginnico?

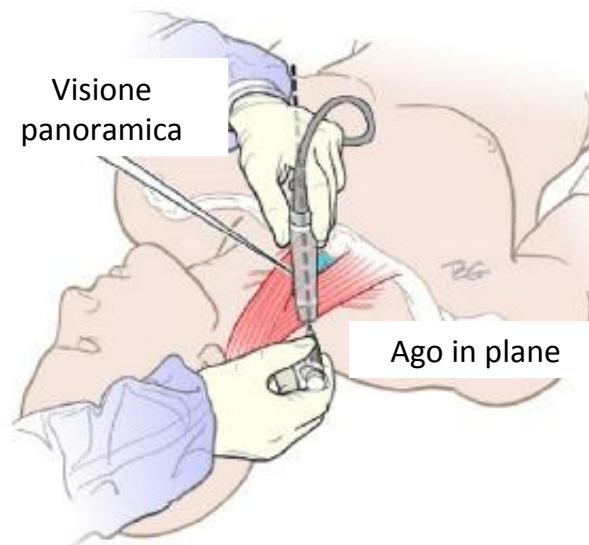


Figure 4. Ultrasound image of right neck vessels shown in oblique orientation. Notice the slight oval shape of the internal jugular vein.

THE OBLIQUE VIEW: AN ALTERNATIVE APPROACH FOR ULTRASOUND-GUIDED CENTRAL LINE PLACEMENT

Michael Phelan, MD* and Daniel Hagerty, MD†

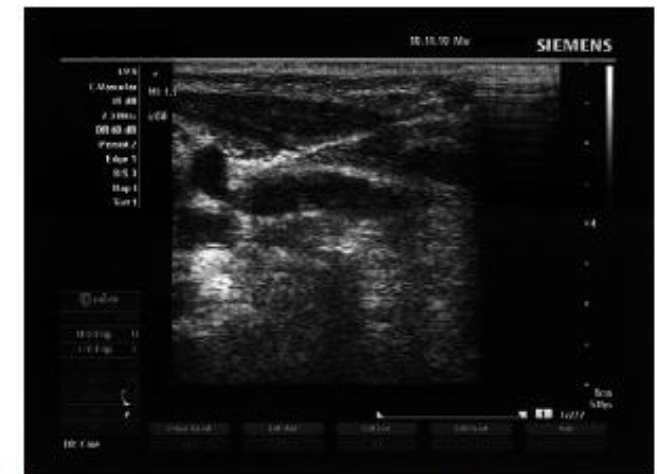
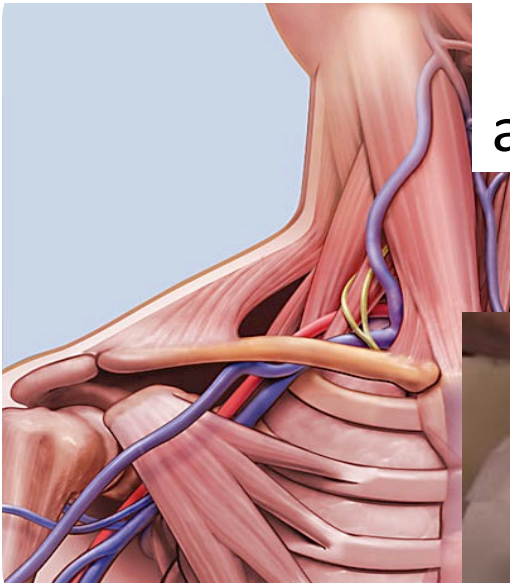
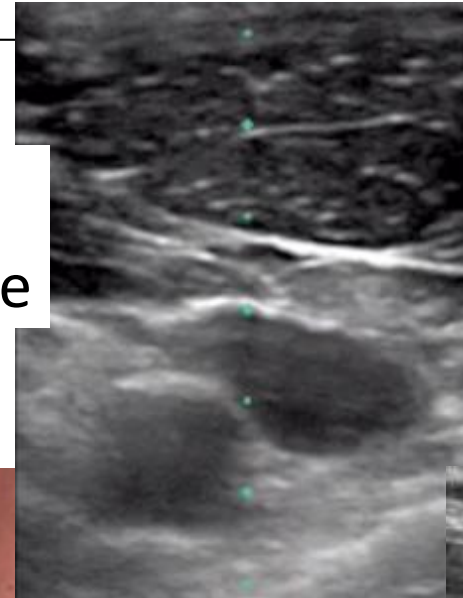


Figure 5. Ultrasound image of the right internal jugular vein shown in oblique orientation with the needle in long axis, and needle tip indenting the internal jugular vein just before puncture.

