

2019 GAVeCeLT

Verona, December 2nd-3rd-4th



Il protocollo ISALT per l'impianto dei port 10 anni dopo

Antonio La Greca
Chirurgia d'Urgenza e Trauma



Obiettivi del protocollo ISALT

Minimizzare le complicanze da venipuntura:

Fallimento, tentativi ripetuti, PNX, puntura arteriosa

Minimizzare il rischio infettivo

Minimizzare le malposizioni

Minimizzare il rischio trombotico

Minimizzare il rischio di dislocazione

Minimizzare il rischio di aritmie



Gli albori: gennaio 2007 – pubblicazione 2010

Il protocollo ISALT 2 per l'impianto degli accessi venosi centrali a lungo termine: una proposta GAVeCeLT per un approccio più sicuro e costo-efficace

Mauro Pittiruti ¹, Antonio LaGreca ¹, Alessandro Emoli ², Giancarlo Scoppettuolo ³

**The SILTA 2 protocol for placement of long-term
central venous access devices: GAVeCeLT proposal
of a safer and more cost-effective approach**

¹ Dipartimento di Scienze Chirurgiche

² Day Hospital Oncologia Medica

³ Istituto di Malattie Infettive

Università Cattolica del Sacro Cuore - Roma

Tabella II - Il protocollo ISALT 2

1. Tecnica asettica e massime protezioni di barriera durante l'impianto
 2. Venipuntura percutanea eco-guidata
 3. Controllo della posizione della punta del catetere durante la procedura, preferibilmente mediante metodo dell'ECG intracavitario
 4. Gestione appropriata della guida metallica
 5. Stabilizzazione appropriata dei cateteri tunnellizzati
 6. Scelta appropriata del sito ove intascare il *reservoir*
-



Il protocollo ISP

ISP = impianto sicuro dei PICC



1. Lavaggio delle mani, asepsi e massime protezioni di barriera
2. **Esame ecografico bilat. di tutte le vene del braccio e del collo**
3. **Scelta della vena appropriata a 1/2 braccio (mm vena = o > Fr cat.)**
4. **Identificazione del n.mediano e della arteria brachiale**
5. **Venipuntura ecoguidata**
6. **Controllo ecografico della v.giugulare interna durante la progressione del PICC**
7. **Verifica della posizione centrale della punta con metodo ECG**
8. Fissaggio del PICC con un sistema 'sutureless'



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.

Kit «all in one»:

- effetto checklist
- customized (scelta qualità aghi, introduttori, guide)

- effetto checklist

- customized (scelta qualità aghi, introduttori, guide

Scelta del vaso / via di accesso



1. Valutazione e Planning

Six steps RaCeVA (**R**apid **C**entral **V**ein **A**ssesement)

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

One step forward



Rapid Central Vein Assessment (RaCeVA): A systematic, standardized approach for ultrasound assessment before central venous catheterization

Timothy R Spencer¹ and Mauro Pittiruti²

The Journal of Vascular Access

1-11

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Valutazione e planning

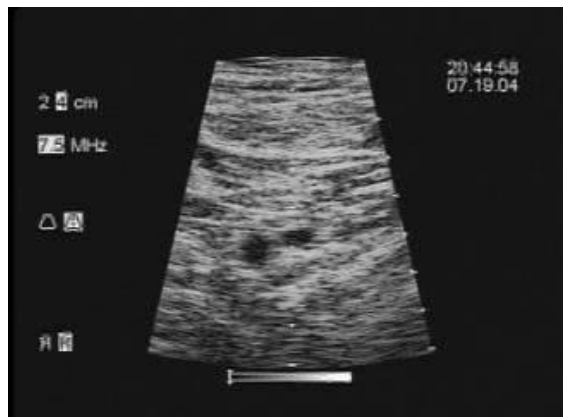
Approach choosing criteria

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



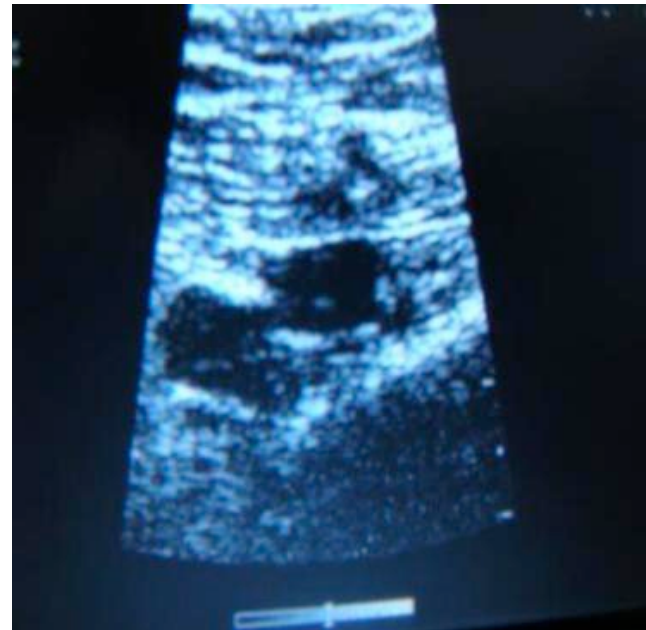
1 – Calibro della vena

Evitare vene troppo piccole: sono difficili da pungere, difficili da incannulare, e si possono associare ad un più alto rischio di trombosi (se il diametro del catetere $> 1/3$ del diametro interno della vena)



2 – Profondità della vena

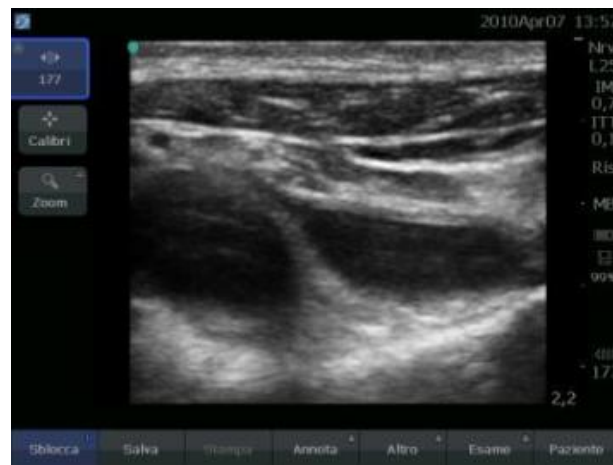
Se la vena è troppo profonda, è difficile da pungere e da incannulare



VAs profonda

3 – Collasso durante la inspirazione

Alcune vene (tipicamente, VGI e VAs) possono collassare durante la fase inspiratoria (pressione toracica negativa), diventando difficili da pungere e da incannulare



Vena che collassa con il respiro

- Posizione di Trendelenburg
 - Non utile
- Per la vena ascellare: abduzione del braccio a 90°, con spalla lievemente anteposta
 - Rilascia la pressione del muscolo pettorale sui vasi ascellari: metodo efficace per massimizzare il calibro della vena ascellare

4 – Compressione da parte della arteria o da strutture patologiche

Alcune vene (tipicamente la VGI) possono essere compresse da arterie contigue.

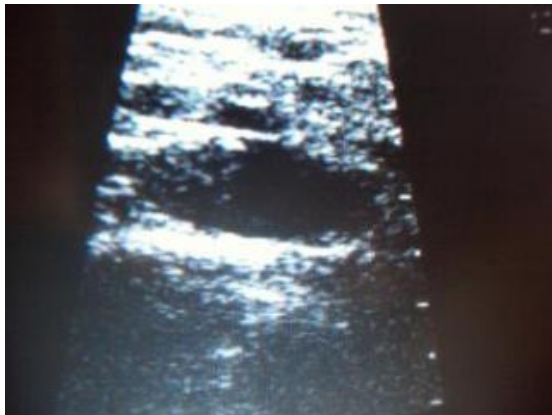
In questi casi, il rischio di puntura arteriosa accidentale diventa significativo, anche usando la ecoguida



5 – Contiguità con la pleura

Tipico problema della vena succlavia

Per questo motivo, la venipuntura succlavia è raramente la opzione di prima scelta.



6 – Convenienza dell'exit site

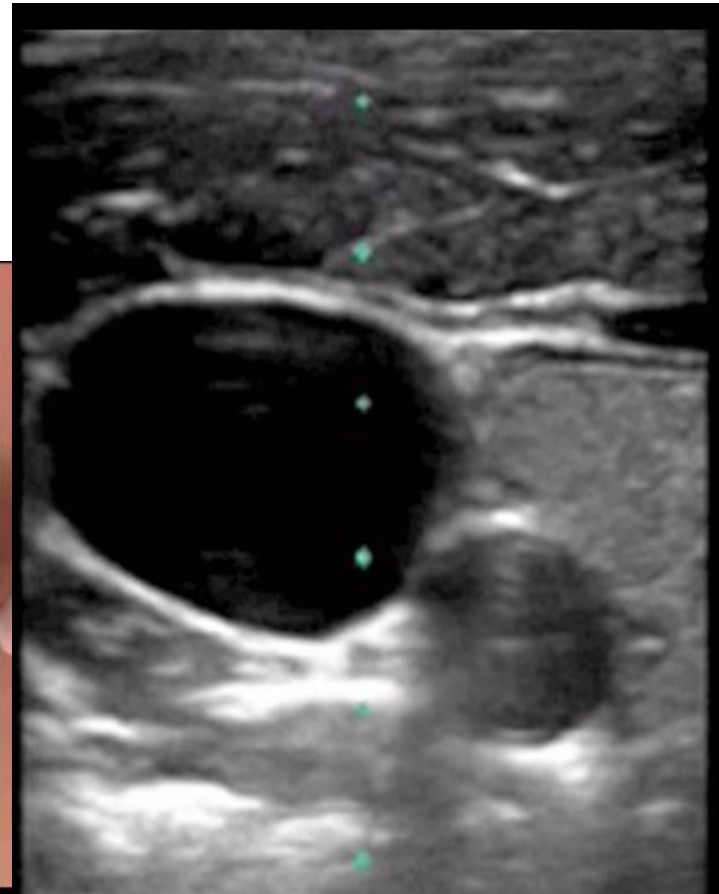
Per i cateteri non tunnellizzati, gli approcci associati ad un sito di emergenza sottoclaveare (VAs) o sopraclaveare (VA, VGI 'in plane', VS) sono preferibili agli approcci che comportano un sito di emergenza a metà collo (VGI 'out of plane').



Raceva «applicato»

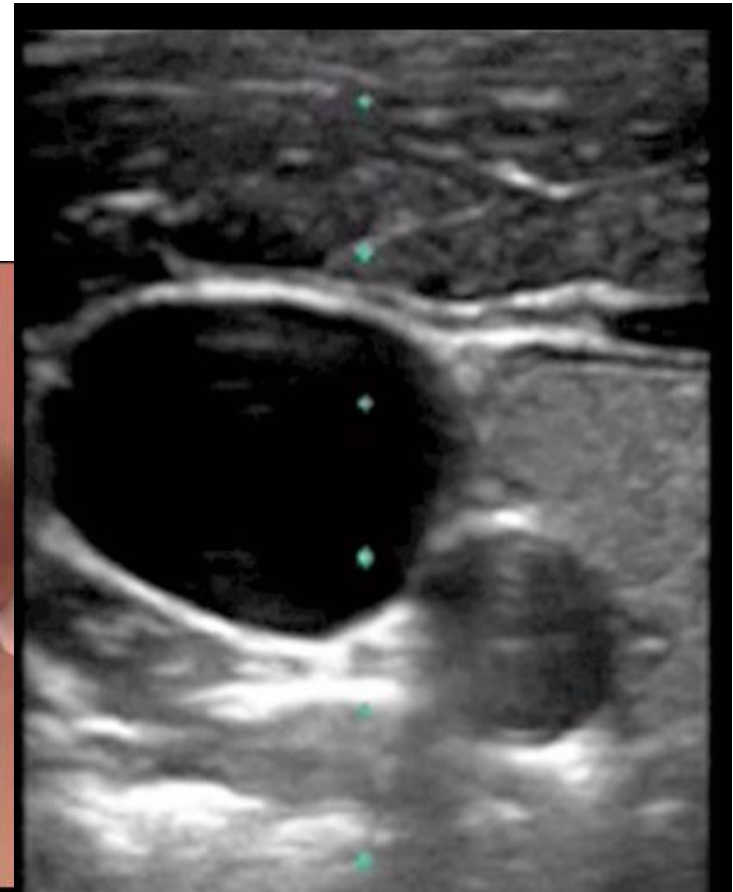
1. Sonda a metà collo

- VGI + Art Carot + tiroide



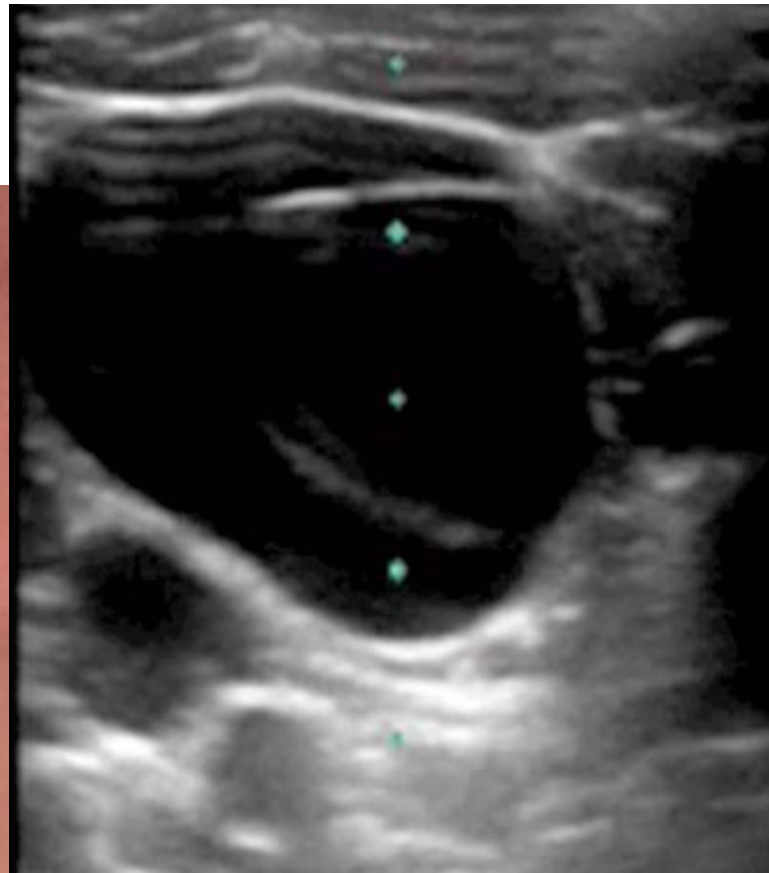
1. Sonda a metà collo

- Accesso postero-superiore alla VGI



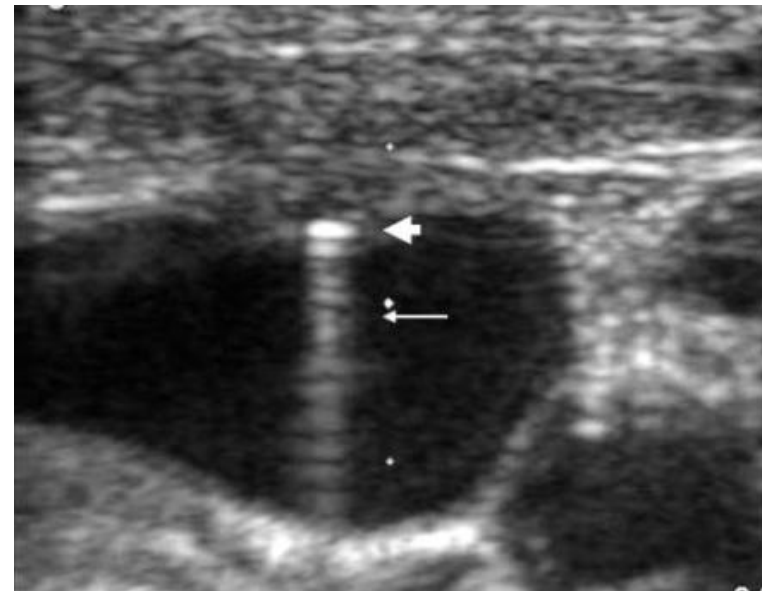
2a. Sonda alla base del collo

- VGI + valvole



Ideal position for 'short axis' + 'out of plane' puncture of the internal jugular vein

