Principi di base dell'imaging ecografico; valutazione ecografica preliminare (RaCeVA, RaFeVA e RaPeVA);tecniche di venipuntura centrale ecoguidata

V Convegno Nazionale
GAVePed
2023 RIMINI
15-16 Maggio

Dott.ssa **Zanaboni Clelia**

Responsabile Anestesia e
Rianimazione Pediatrica

AUO Parma

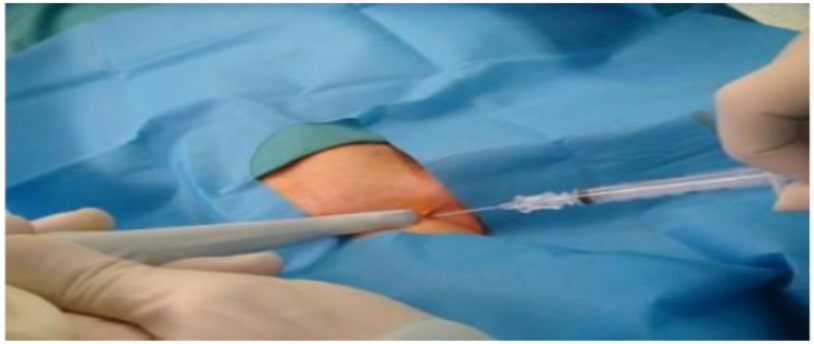
SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA
Azienda Ospedaliero - Universitaria di Parma

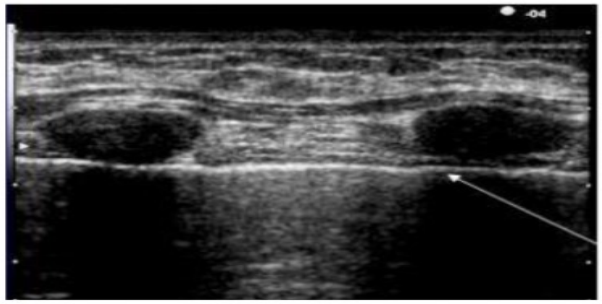
OSPEDALE dei BAMBINI

Ecografia: uso globale

Valutazione Ecografica Preliminare
(scelta approccio)

Puntura ecoguidata





Controllo della punta
Diagnosi/Esclusione
PNX/Emotorace

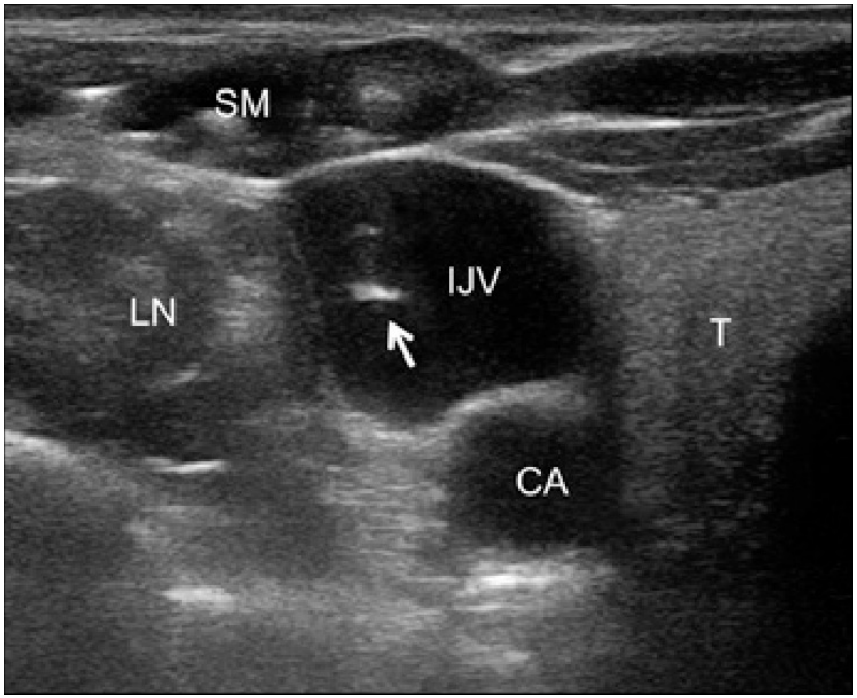
Convenzione nella scansione TRASVERSALE

- Sulla parte sinistra del monitor viene rappresentata la parte destra della sezione anatomica in esame
- Sulla parte destra del monitor viene rappresentata la parte sinistra della sezione anatomica in esame