Stato dell'Arte – Tecnica di venipuntura



Asse obliquo:
applicabile versatilmente



Stato dell'Arte – Tecniche accessorie



One step forward



MADNESS

FICC
tunnellizzato

Stato dell'Arte – Tecniche accessorie



One step forward



MADNESS

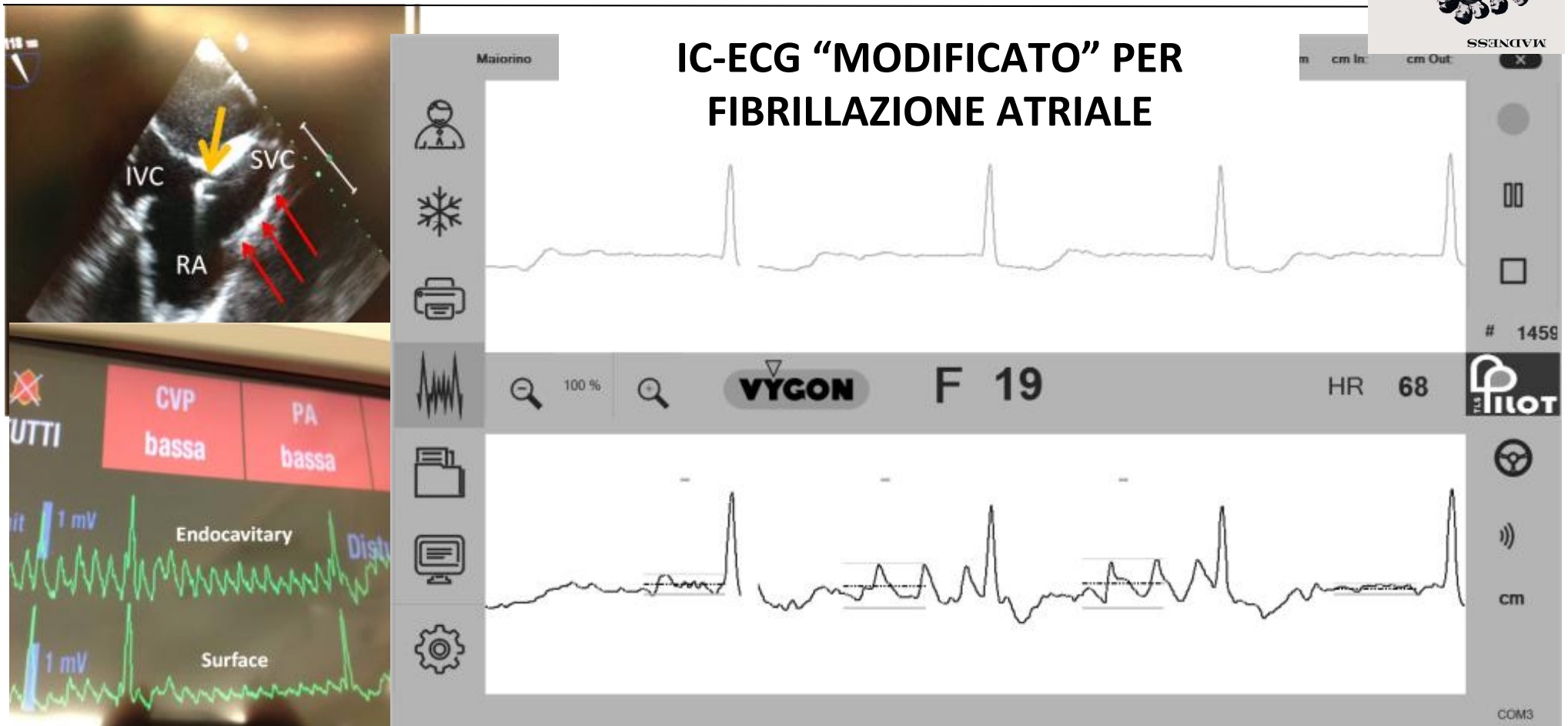
CICC
tunnellizzato

Stato dell'Arte – Controllo della punta

One step forward



MAJORITY



Diagnostic Accuracy of Central Venous Catheter Confirmation by Bedside Ultrasound Versus Chest Radiography in Critically Ill Patients: A Systematic Review and Meta-Analysis