IJV = in short axis

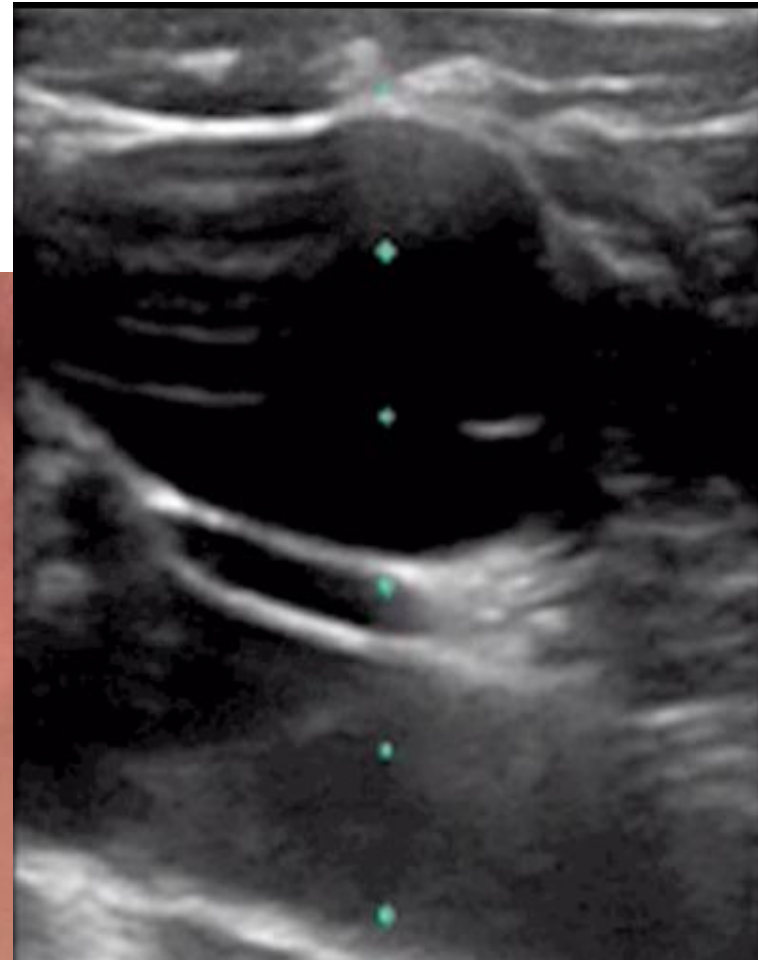


Also, ideal position for 'short axis' + 'in plane' puncture of the internal jugular vein (postero-inferior approach or modified Jernigan)



2b. Sonda alla base del collo

- VGI + VGE + Art Succl

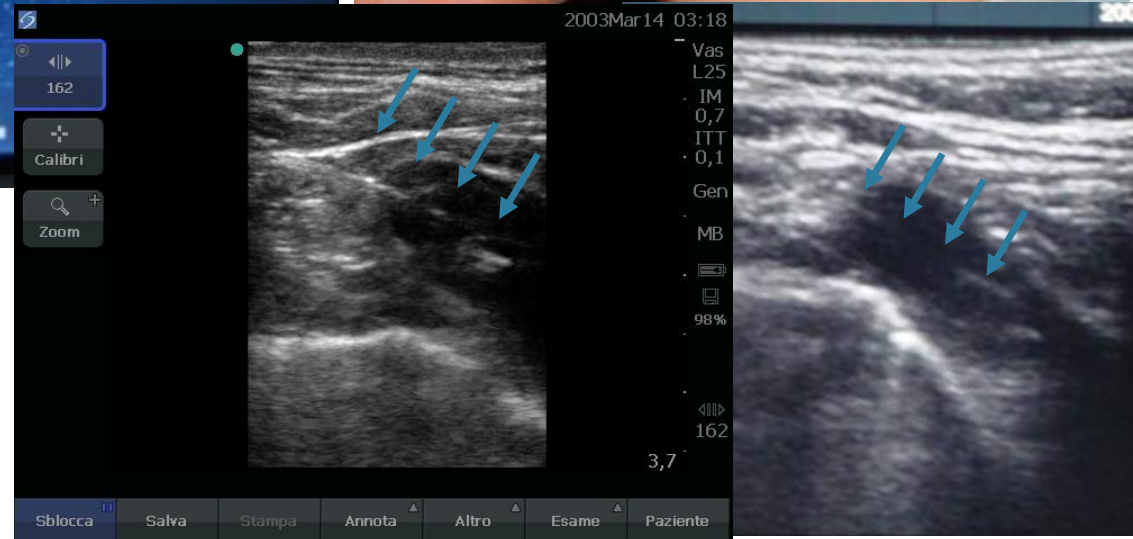


3. Tilting verso il mediastino

- Vena brachiocefalica



Ideal position for 'long axis' + 'in plane' puncture of the brachio-cephalic vein

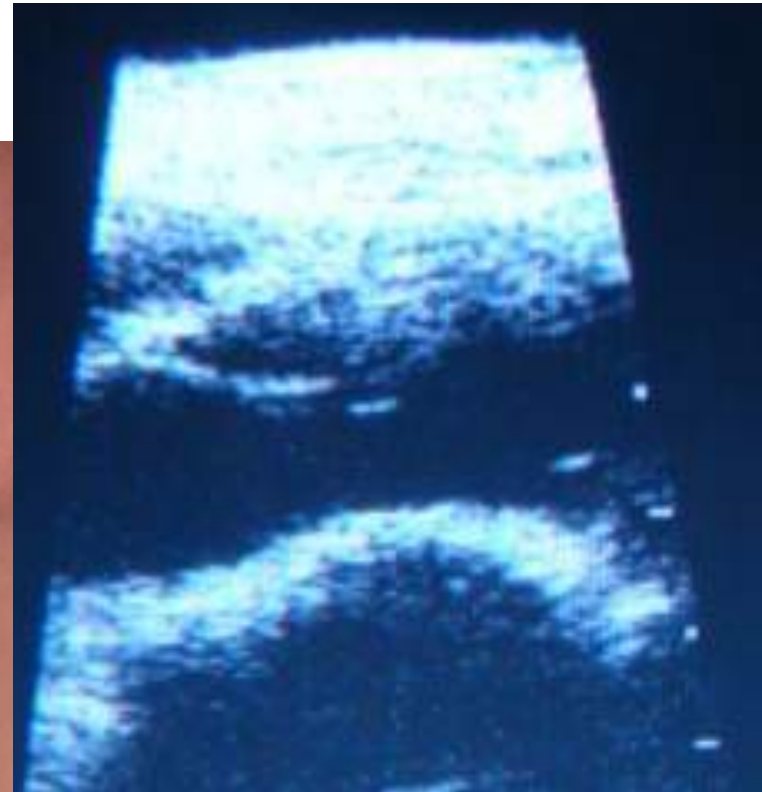




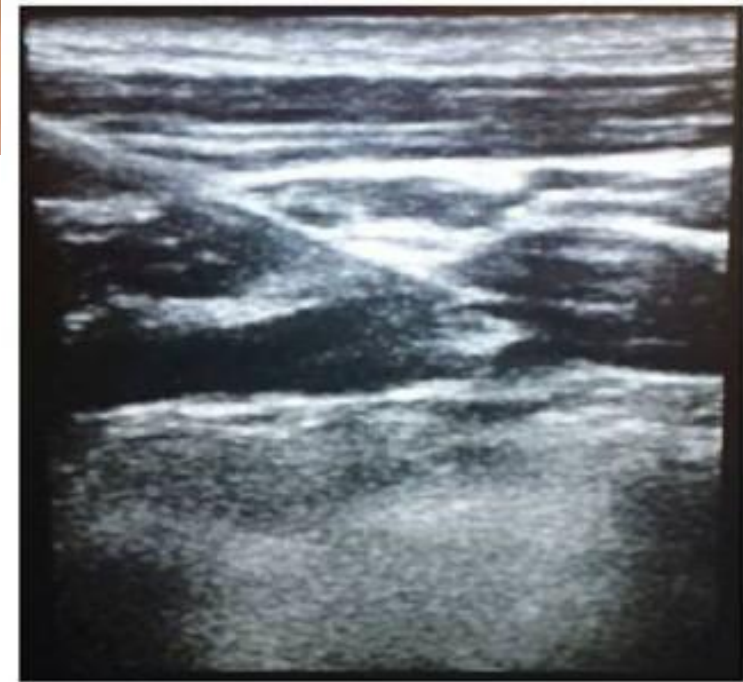
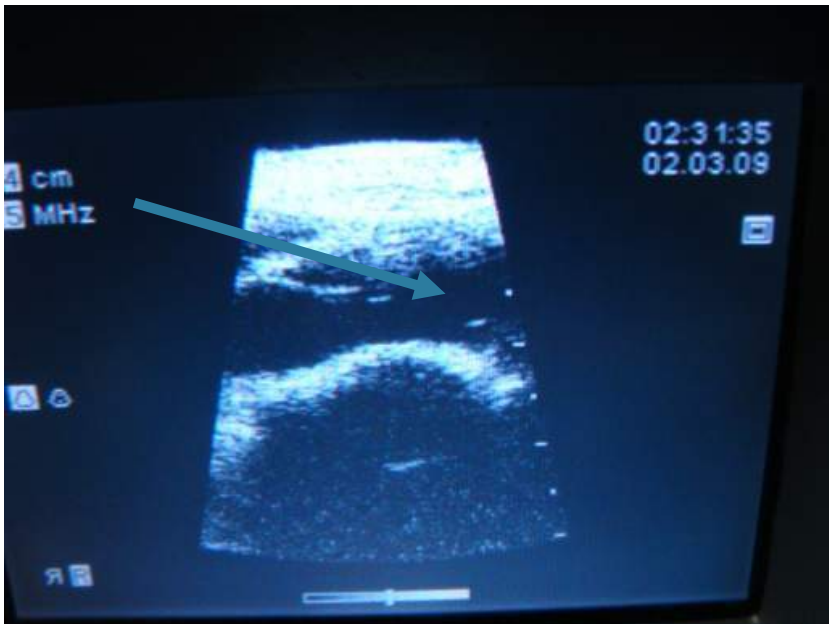


4. Scorrimento laterale

- Vena succlavia (via sovraclaveare)



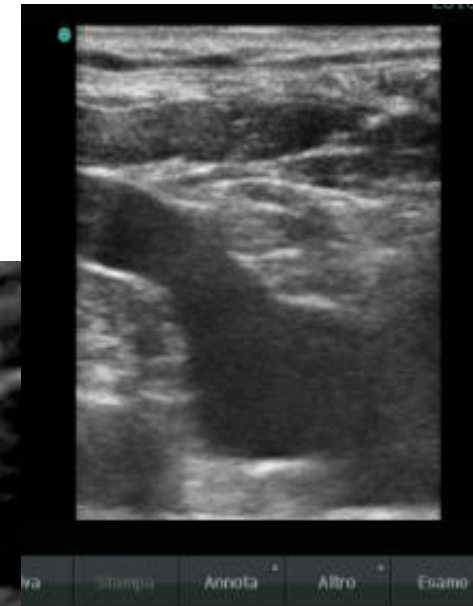
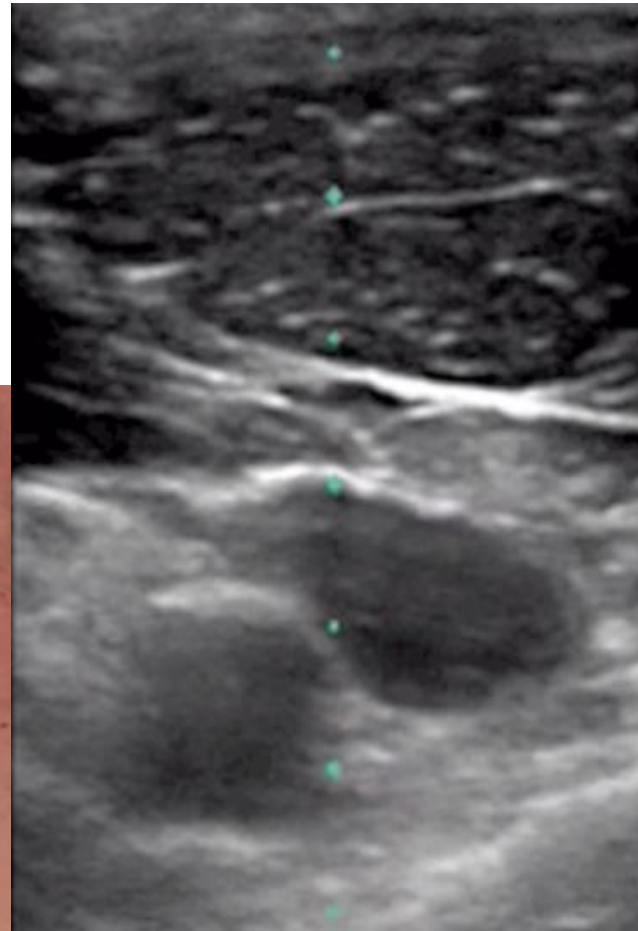
Ideal position for 'long axis' + 'in plane'
puncture of the subclavian vein



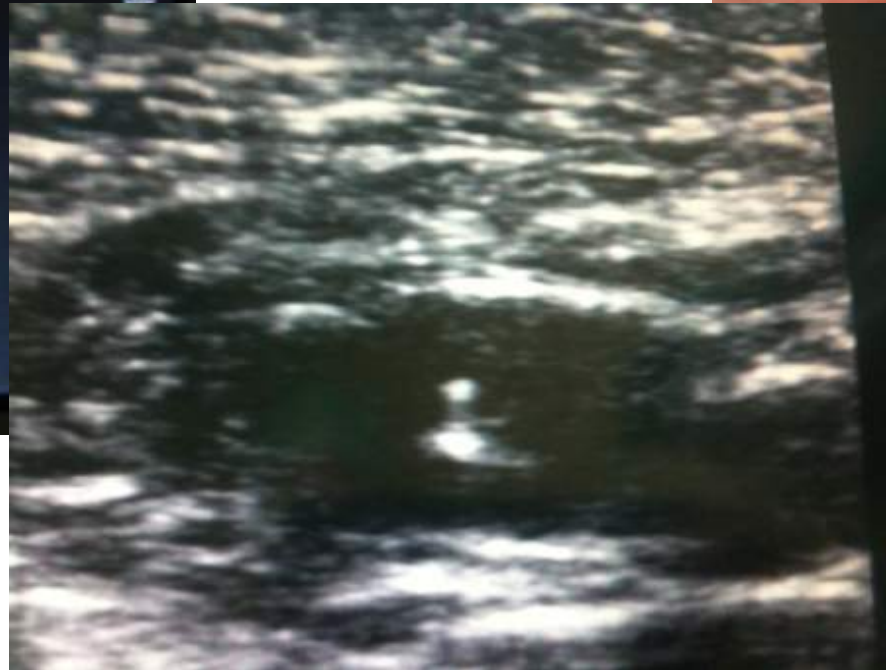
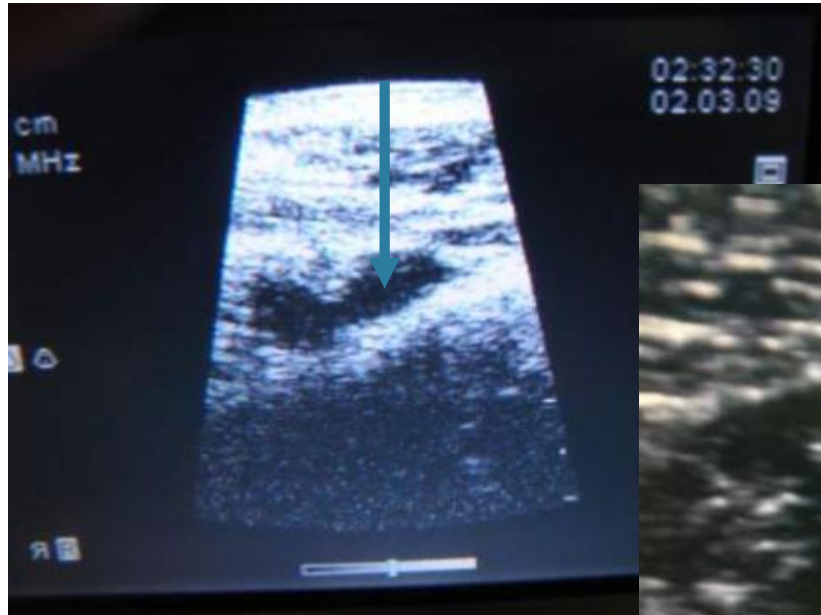
5. Sonda sottoclavicolare

(scansione asse corto)

- Vena ascellare
- Vena cefalica



Ideal position for 'short axis' + 'out of plane' puncture of the axillary vein



6. Sonda sottoclavicolare (scansione asse lungo)

- Vena ascellare
- Vena cefalica

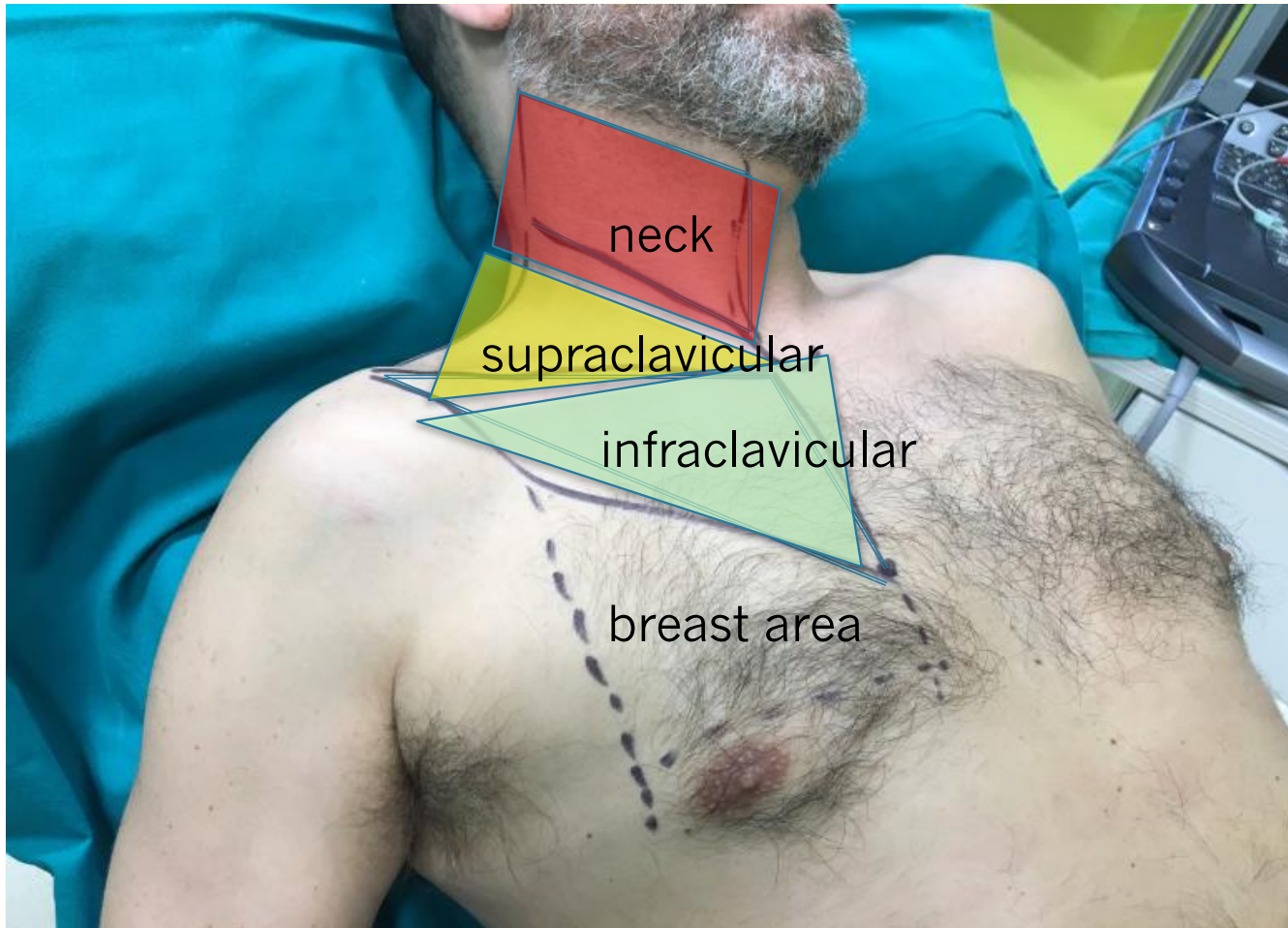


Ideal position for 'long axis' + 'in plane'
puncture of the axillary vein

AV = in long axis



Valutazione e planning



One step forward



... alla Central
Zone Insertion
Method

DALL'ECO AL
TUNNEL !!!