In pratica è come se guardassimo una sezione anatomica trasversale dai piedi del paziente posto in posizione supina

Anteriore

Destra



Sinistra

Posteriore

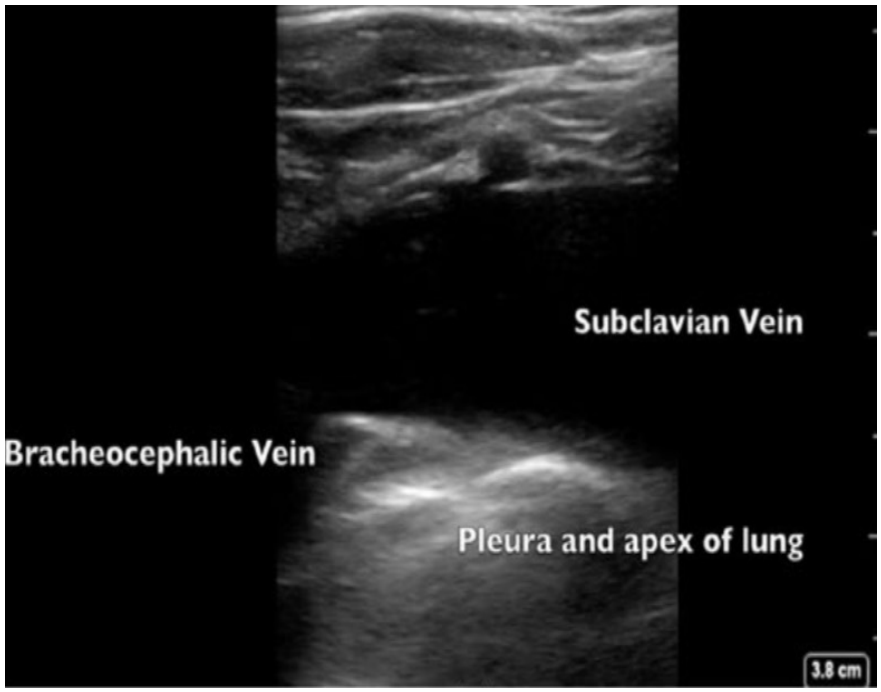
Convenzione nella scansione LONGITUDINALE

- Sulla parte sinistra del monitor sono rappresentate le scansioni craniali delle strutture in esame;
- Sulla parte destra del monitor sono rappresentate le scansioni caudali delle strutture in esame

In pratica è come se guardassimo una sezione anatomica longitudinale dal fianco destro del paziente

Anteriore

Testa

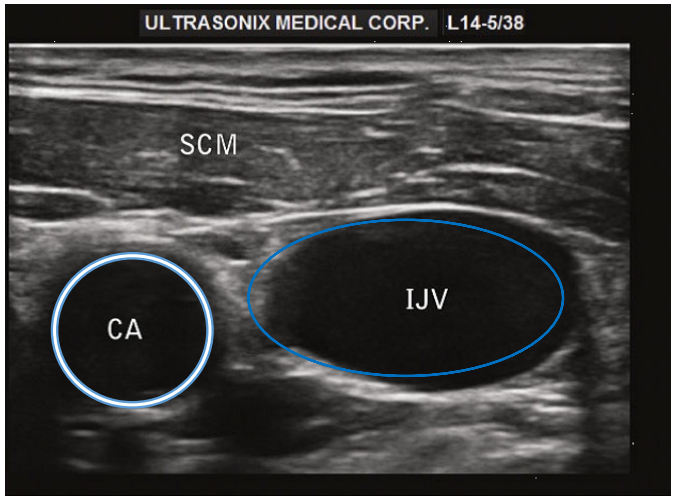


Piedi

Posteriore

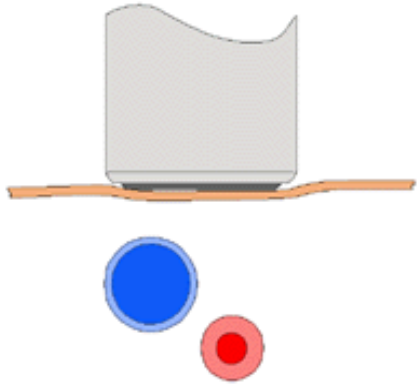
Distinzione Vasi Venosi da Vasi Arteriosi