Critical Care Medicine 2016

Enyo A. Ablordeppey, MD, MPH^{1,2}; Anne M. Drewry, MD, MSCI¹; Alexander B. Beyer, MD, MPH³;
Daniel L. Theodoro, MD, MSCI²; Susan A. Fowler, MLIS⁴; Brian M.
R. Carpenter, MD, MSCI²

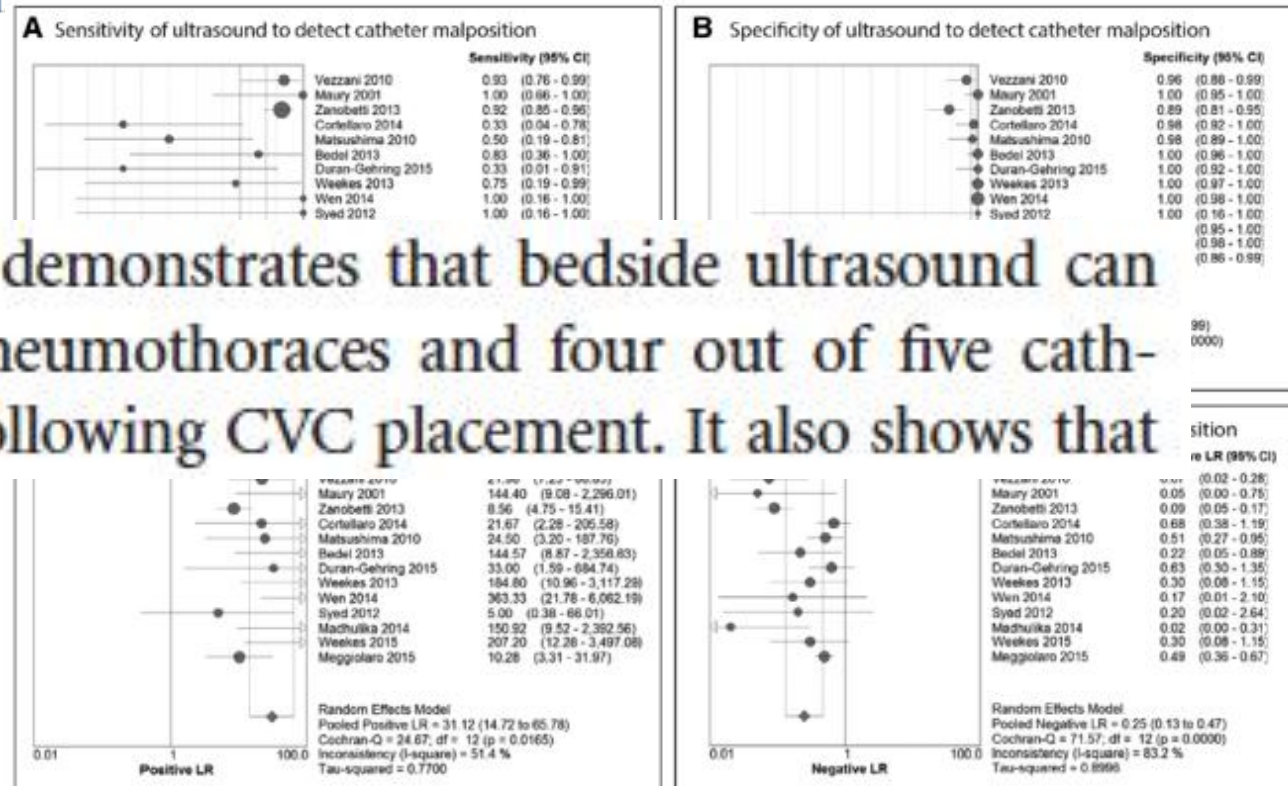
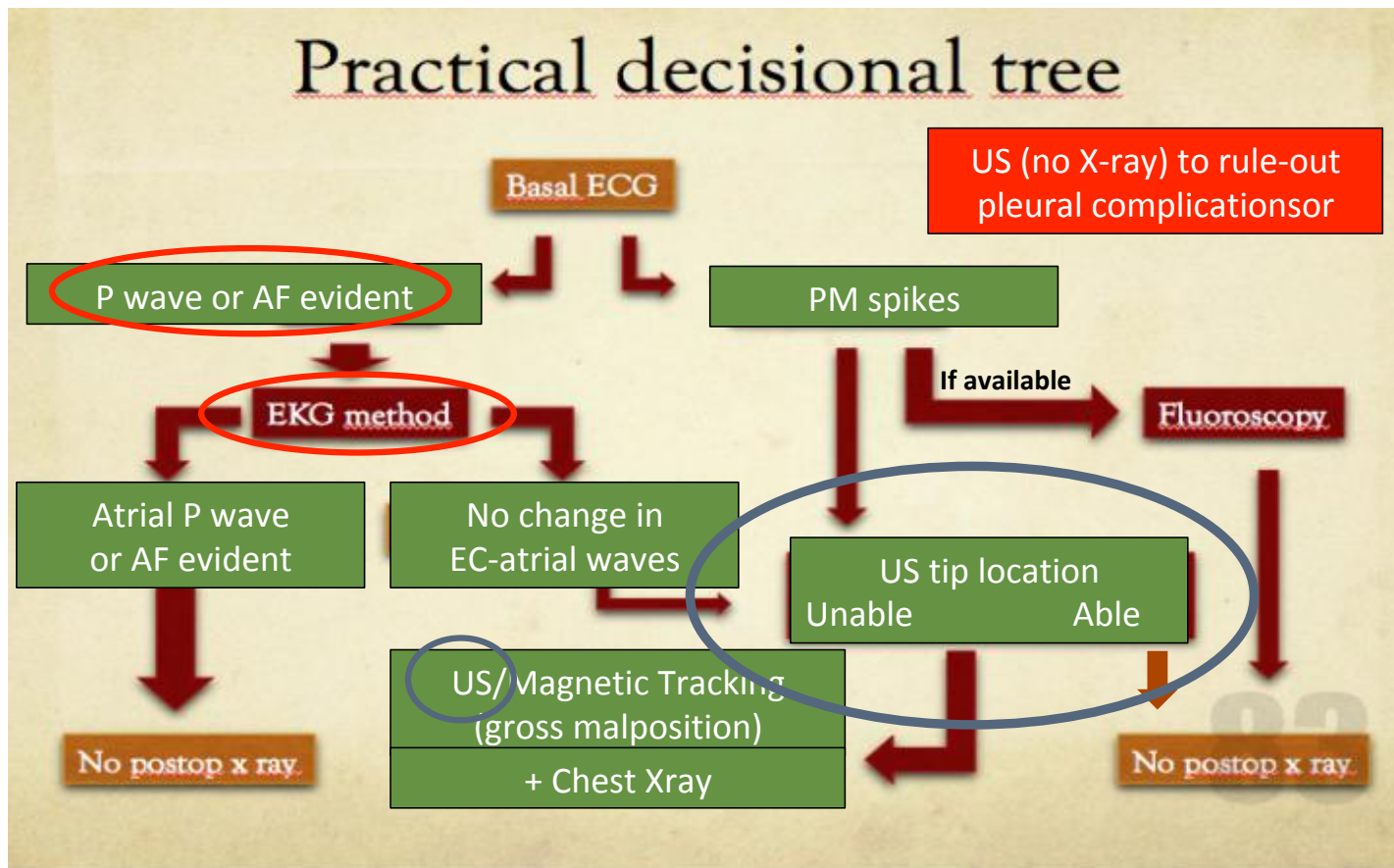


Figure 2. Pooled sensitivity, specificity, and likelihood ratio (LR) of included studies.