ECOGUIDA



Tecniche di venipuntura

- Multipli approcci a disposizione dell'operatore (OPERATOR VERSATILITY)
- Definizione accurata tecniche di venipuntura ecoguidata

One step forward



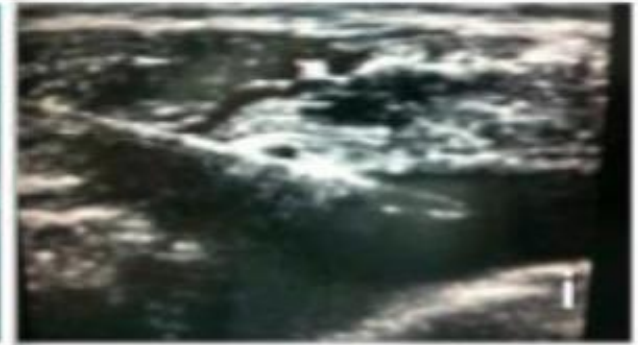
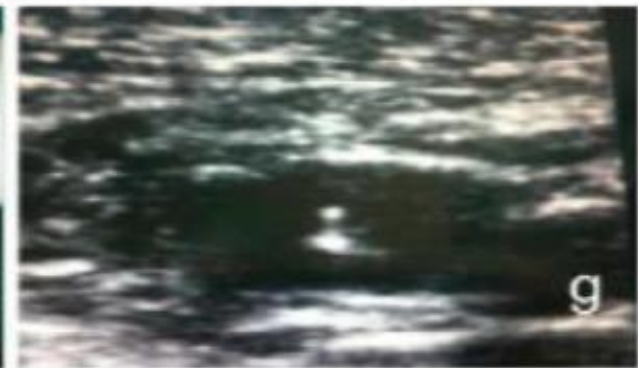
Ultrasound-guided infraclavicular axillary vein cannulation: a useful alternative to the internal jugular vein[†]

R. O'Leary, S. M. Ahmed, H. McLure, J. Oram, A. Mallick, B. Bhambra and A. R. Bodenham*

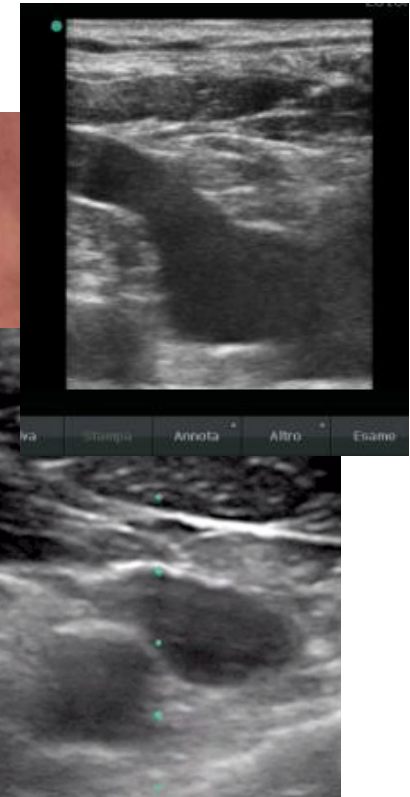
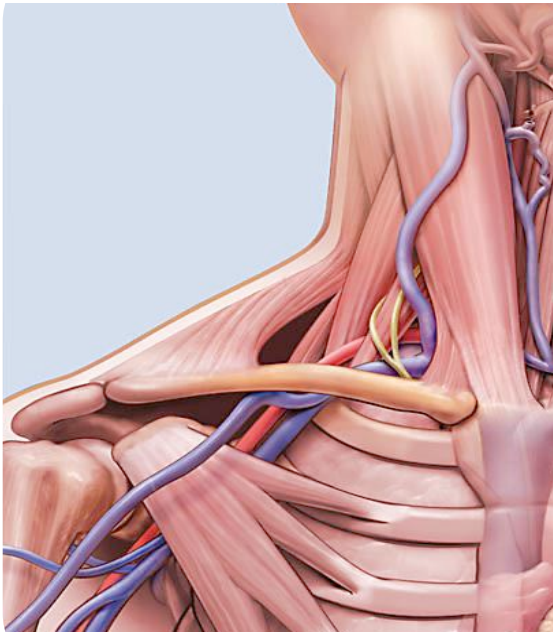
Department of Anaesthesia, Critical Care and Pain, Leeds Teaching Hospitals NHS Trust, Great George Street, Leeds LS1 3EX, UK

Editor's key points

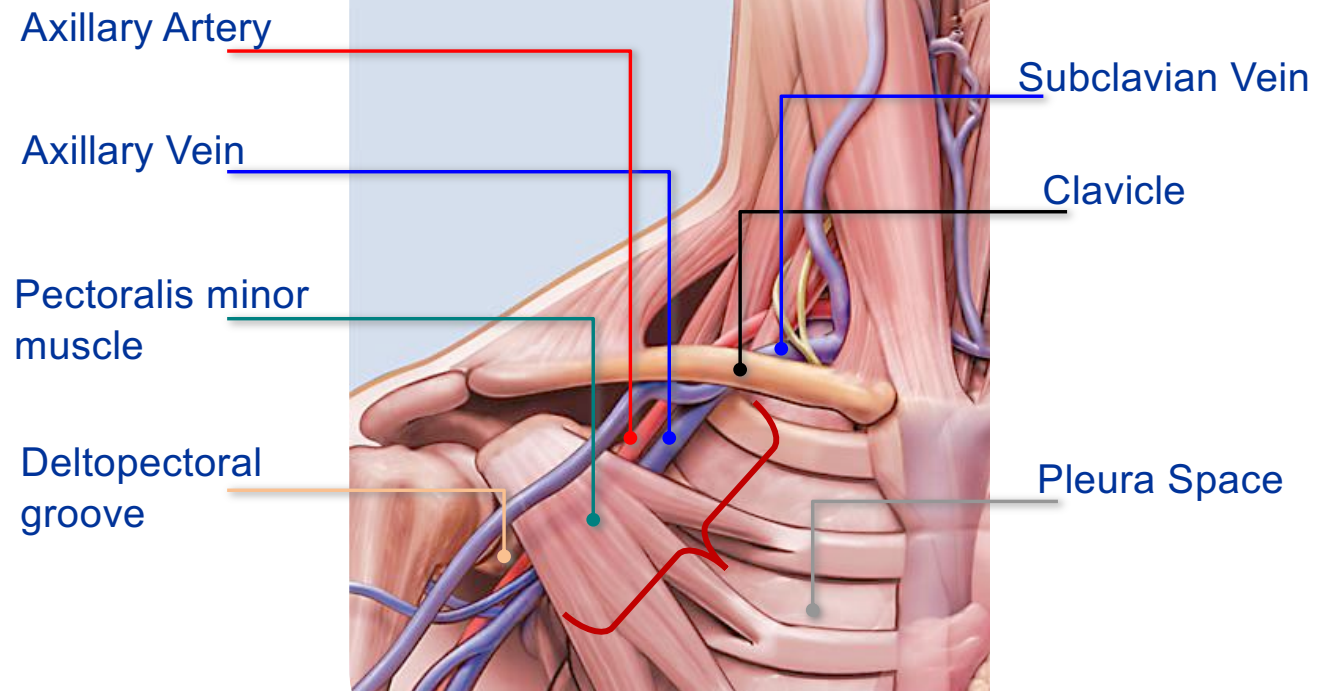
- Cannulation of the axillary vein (AxV) provides a potential alternative to subclavian vein cannulation that is more amenable to ultrasound (US) guidance.
- A retrospective analysis evaluated the success and complications reported in a large prospectively collected database of central vein catheterization at a large UK centre.
- US-guided internal jugular and AxV catheterization were both effective and relatively safe.



LA RINASCITA DELL'APPROCCIO SOTTOCLAVEARE PUNTURA DELLA VENA "ASCELLARE"



La «riscoperta» della puntura sottoclaveare: la vena ascellare



Advantages of axillary puncture for port insertion

One wound only

- better cosmetic result
- less tissue trauma
- less local anesthesia
- less postoperative pain

No tunnel over the clavicle

- better cosmetic result
- reservoir is more stable
- less postoperative pain



BETTER MEDICATION OF EXIT SITE
AVOID HAIR, TRACHEOSTOMY

Advantages of axillary puncture for short/medium term catheters

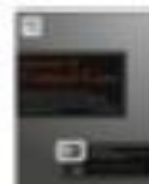
Is ultrasound-guided central venous port placement effective to avoid pinch-off syndrome?

Akio Tamura¹, Miyuki Sone², Shigeru Ehara¹, Kenichi Kato¹, Ryoichi Tanaka¹, Tatsuhiko Nakasato¹, Tetsuya Itabashi³

- US guided puncture of the axillary vein has been proved to avoid 'pinch-off' syndrome in totally implanted central VADs

How to make the axillary vein larger? Effect of 90° abduction of the arm to facilitate ultrasound-guided axillary vein puncture[☆]

Mauro Pittiruti, MD ^a, Daniele Guerino Biasucci, MD ^{b,*}, Antonio La Greca, MD ^a, Alessandro Pizza, MD ^b, Giancarlo Scoppettuolo, MD ^c

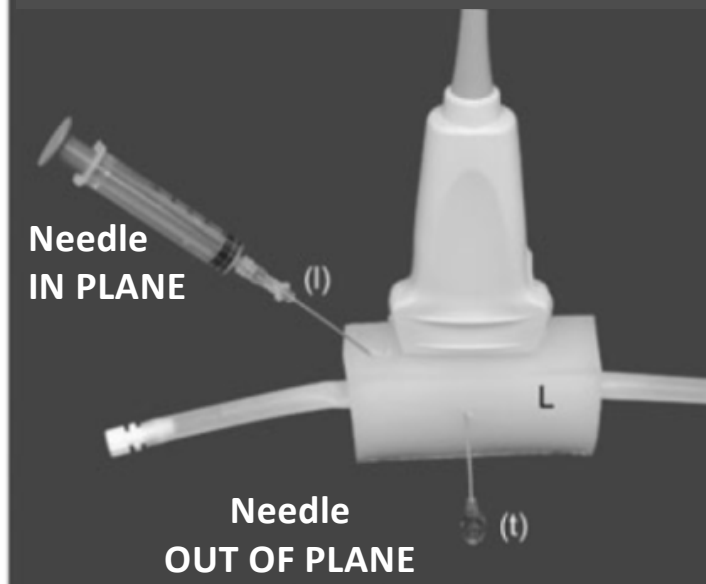


Tecnica di venipuntura: CAPIAMOCI

One step forward



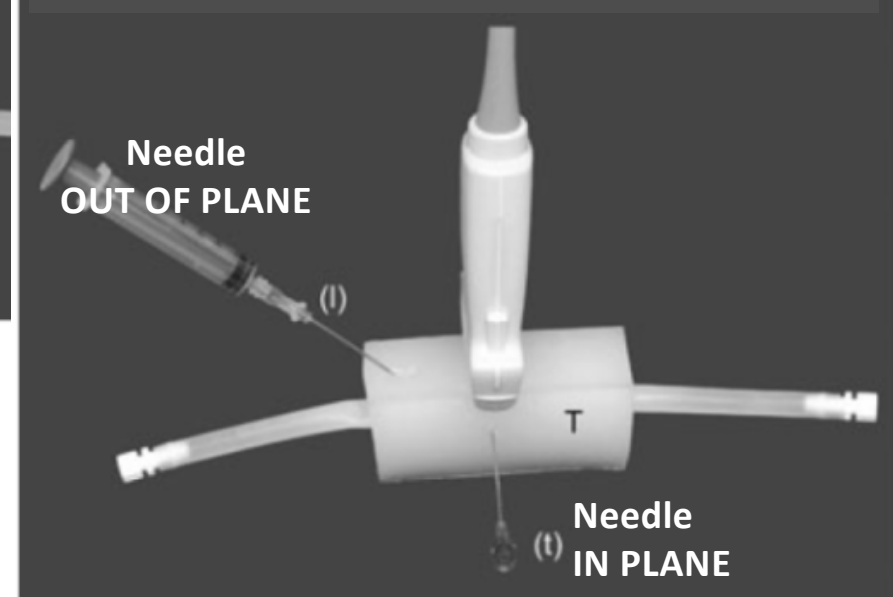
Vein visualization: LONG AXIS



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-Guided Central Venous Catheterization: It Is High Time to Use a Correct Terminology

To the Editor:

We read with interest the article by Vogel et al (1) on ultrasound-guided puncture of internal jugular vein (IJV) and subclavian vein (ScV). In this article, the authors refer to the long-axis (LA) and short-axis (SA) views as “venipuncture” techniques. This is not correct: LA and SA views are sonographic imaging approaches and refer to the relationship between the plane of the probe and the axis of the vessel (Fig. 1). In LA view, the plane of the probe is parallel to the LA of the vein (longitudinal scan, Fig. 1, *I* and *M*); in SA view, the plane of the probe is perpendicular to the axis of the vessel (transversal view, Fig. 1, *B*, *D*, and *G*).

Venipuncture techniques are defined not only by this spatial relationship between the plane of the probe and the axis of the vein but also by the relationship between the probe and the needle (Fig. 1, *A*, *F*, *H*, and *L*). Regardless of the vessel view, the needle can be advanced “out-of-plane” (OP), that is, perpendicular to the plane of the probe (Fig. 1*F*), or “in-plane” (IP), that is, within the plane of the probe (2) (Fig. 1, *A*, *C*, *E*, *F*, *H*, and *L*). Each venipuncture technique should be appropriately defined by the relationship between the probe and the vein (SA or LA) and by the relationship between the probe and the needle (OP or IP).

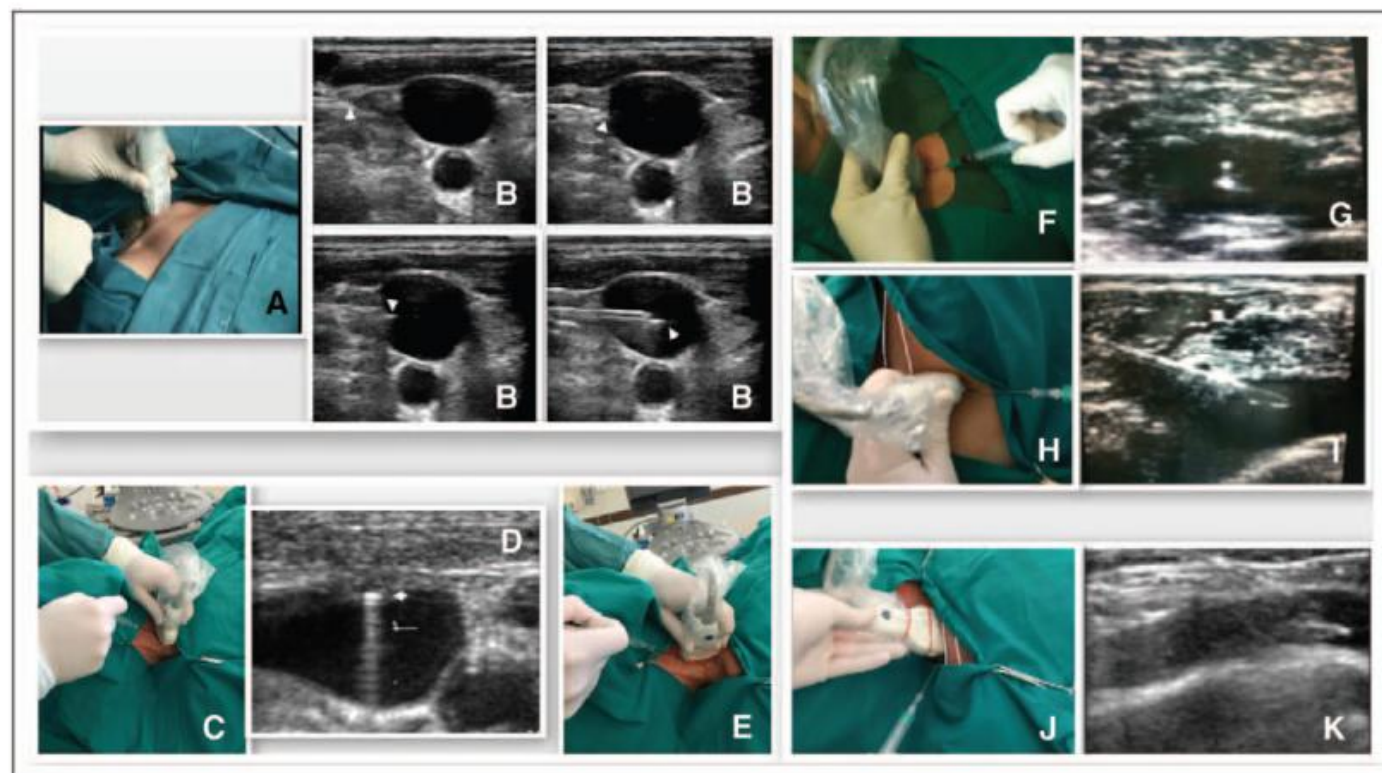


Figure 1. Ultrasound-guided venipuncture techniques. **A–E**, Ultrasound-guided puncture techniques of the internal jugular vein (IJV): in-plane (IP) puncture performed placing the probe perpendicular to the long axis (LA) of the IJV so to obtain a short-axis (SA) view of the target vessel and advancing 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 (clavicula 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 (clavicula borders are highlighted by *white lines*) (L) and needle tip and shaft entering the ScV (M).

UNA NOVITA': L'ASSE OBLIQUO

Versatilità o esercizio ginnico?

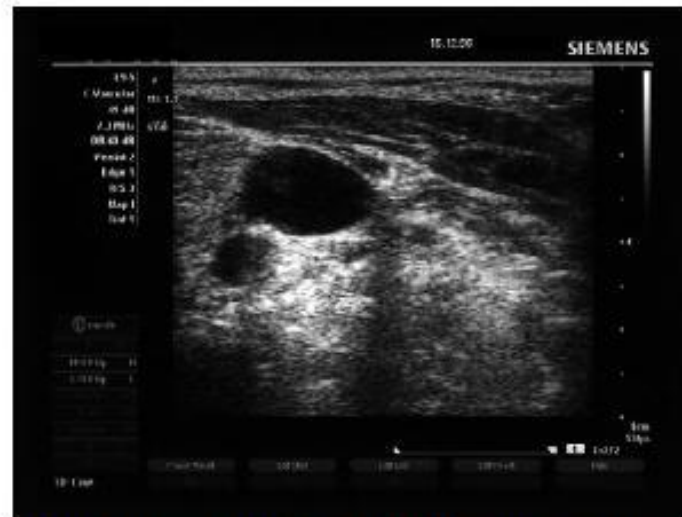
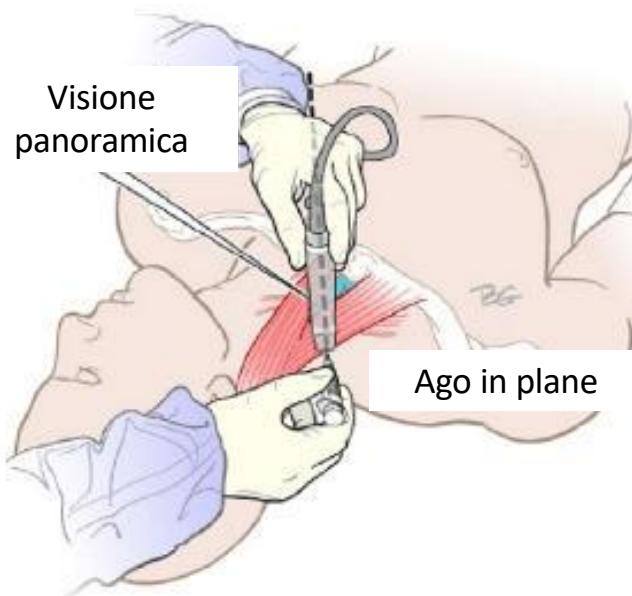


Figure 4. Ultrasound image of right neck vessels shown in oblique orientation. Notice the slight oval shape of the internal jugular vein.



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0736-4679/09 \$-see front matter

doi:10.1016/j.jemermed.2008.02.061

Ultrasound in Emergency Medicine

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

Michael Phelan, MD* and Daniel Hagerty, MD†

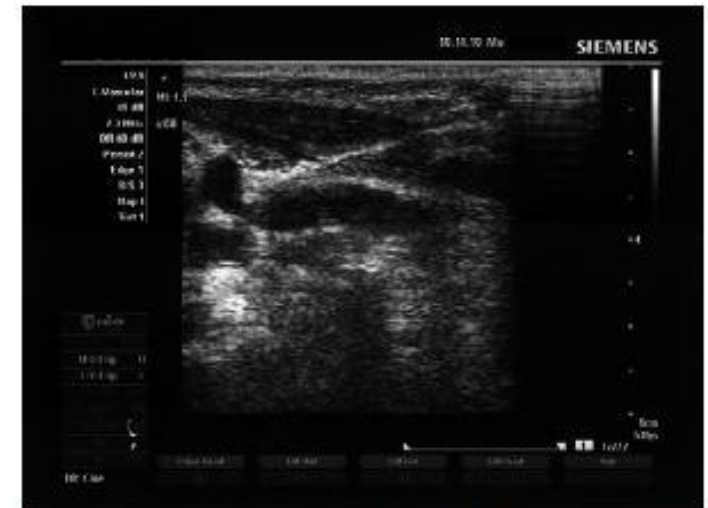


Figure 5. Ultrasound image of the right internal jugular vein shown in oblique orientation with the needle in long axis, and needle tip indenting the internal jugular vein just before puncture.

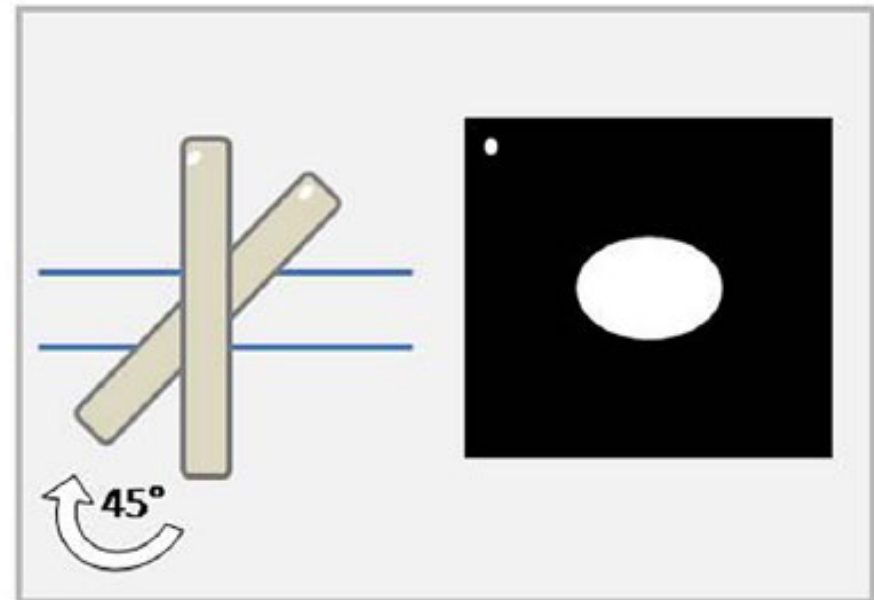
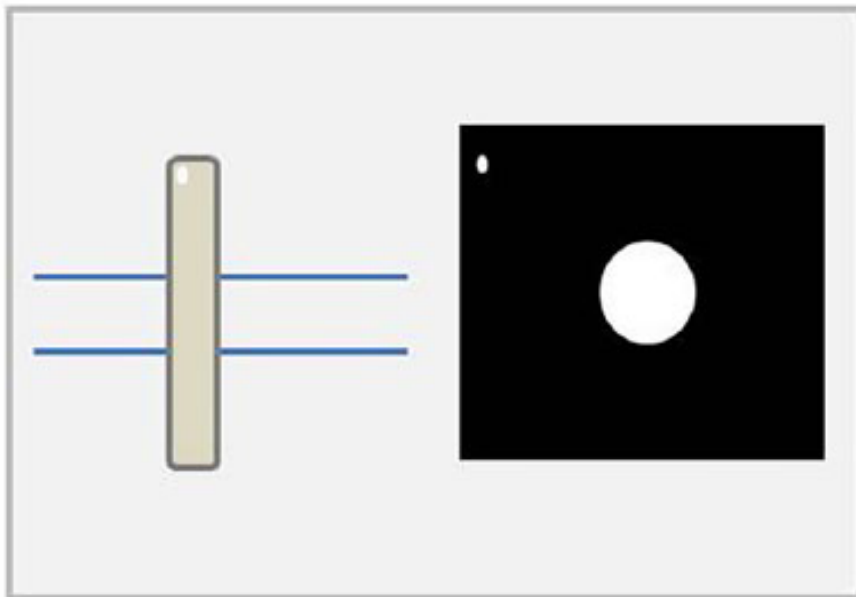
Obl ax + in plane: AXILLARY

Techniques in vascular access

JVA | The Journal of
Vascular Access

**A novel ultrasound-guided approach to
the axillary vein: Oblique-axis view
combined with in-plane puncture**

The Journal of Vascular Access
1-6
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Obl ax + in plane: AXILLARY

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La tecnologia al servizio della sicurezza

C'ERA UNA VOLTA ...



Ecografo con corpo macchina “semplificato”

- *“Dedicato” per accessi vascolari*
- *Basso costo*
- *Semplice utilizzo*
- *Sonde ad alta frequenza (7.5 - 9 MHz) per tessuti superficiali*
- *No doppler, no m.d.c.*
- *Portatile*

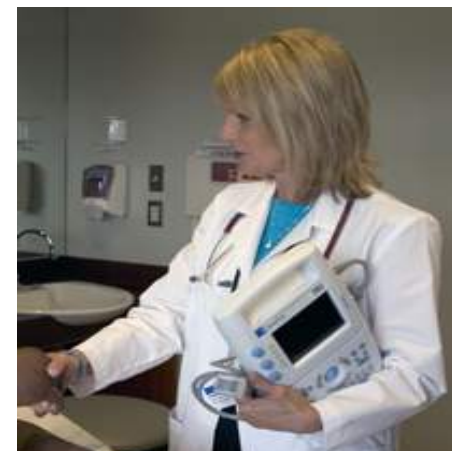


OGGI ...



Ecografo con corpo macchina “semplificato”, MA ...

- *“Dedicato” per “point of care ultrasound”*
- *Basso costo*
- *Semplice utilizzo*
- ***Versatile***
 - *elevata risoluzione di immagine*
 - *possibilità di sonde multiple*
 - *funzioni avanzate (ecodoppler ?)*
 - *ecocontrastografia*
- ***Portatile***



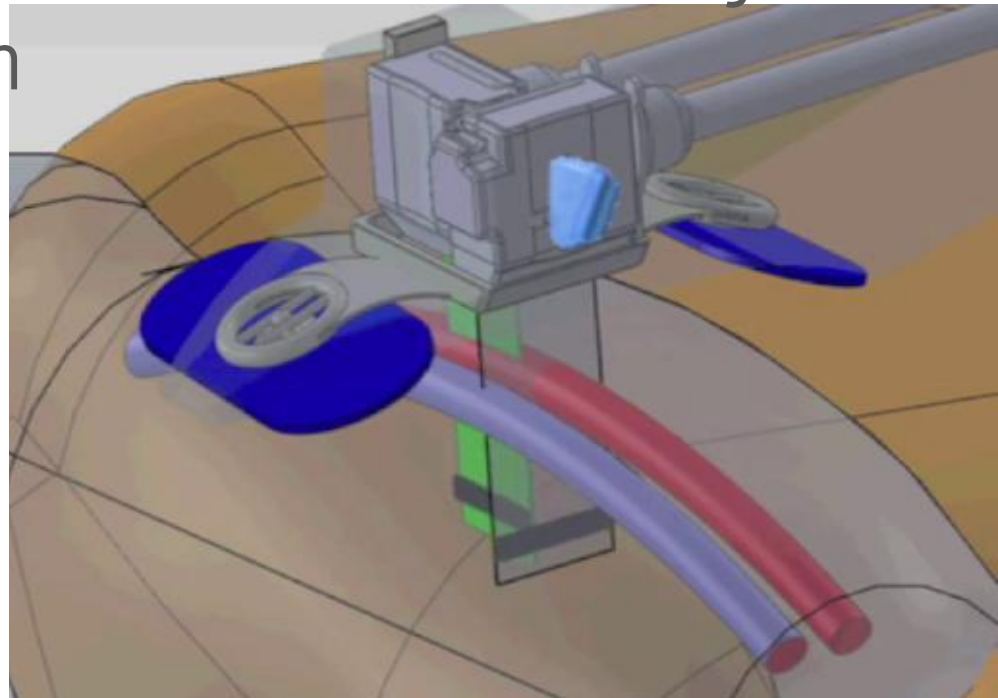
THE “DOUBLE VISION”

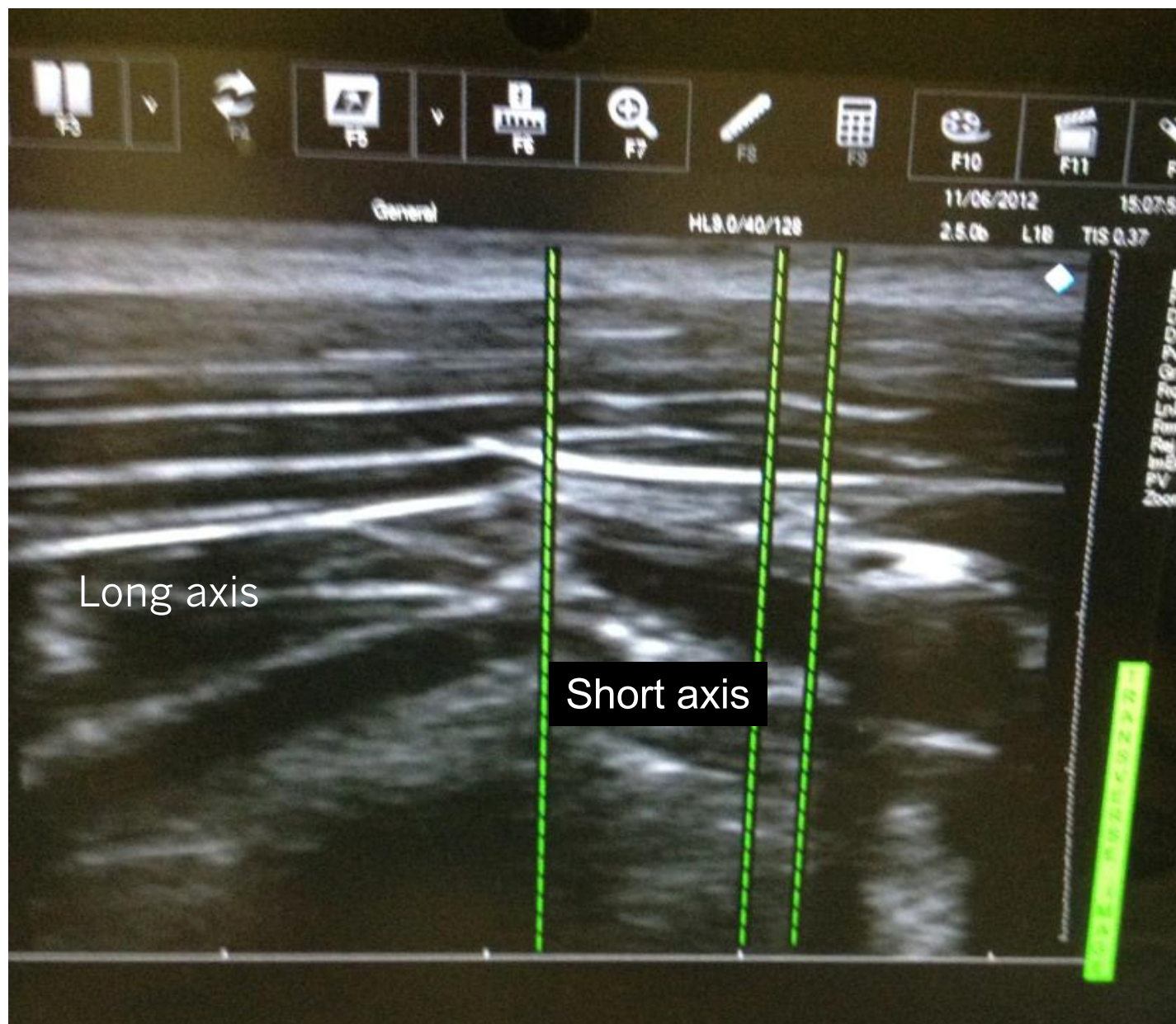
Long axis + in plane AND short axis + out of plane combined by means of a double US probe arranged in a T fashion



THE “DOUBLE VISION”