Stato dell'Arte – Controllo della punta



**INTEGRAZIONE DI
METODICHE**



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

Stato dell'Arte

Bundles di impianto per prevenzione di complicanze tardive



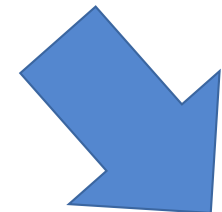
RACCOMANDAZIONI GAVECELT 2012 PER LA PREVENZIONE DELLE TROMBOSI DA CATETERE VENOSO CENTRALE

1. Verificare che il calibro della vena sia adeguato al calibro del catetere
2. Utilizzare la venipuntura ecoguidata
3. Verificare che la punta del catetere sia in prossimità della giunzione cavo-atriale
4. Stabilizzare in modo adeguato il catetere (exit site appropriato + sutureless device + medicazione trasparente)

Dallo standard di cura

...

... allo stato dell'arte

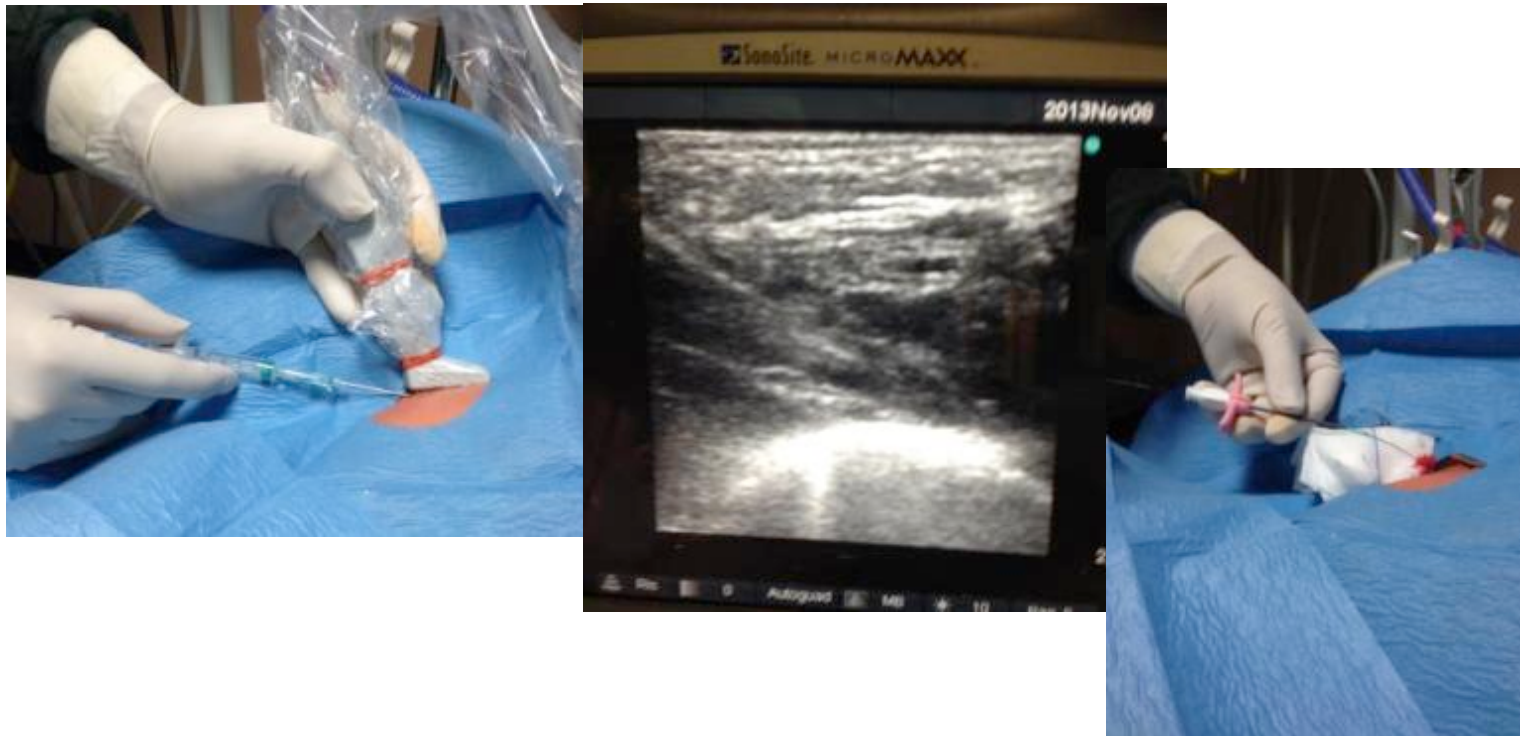


1) Scelta appropriata del vaso (RaCeVA)