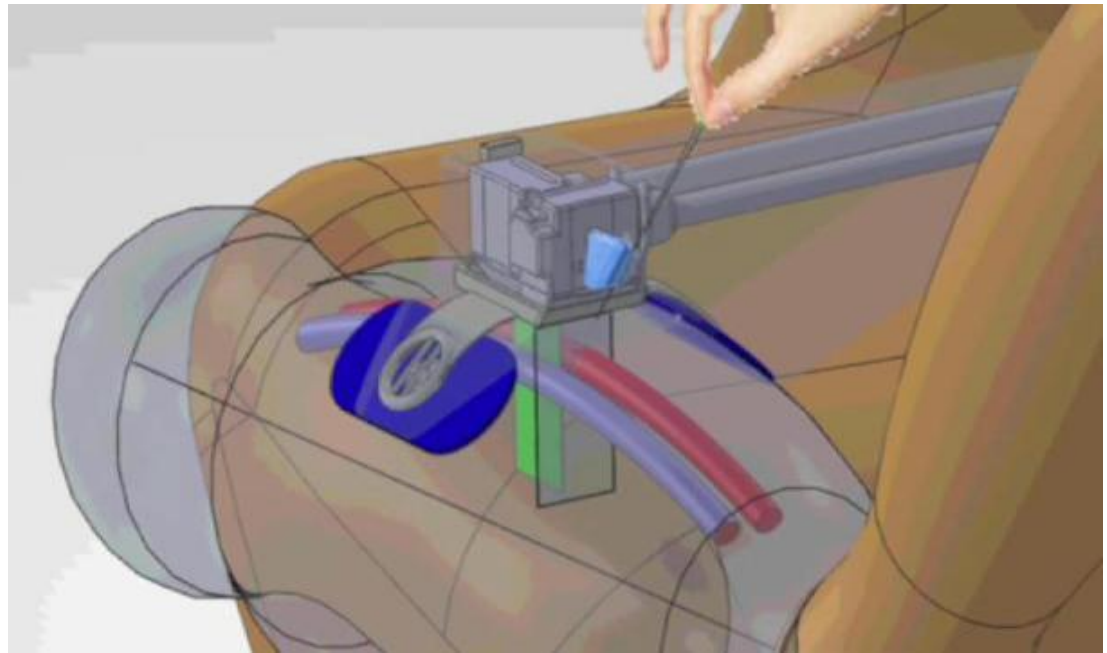
- A T-probe allows viewing the axillary vein in the longitudinal (long) and transversal (short) axis simultaneously in the same screen

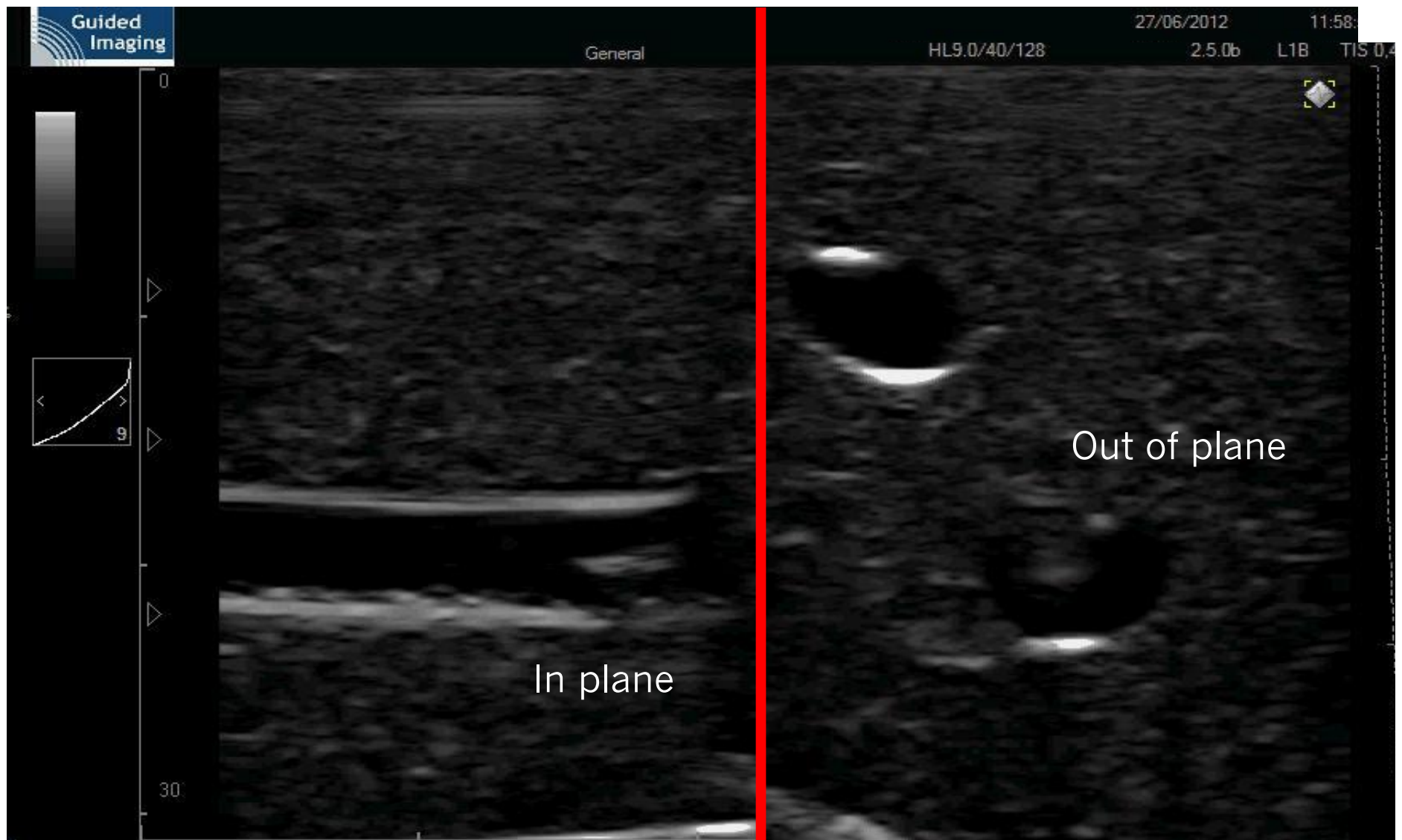


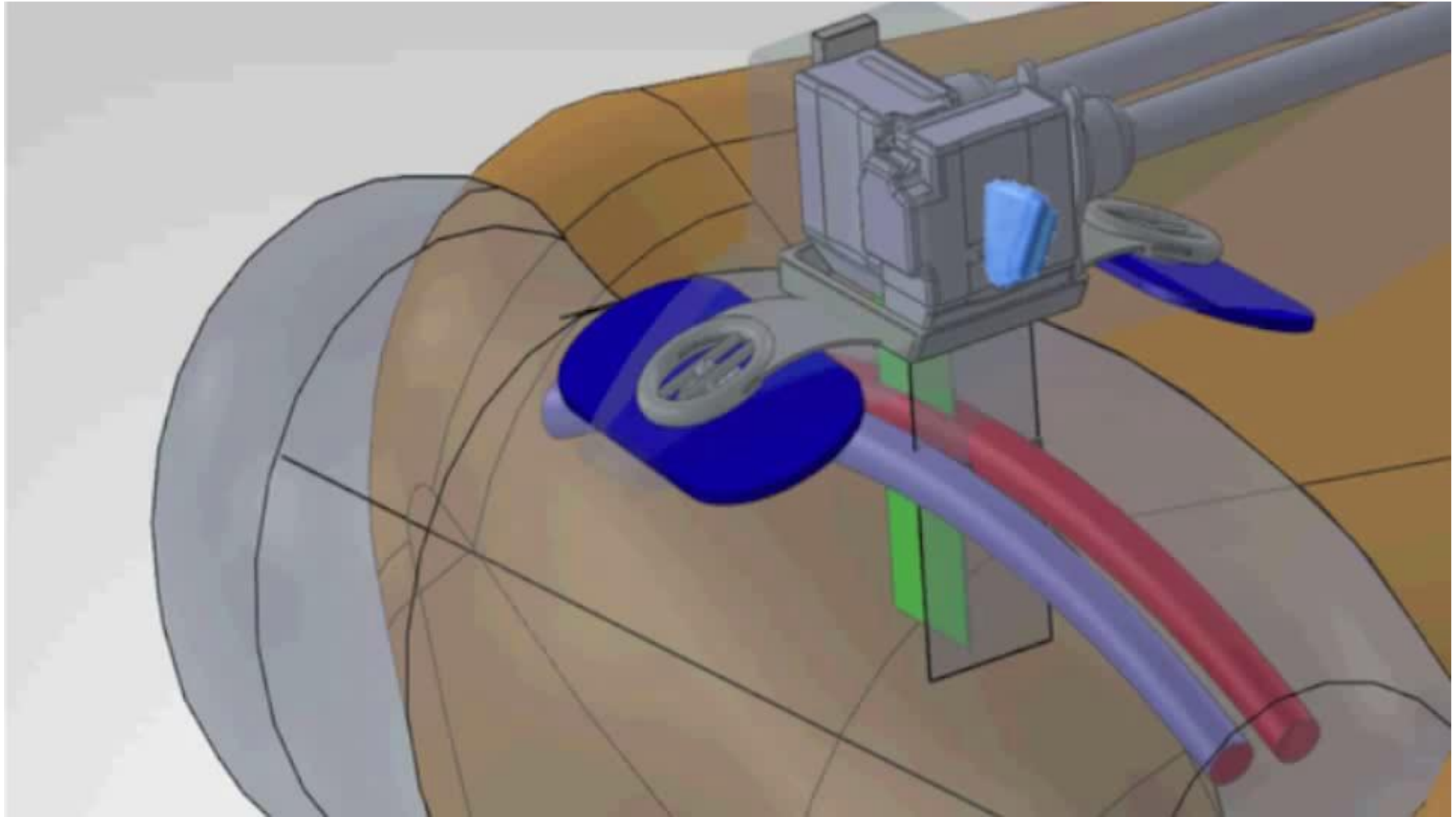


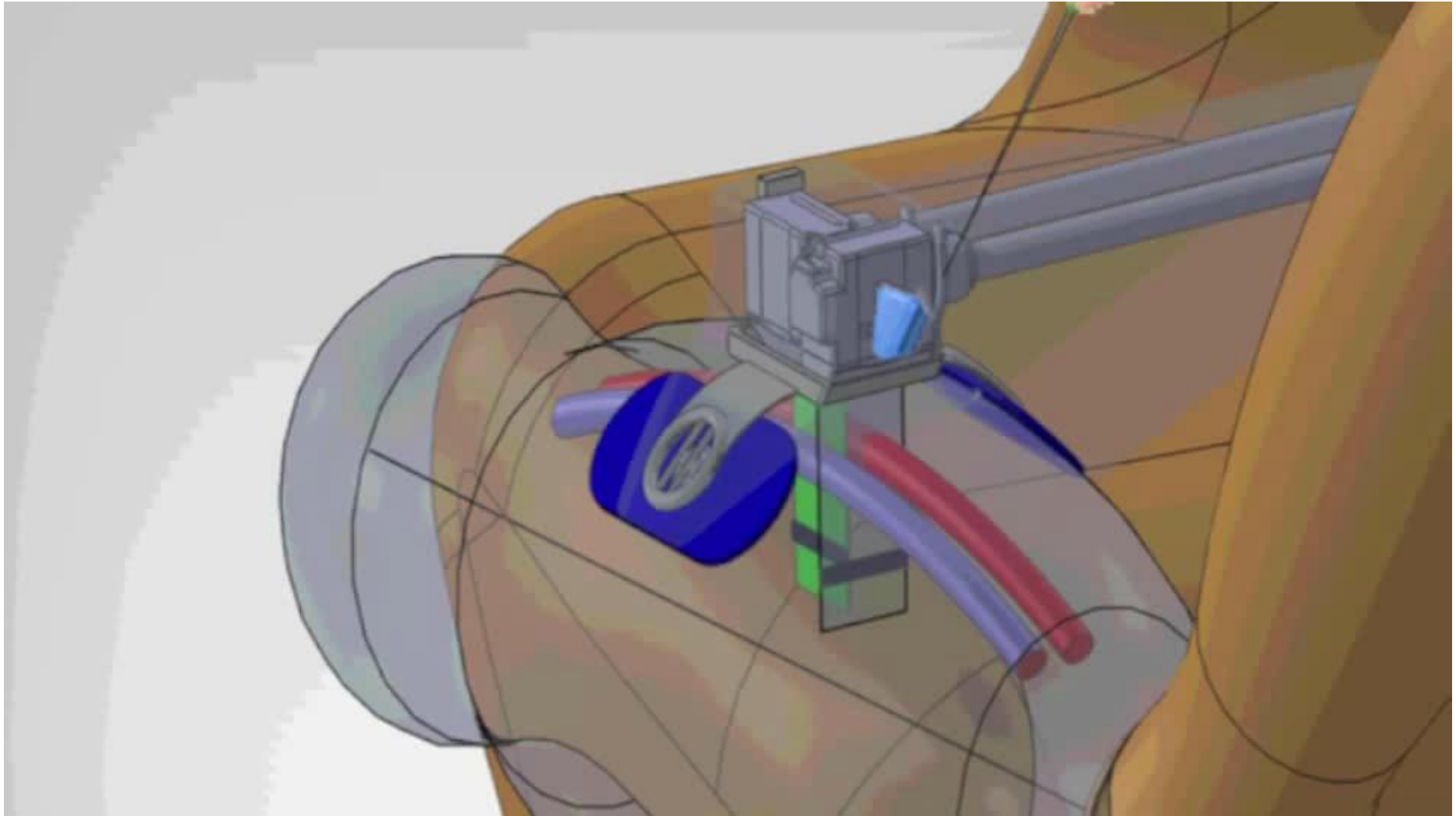
THE “DOUBLE VISION”

- thus, the needle entering the tissues is visualized simultaneously in-plane and out-of-plane









[B]

FPS 20

De 30 mm

DR 68 dB

Pw 100 %

Gn 99 %

Frq 9 MHz

LnDens St

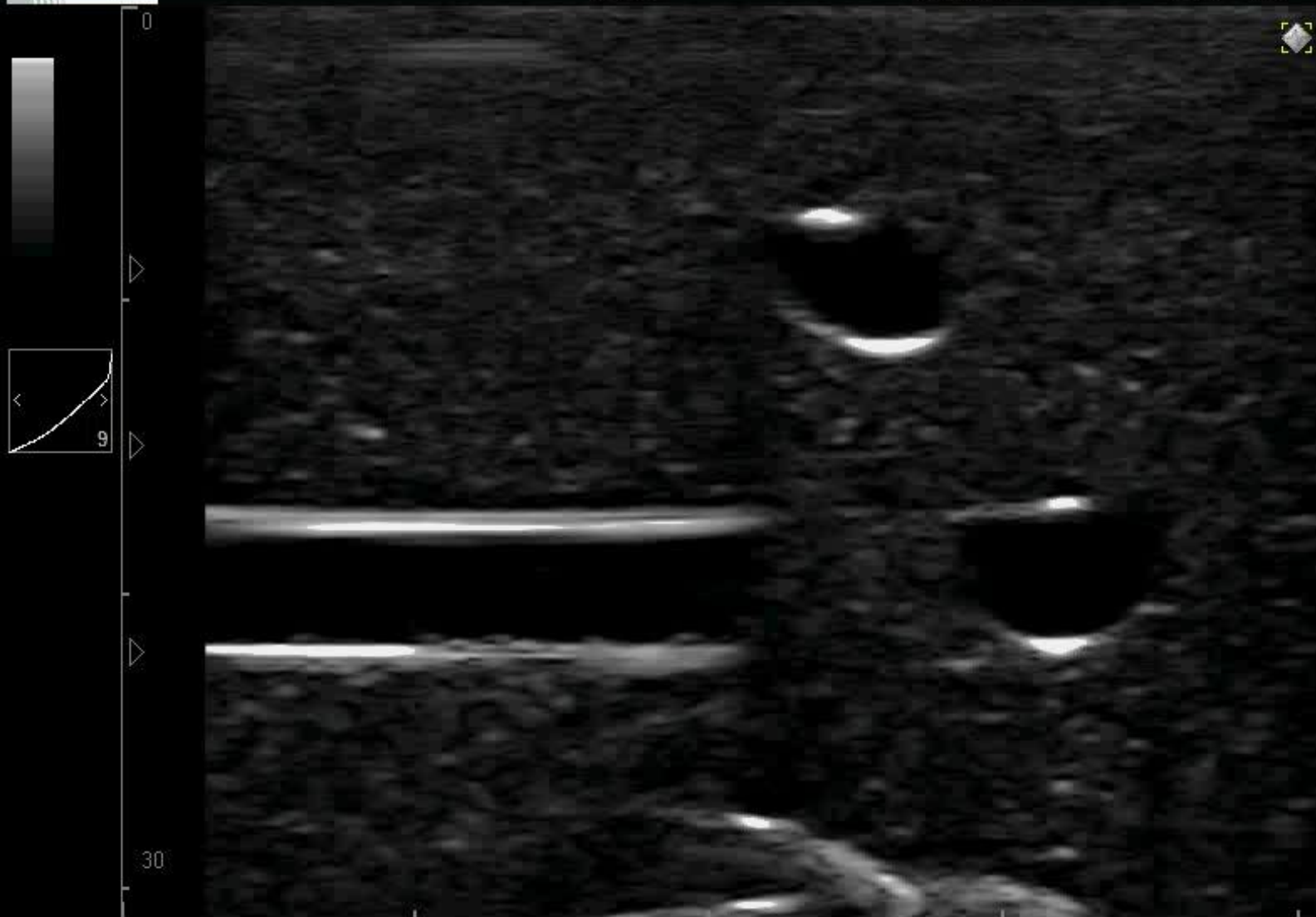
FmAvg 3

Rej 6

ImEnh 3

NV 3

Zoom 100 %



Evaluation of the eZono 4000 with eZGuide for ultrasound-guided procedures

Needle-guidance
GPS mediata

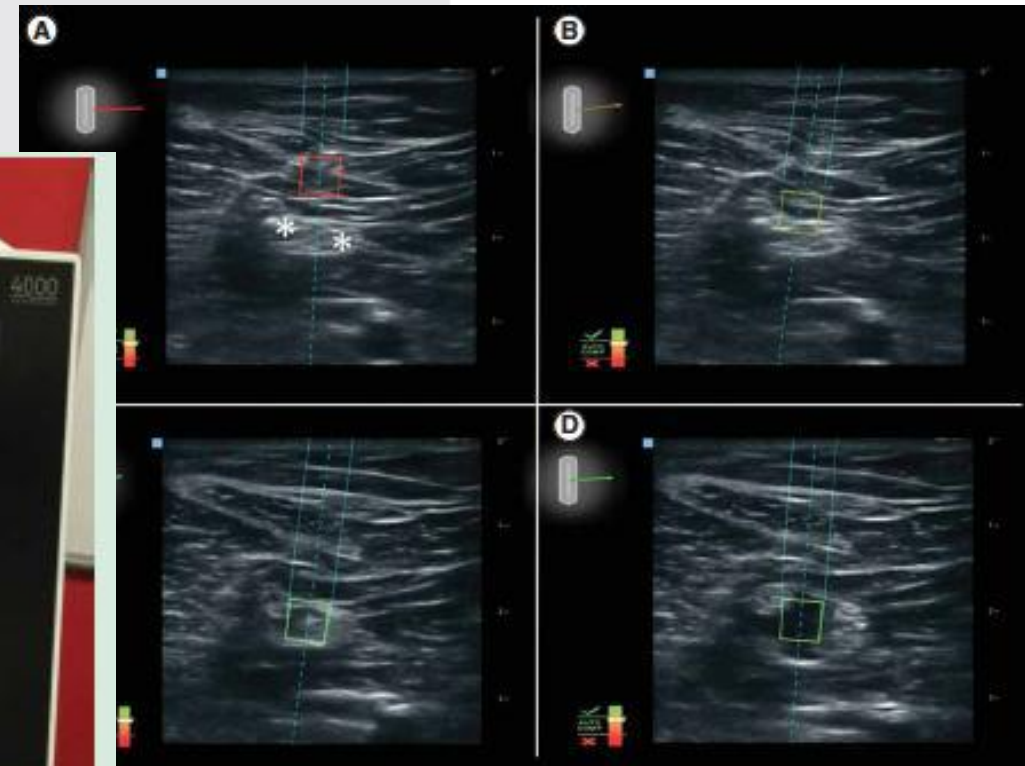
Expert Rev. Med. Devices Early online, 1–11 (2014)

Jeff Gadsden^{*1},
Malikah Latmore² and
Daniel M Levine²

¹Department of Anesthesiology, Duke University Medical Center, Durham, NC, USA

²Department of Anesthesiology Mount Sinai-St. Luke's and Mount Sinai-Roosevelt Hospitals, New York, NY, USA

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Tel.: +1 919 681 6437
Fax: +1 919 681 2923
jeffgadsden@gmail.com



Sonde wireless





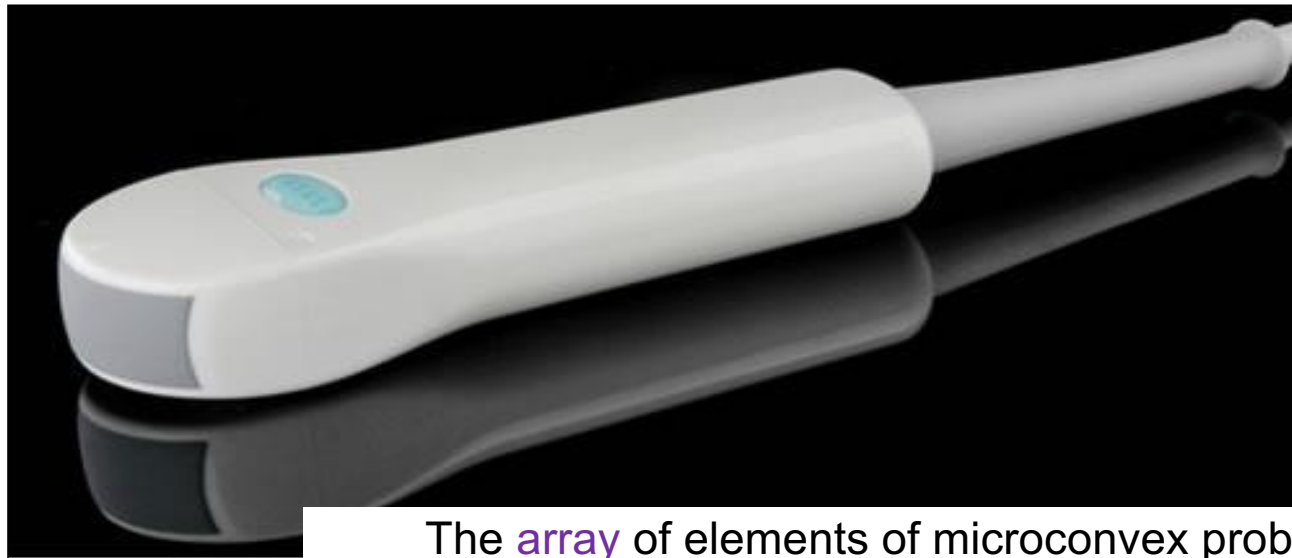
Sonda Microconvex

5-10 MHz

media risoluzione = penetrazione intermedia

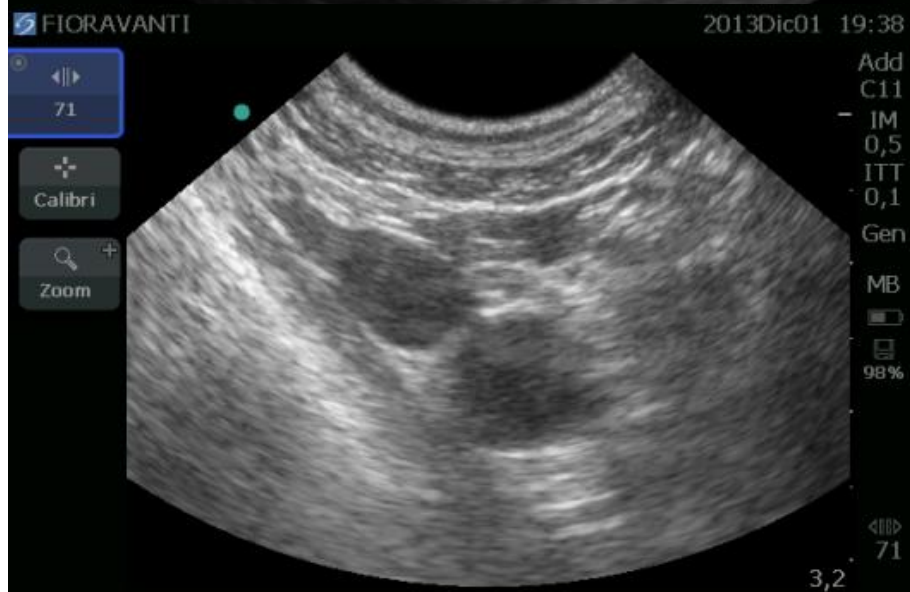
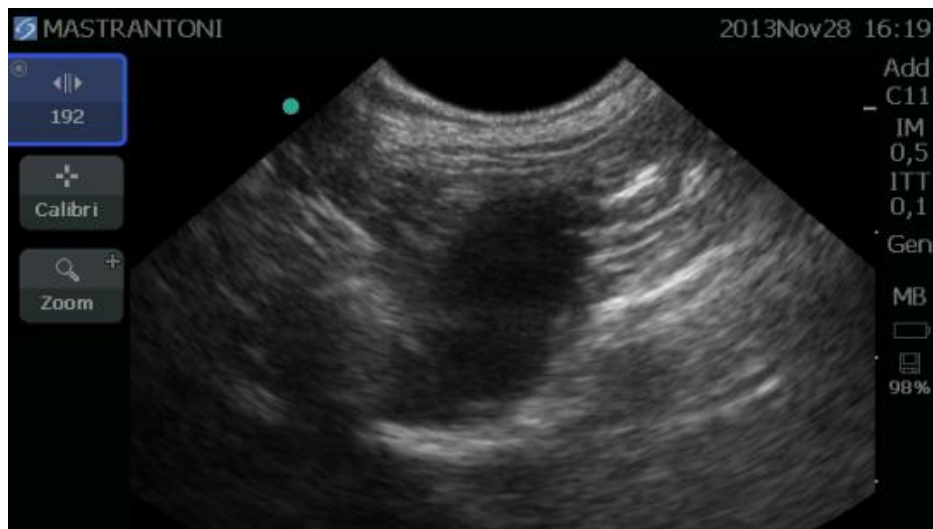
Applicazioni

Addome-torace-vascolare invasiva



The array of elements of microconvex probe is curved with a certain radius. Microconvex probes have a much smaller contact surface, which improves the coupling between the transducer and the skin surface even in complicated areas as the supraclavicular or jugular fossa.



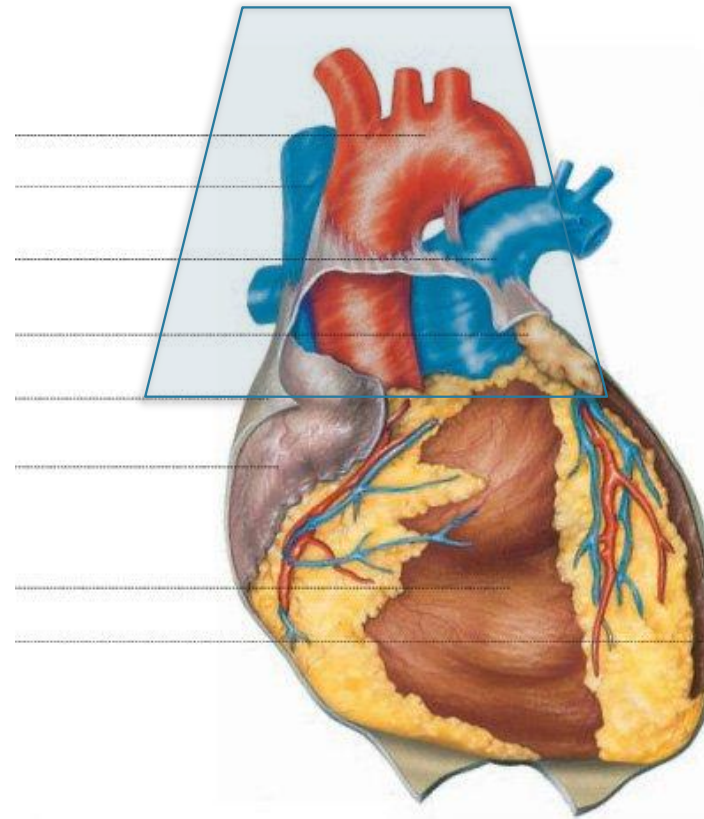
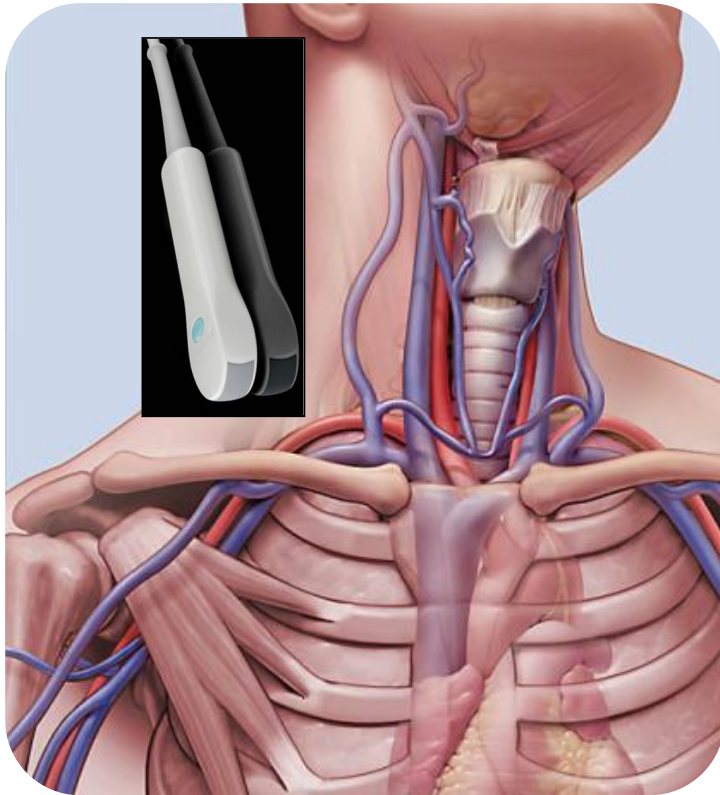


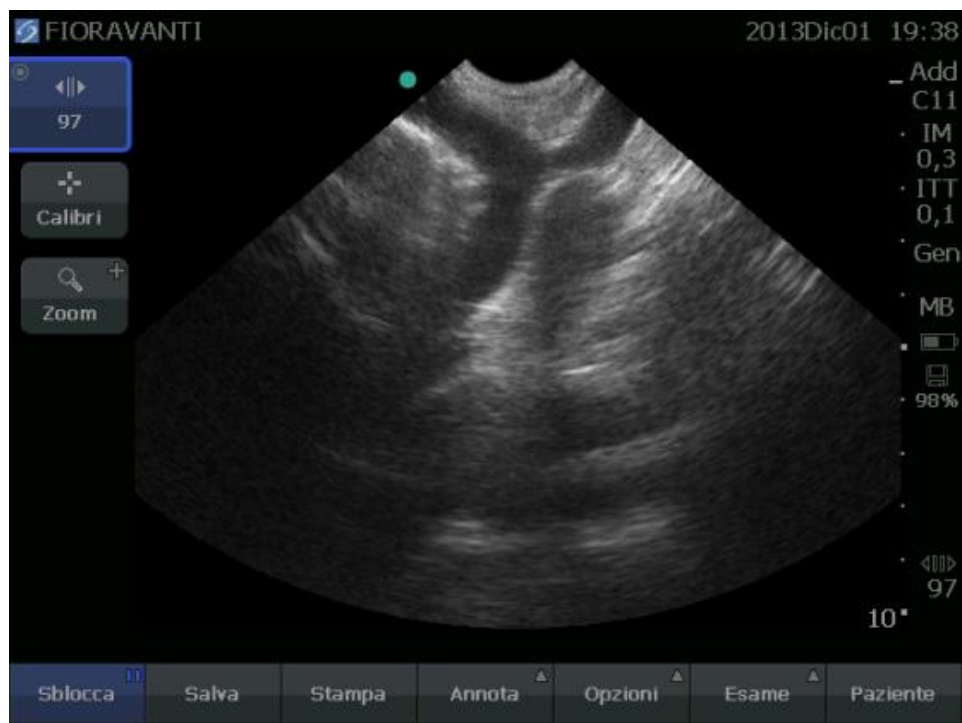
3,2



4,1.