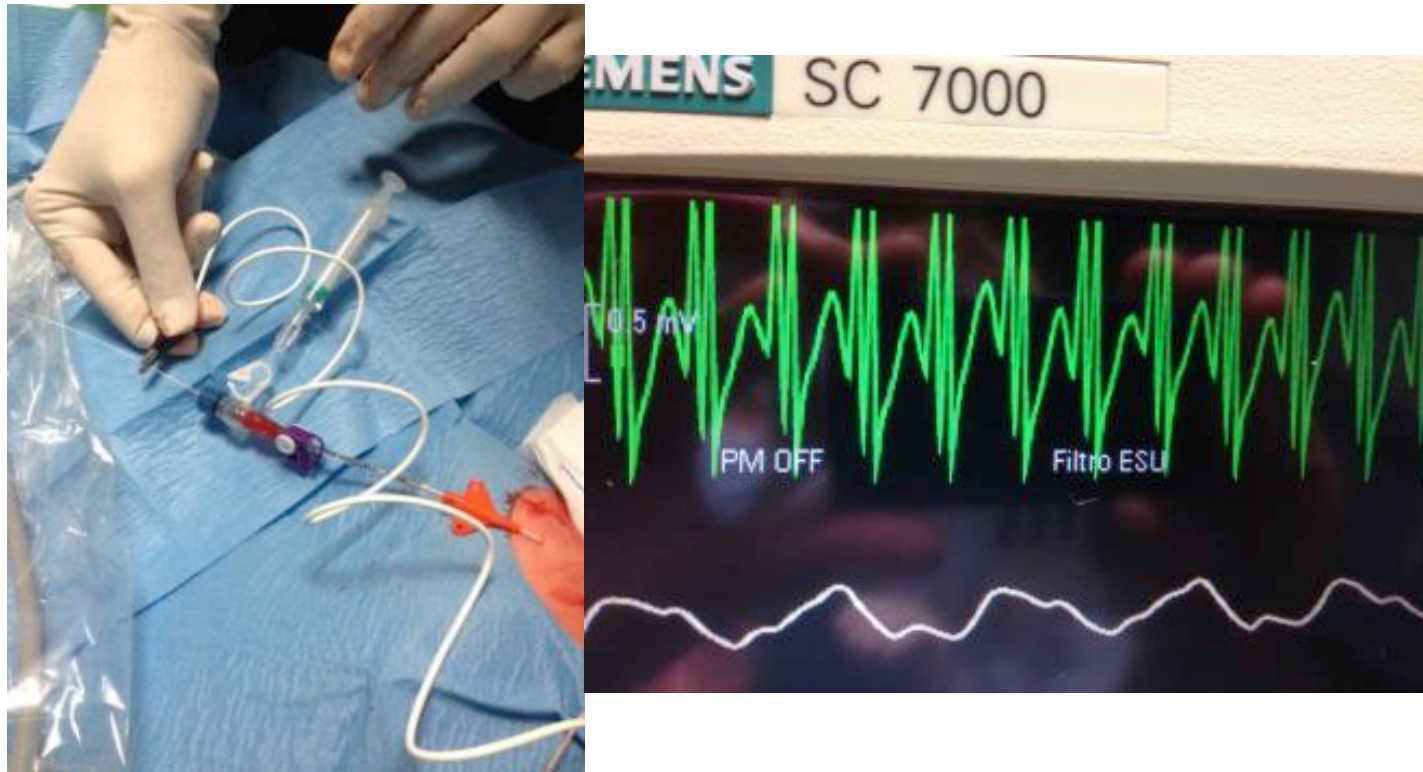
1. caliber
2. depth
3. collapse
4. patency/abnormal structures
5. closeness to 'dangerous' structures (pleura, arteries, nerves)
6. convenience of exit site



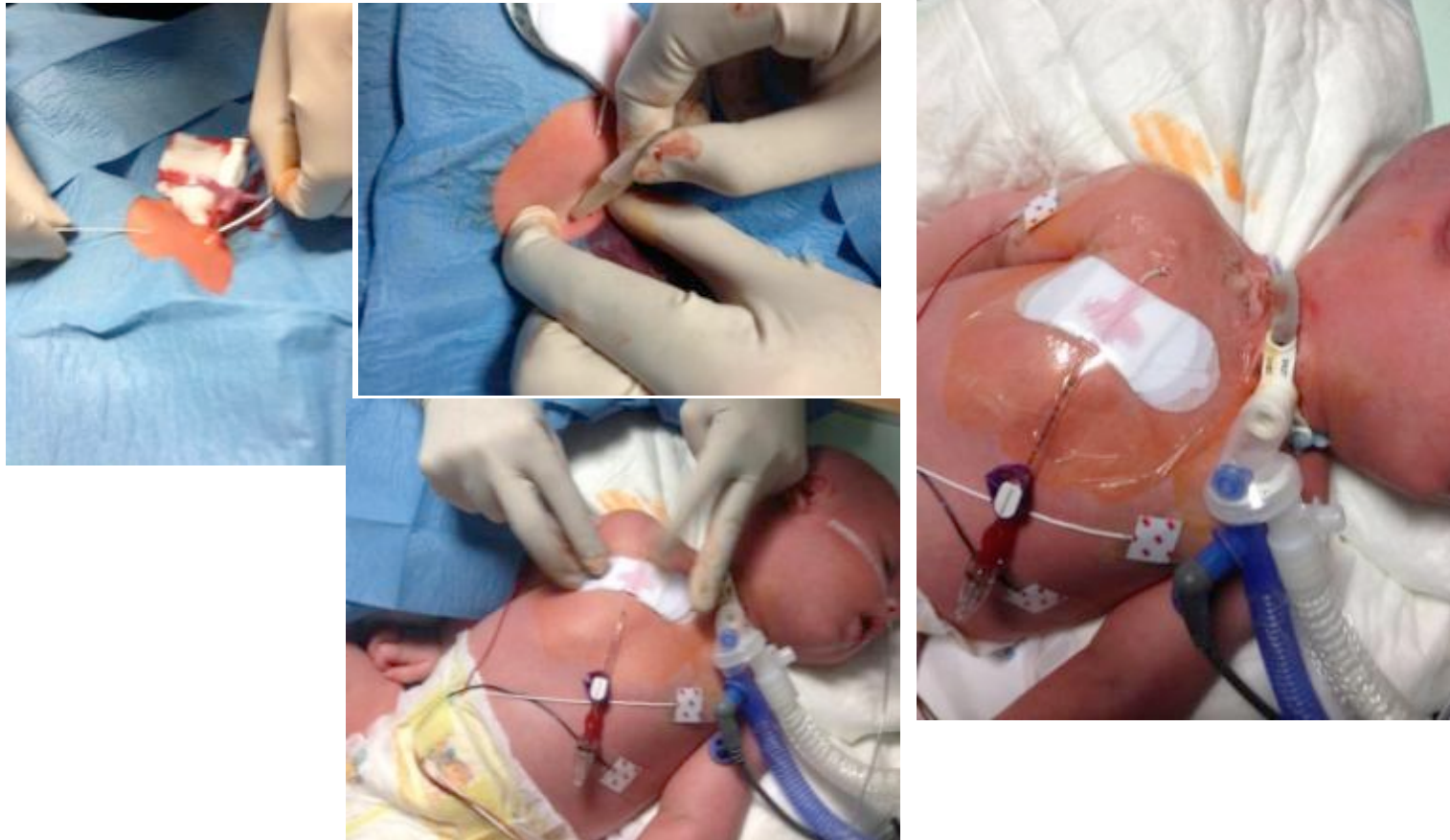
2) Puntura ecoguidata + micro-introduzione



3) Controllo punta mediante ECG endocavitario



4) Fissaggio: tunnel/exit site + colla + sutureless device + med. trasp.



Tecnica impianto CICC/FICC in ICU

CONCLUSIONI

- La fase di impianto è cruciale per prevenire non solo le complicanze immediate ma anche quelle a manifestazione tardiva
- Molti standard di cura sono ad oggi sottoutilizzati
- Lo stato dell'arte include novità tecniche ma soprattutto innovazioni di processo
 - Standardizzazione di tecniche e metodi
 - Integrazioni di metodiche
 - Protocolli e bundles





GRAZIE !!!

Gemelli



GAVeCeLT 2017