SCANSIONE CORONALE SOVRACLAVEARE DX





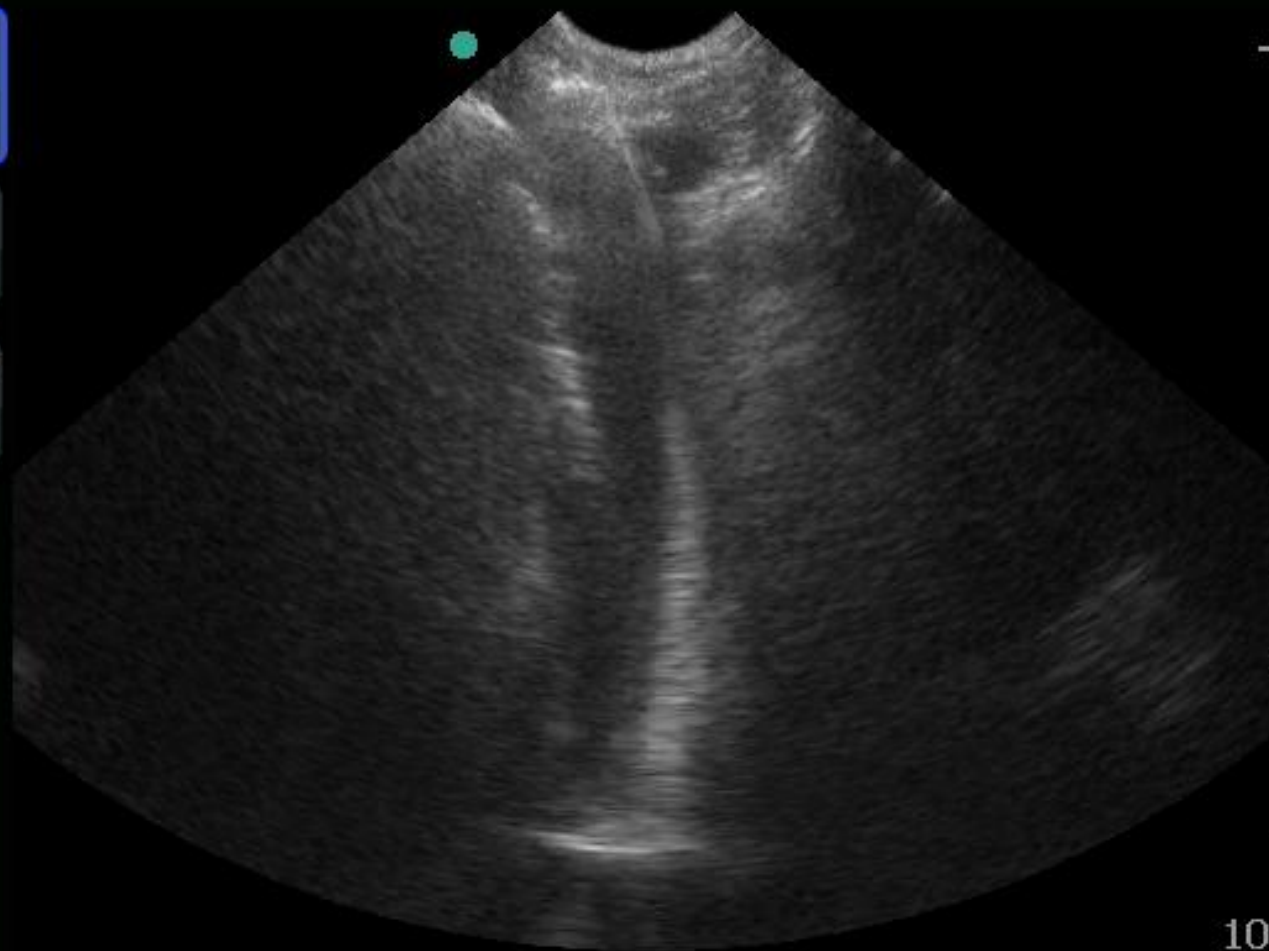
PINCO

2013Nov23 14:33

◀▶▶▶
59

✚
Calibri

🔍 +
Zoom



- Add
C11
· IM
0,3
· ITT
0,1
· Gen
· MB
■ 

99%

◀▶▶▶
59
10°

Sblocca

Salva

Stampa

Annota

Opzioni

Esame

Paziente

**Sonda «all in one»
convex + lineare**

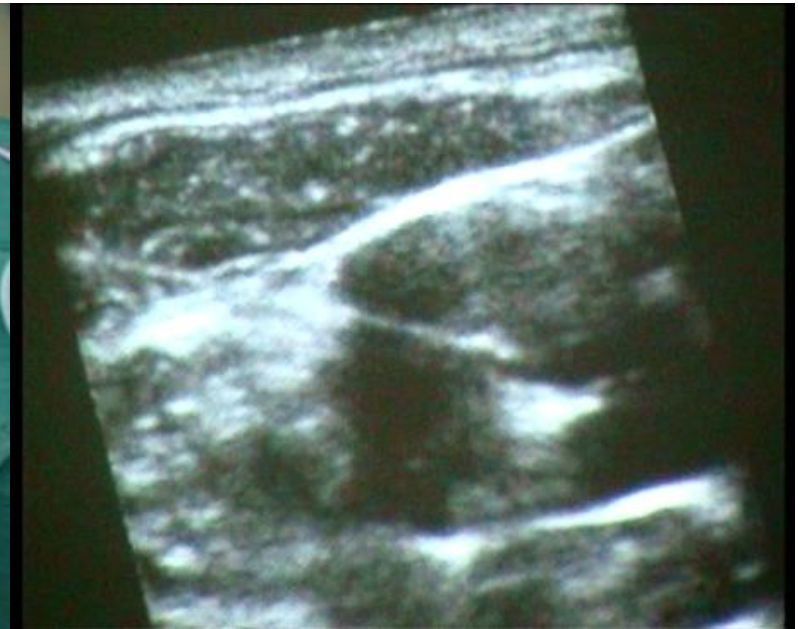


Un passo avanti

ECOGUIDA
guidiamo l'ago o l'operatore ?

UNA NUOVA SPINTA VERSO L'OPERATORE

One step forward



Il nuovo concetto che emerge
dalla pratica clinica è:

USO ' GLOBALE' DELL'ECOGRAFO

Ovvero:

- Per la scelta della vena
- Per la venipuntura
- Per la corretta direzione del catetere
- Per la esclusione di complicanze da venipuntura
- Per la verifica della posizione della punta
- **Per incannulare qualunque tipo di vaso in qualunque setting**

Prima ...

Intensive Care Med
DOI 10.1007/s00134-012-2597-x

CONFERENCE REPORTS AND EXPERT PANEL

2012

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

**International evidence-based
recommendations on ultrasound-guided
vascular access**

- **Pre-procedural ultrasound vessel screening**

Dopo ...

2012

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

**International evidence-based
recommendations on ultrasound-guided
vascular access**

- CEUS (contrast-enhanced ultrasound) is a valid method for detecting a central venous catheter tip in the right atrium
- The ultrasound equipment should remain easily accessible at the patient's bedside to detect early life-threatening catheter-related complications such as pneumothorax, cardiac tamponade and hemothorax
- Ultrasound can accurately detect pneumothorax and should be routinely performed after central venous catheter cannulation when the pleura could have been damaged

Daniele G. Biasucci
Antonio La Greca
Giancarlo Scoppettuolo
Mauro Pittiruti

What's really new in the field of vascular access? Towards a global use of ultrasound

Accepted: 2 March 2015
Published online: 10 March 2015
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ESICM 2015

Dear Editor,
We read with interest the paper from Schmidt and collaborators reviewing the advantages of ultrasound in central venous access (CVA) [1]. However, modern ultrasound application in the field of CVA is not limited to ultrasound-guided venipuncture but it can be extended to assist all steps of CVA: (a) rational choice of appropriate vein and proper approach; (b) prevention of malposition; (c) ruling out of respiratory complications [2].

Most benefits of ultrasound-based CVA come from a preliminary evaluation of all possible venipuncture options which allows a rational choice of the most appropriate vein to

cannulate, considering such factors as vein size, pathological abnormalities, and collapse during breathing [2]. In a critical care environment, two long-term outcome determinants are of paramount importance: (a) vessel and approach should be chosen so as to obtain an exit site allowing optimal management and dressing to reduce catheter-related infections and accidental catheter dislodgement rates; (b) vein size should be measured, since the external diameter of the catheter should not exceed 1/3 of the internal diameter of the vein: this will reduce the risk of venous thrombosis. Recently, different protocols have been proposed for a rationale evaluation of central veins, such as the RaCeVA [3].

Ultrasound is also useful after venipuncture for preventing primary malposition. In this regard, ultrasound may play two roles [2, 4, 5]. As a 'tip navigation' technique, ultrasound can be used to confirm that the catheter or guidewire is travelling towards the cavo-atrial junction (CAJ) by its direct visualization throughout the homolateral brachiocephalic vein or ruling out catheter misdirection in the ultrasound-explorable superior vena cava (SVC) tributary veins: internal jugular (IJV), axillary and contralateral brachiocephalic veins (negative assessment, Fig. 1a). This 'ultrasound-based tip navigation' may be performed with the same linear probe

used for venipuncture. As a 'tip location' technique, transthoracic echocardiography allows direct or indirect visualization of the catheter tip or J-guidewire at the CAJ or in the lower SVC by means of a subcostal bicaval view (Fig. 1b) [2, 5]. This approach meets significant limitations in obese patients, after recent open-abdomen surgery or when stomach or colon is overinflated and/or involved with bulky diseases/tumours. Transoesophageal echocardiography is the most accurate method for tip location, but it is expensive and invasive. Recently, Kim and collaborators [4] proposed the use of a micro-convex probe to visualize both right IJV cannulation and catheter passage into the SVC. A supraclavicular scan obtained with this probe offers a longitudinal view of the SVC to its crossing with the right pulmonary artery, allowing catheter tip detection at the CAJ (Fig. 1c).

Furthermore, various evidence has shown that ultrasound can accurately detect pneumothorax and haemothorax (Fig. 1d). Therefore, lung ultrasound should be routinely performed after CVA when the pleura could have been damaged [2].

In conclusion, it is time for all intensivists to become proficient in the 'global' use of ultrasound that makes CVA safer and cost-effective helping not only to cannulate central veins using real-time needle tip

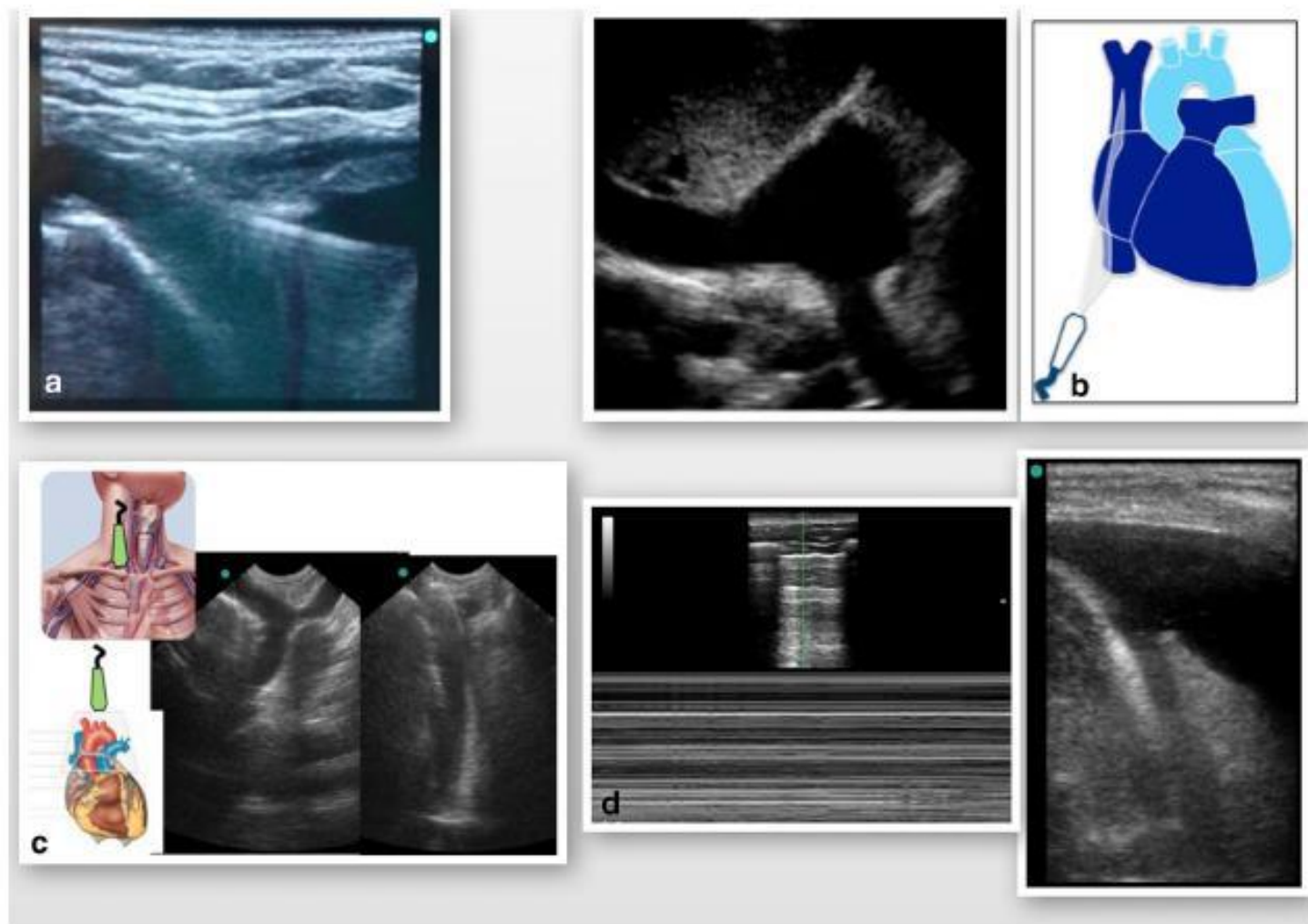
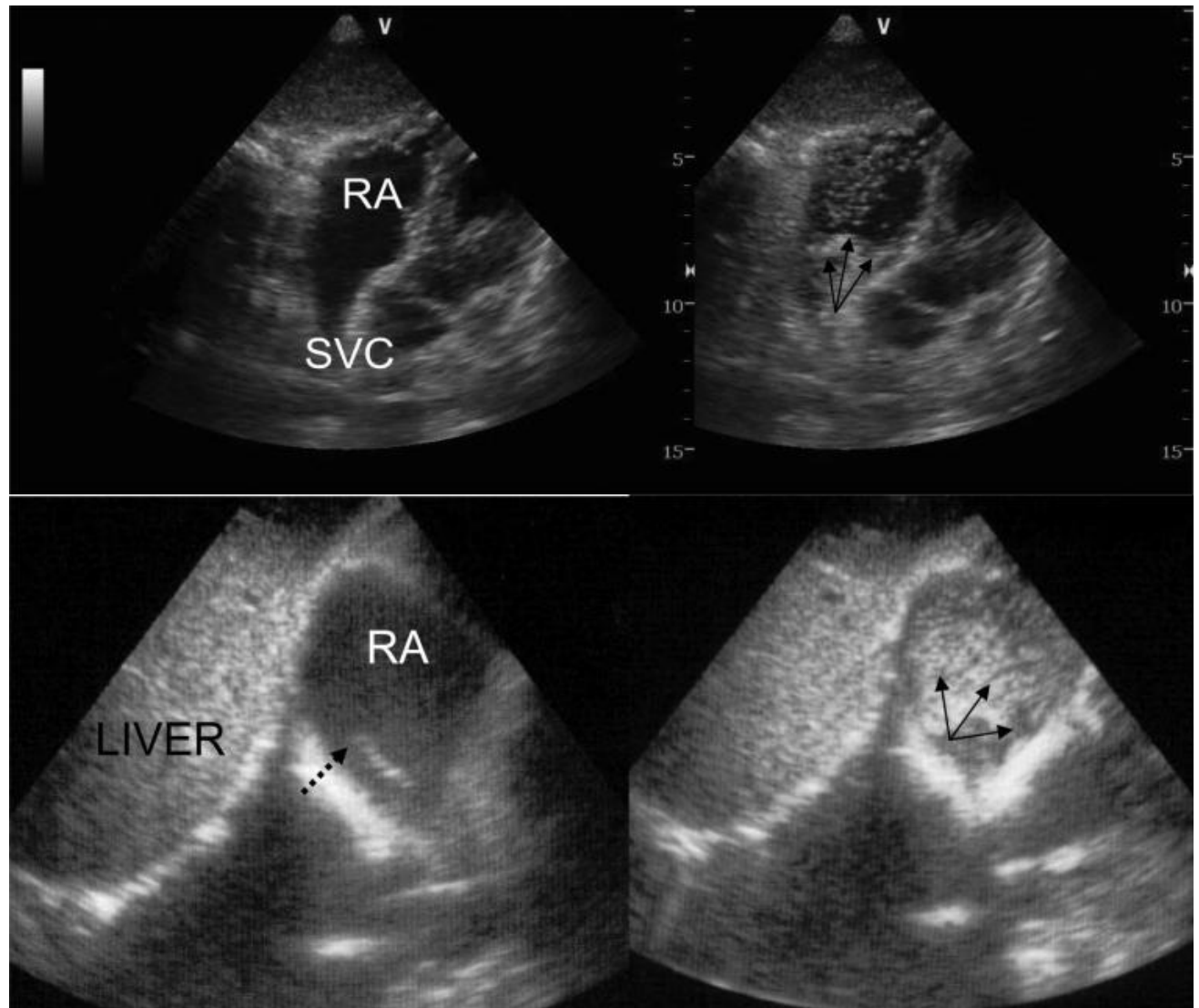


Fig. 1 'Global' use of ultrasound in CVA. **a** B-mode imaging showing the catheter guidewire travelling in the wrong direction towards the contralateral brachiocephalic vein. **b** Subcostal bicaval view which may allow catheter tip or J-guidewire visualization in the lower part of the SVC or at the CAJ.

c Supraclavicular scan obtained with a micro-convex probe showing a longitudinal view of the SVC to its crossing with the right pulmonary artery allowing J-guidewire detection at the CAJ. **d** Evaluation of the pleural line to rule out pneumothorax (left) and diagnosis of a pleural effusion/haemothorax (right).

US-based tip location

- Il bubble test
- Il progetto
echo-tip



ECG - GUIDA



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, Luigi De Simone⁶, Antonio La Greca¹, Cecilia Pelagatti⁷, Pier Sandro Sette⁸

TABLE II - OVERALL ACCURACY

1444 paz

P – Perfect match	1199	83.0%	} 95.4%
C – Correct match	179	12.4%	
S – Mismatch	55	3.8%	
NA – Not applicable	11	0.7%	

The intracavitary ECG for positioning the
tip of central VADs in pediatric patients.
Preliminary results of an Italian multicenter study

M.Pittiruti, M.Lamperti, U.Graziano, D.Celentano,
G.Capozzoli and F.Rossetti

The Italian Group for Venous Access Devices - GAVeCeLT

Our conclusions

- In the pediatric population, the IC-EKG method is applicable and feasible in almost all patients (> 99%)
- As compared with the radiological methods, the accuracy of the IC-EKG method is very high 95.8%, and even higher if performed with a dedicated monitor such as Nautilus (98.8%)
- The IC-EKG method is 100% safe also in children

Making Health Care Safer II: An Updated Critical Analysis of the Evidence for Patient Safety Practices

Evidence Report/Technology Assessment

Number 211



Agency for Healthcare Research and Quality
Advancing Excellence in Health Care • www.ahrq.gov

Evidence-Based
Practice

Patient Safety

Annals of Internal Medicine

SUPPLEMENT

Annals of Internal Medicine

The Top Patient Safety Strategies That Can Be Encouraged for Adoption Now

5 March 2013 | Annals of Internal Medicine | Volume 158 • Number 5 (Part 2) | 365

Encouraged

Multicomponent interventions to reduce falls

Use of clinical pharmacists to reduce adverse drug events

Documentation of patient preferences for life-sustaining treatment

Obtaining informed consent to improve patients' understanding of the potential risks of procedures

Team training

Medication reconciliation

Practices to reduce radiation exposure from fluoroscopy and CT

The use of surgical outcome measurements and report cards, such as those from ACS NSQIP

Rapid-response systems

Use of complementary methods for detecting adverse events or medical errors to monitor for patient safety problems

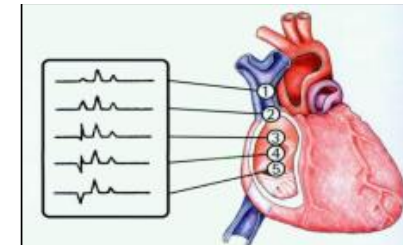
Computerized provider order entry

Use of simulation exercises in patient safety efforts

USO “GLOBALE” DELL’ECG
endocavitario ?



Problem ...



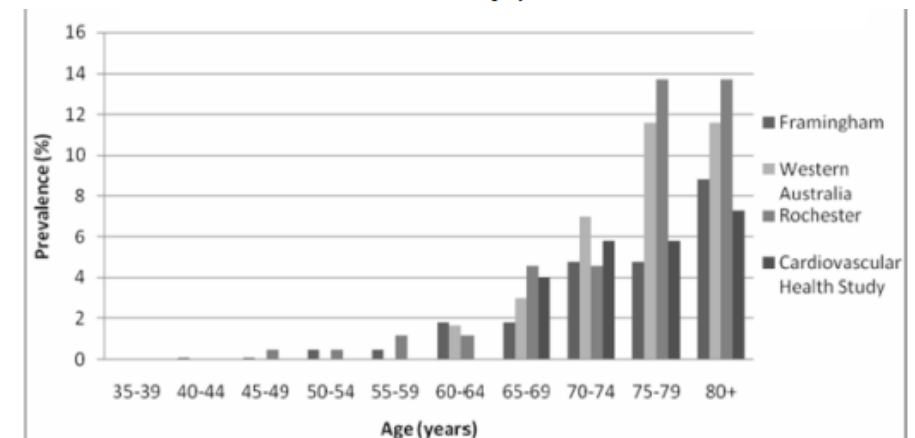
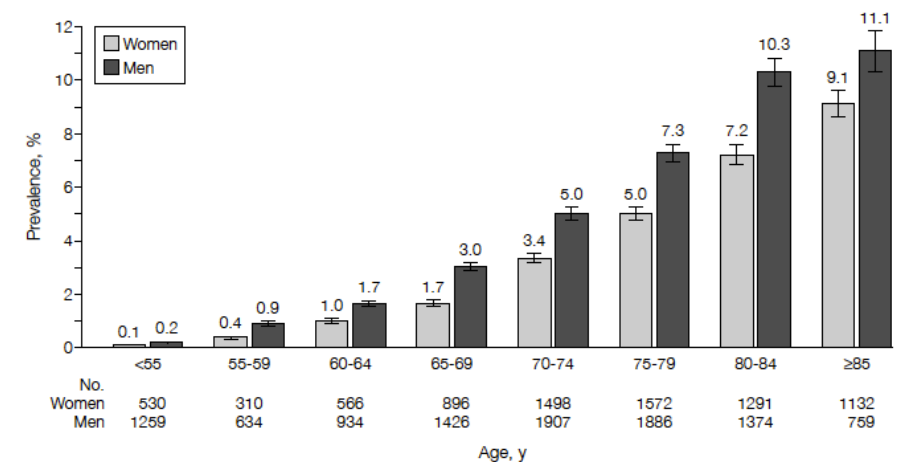
A subgroup of patients cannot benefit from IC-ECG:

a) Patients without an evident P wave or with abnormal P on their basal surface ECG tracking

- atrial fibrillation or other morphologic abnormalities of p wave (junctional rhythms and others)
- Active atrial pace-makers

Global **applicability** (in-hospital):
91-93%

Figure 2. Prevalence of Diagnosed Atrial Fibrillation Stratified by Age and Sex



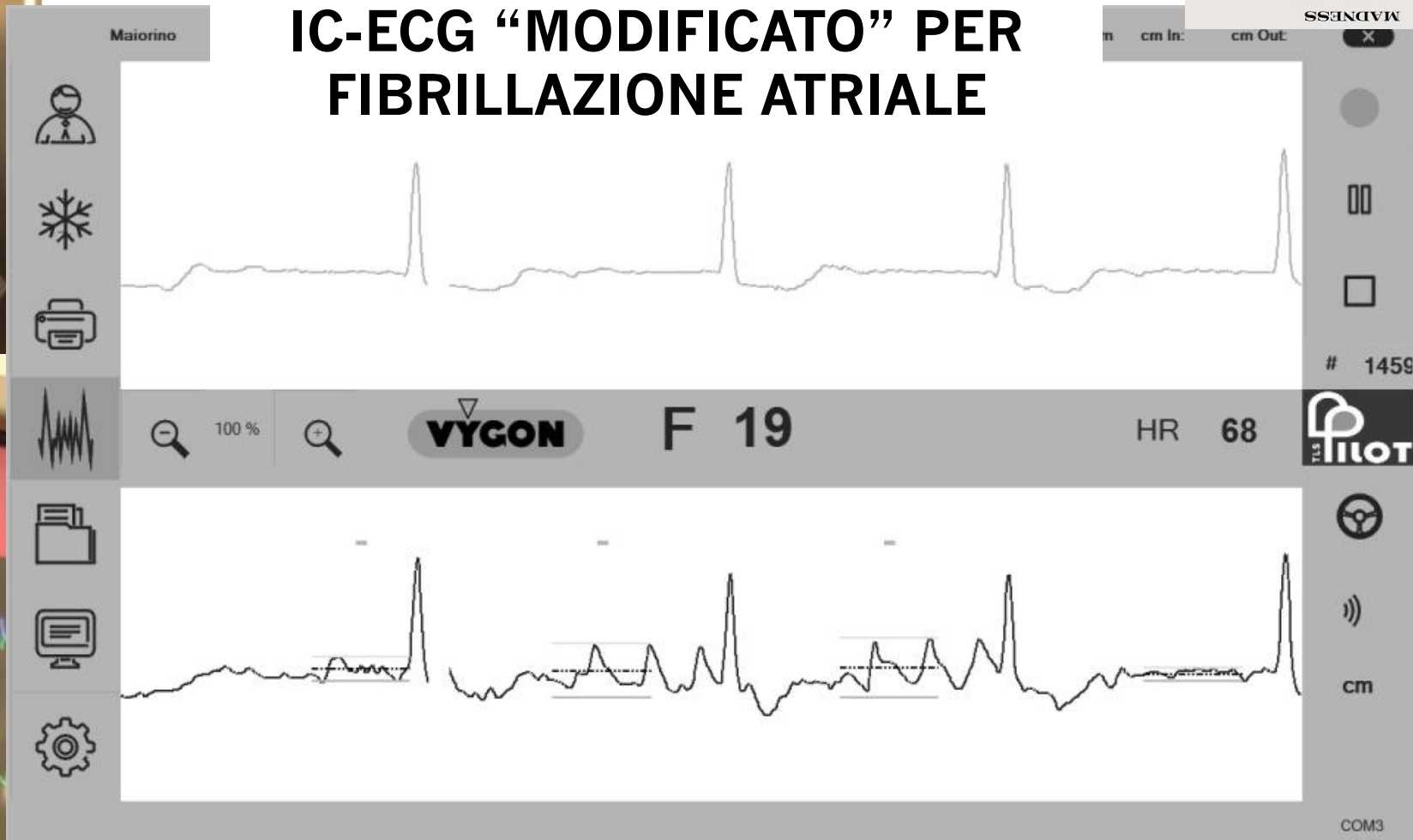
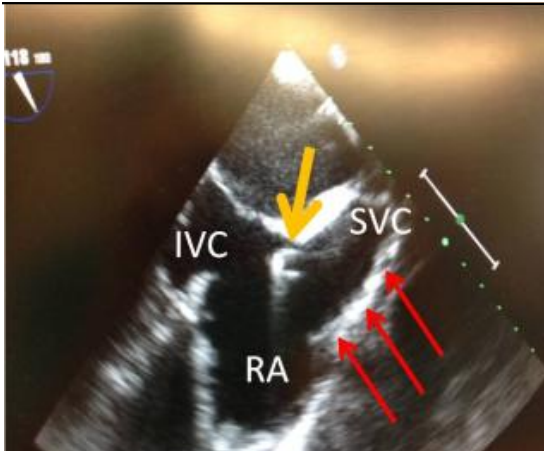
Controllo della punta

One step forward



MADNESS

IC-ECG “MODIFICATO” PER FIBRILLAZIONE ATRIALE



A modified intracavitary electrocardiographic method for detecting the location of the tip of central venous catheters in atrial fibrillation patients

**Maria Calabrese¹, Luca Montini², Gabriella Arlotta¹,
Antonio La Greca³, Daniele G Biasucci², Francesca Bevilacqua¹,
Enrica Antoniucci¹, Andrea Scapigliati¹, Franco Cavaliere¹
and Mauro Pittiruti³**

The Journal of Vascular Access

1–8

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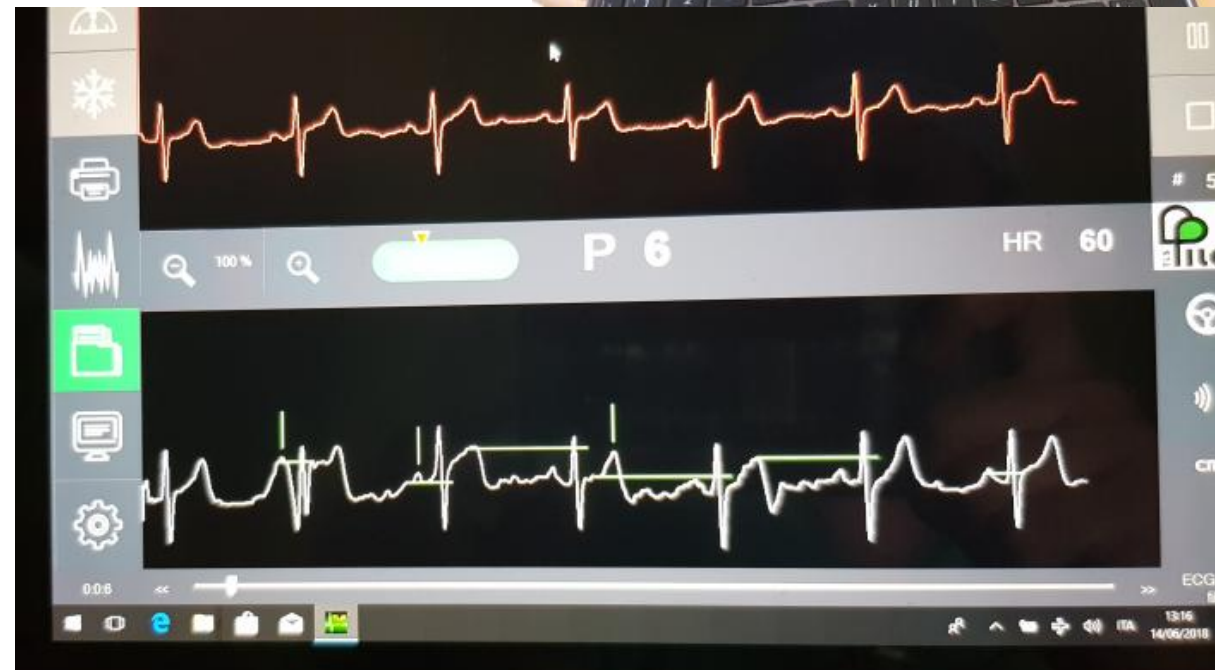
DOI: 10.1177/1129729818819422

journals.sagepub.com/home/jva



Monitor “specializzati”

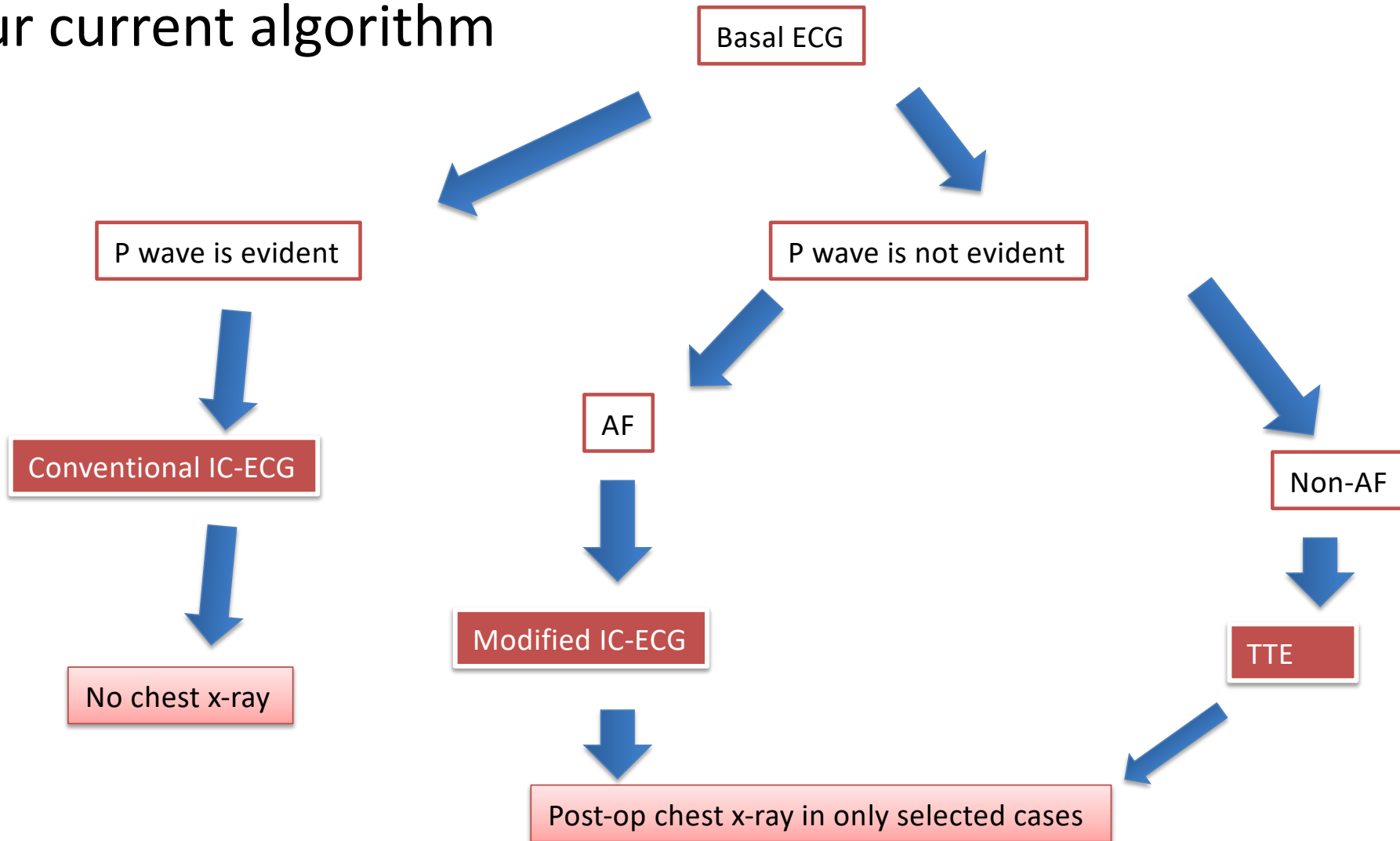
- Freezing
- Salvataggio e confronto di tracce
- Elaborazione delle tracce (misura...)
- Comando a distanza



PACE MAKERS ATTIVI

CONTROLLO PUNTA:
(ECG) + ECO ?

Our current algorithm



Integrazione ECO-ECG su unica macchina



LA SFIDA

Un documento di consenso per
integrare coerentemente e validare
ECOGRAFIA GLOBALE, ECG
endocavitario e NUOVE TECNOLOGIE in
un unico bundle

Gli albori: gennaio 2007 – pubblicazione 2010

Il protocollo ISALT 2 per l'impianto degli accessi venosi centrali a lungo termine: una proposta GAVeCeLT per un approccio più sicuro e costo-efficace

Mauro Pittiruti ¹, Antonio LaGreca ¹, Alessandro Emoli ², Giancarlo Scoppettuolo ³

**The SILTA 2 protocol for placement of long-term
central venous access devices: GAVeCeLT proposal
of a safer and more cost-effective approach**

¹ Dipartimento di Scienze Chirurgiche

² Day Hospital Oncologia Medica

³ Istituto di Malattie Infettive

Università Cattolica del Sacro Cuore - Roma

ISALT 3 ?

1. Selezione del vaso, della via di approccio e della tecnica di venipuntura ecoguidata mediante screening ecografico preprocedurale dell'anatomia vasale e adozione di criteri di scelta standardizzati (tabella 1)
2. Tecnica asettica e massimi presidi di barriera CON L'AUSILIO DI KIT DI INSERZIONE ALL-INCLUSIVE customizzati
3. Venipuntura percutanea ecoguidata secondo tecniche standardizzate (tabella 2)
4. US-based tip navigation
5. Gestione appropriata della guida metallica per la prevenzione delle aritmie
6. Tip location mediante ECG + US (algoritmo 1, schema 1)
7. US-based rule-out delle complicanze pleuropolmonari e dei tessuti molli
8. Stabilizzazione appropriata dei cateteri tunnellizzati (sutureless e SAS)
9. Scelta appropriata del sito ove intascare il reservoir (figura 1)
10. Controllo US-based delle complicanze tardive

Targeting zero?

YES, WE CAN !!!