- **Arterie:**
  - Strutture anecogene con rinforzo di parete posteriore
  - PULSATILI
  - NON COMPRIMIBILI
  - Forma più rotondeggiante rispetto ai vasi venosi



Vene:

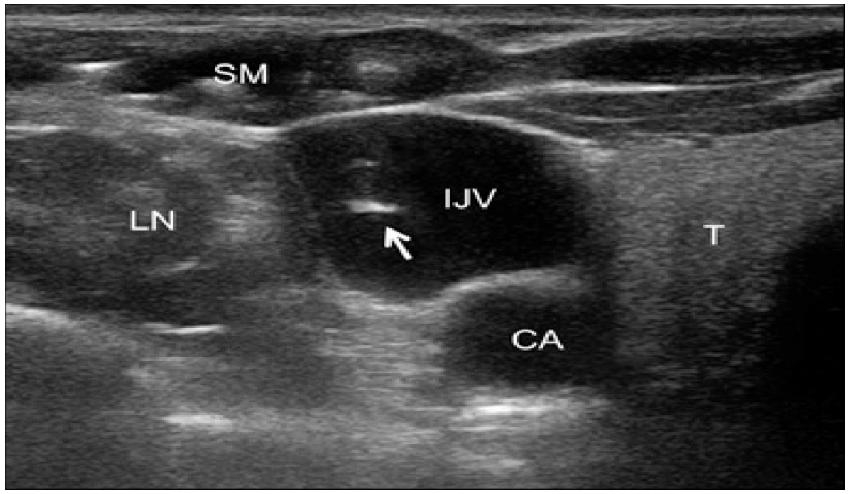
- Strutture anecogene con rinforzo di parete posteriore
- NON PULSATILI
- COMPRIMIBILI
- Forma variabile e non perfettamente circolare



Visualizzazione ecografica

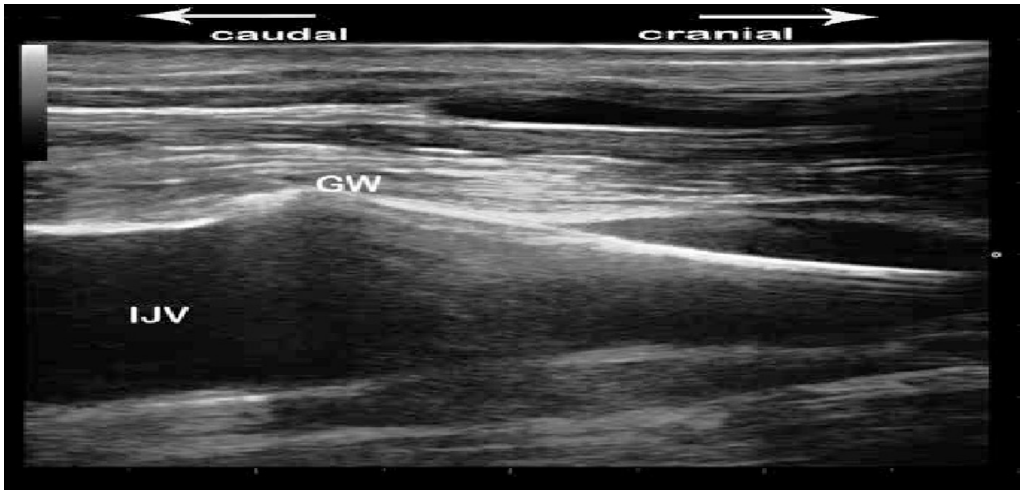
ASSE CORTO

- Visualizzazione panoramica: permette di visualizzare tutto il fascio vascolo-nervoso
- Facile mantenerla durante la venipuntura

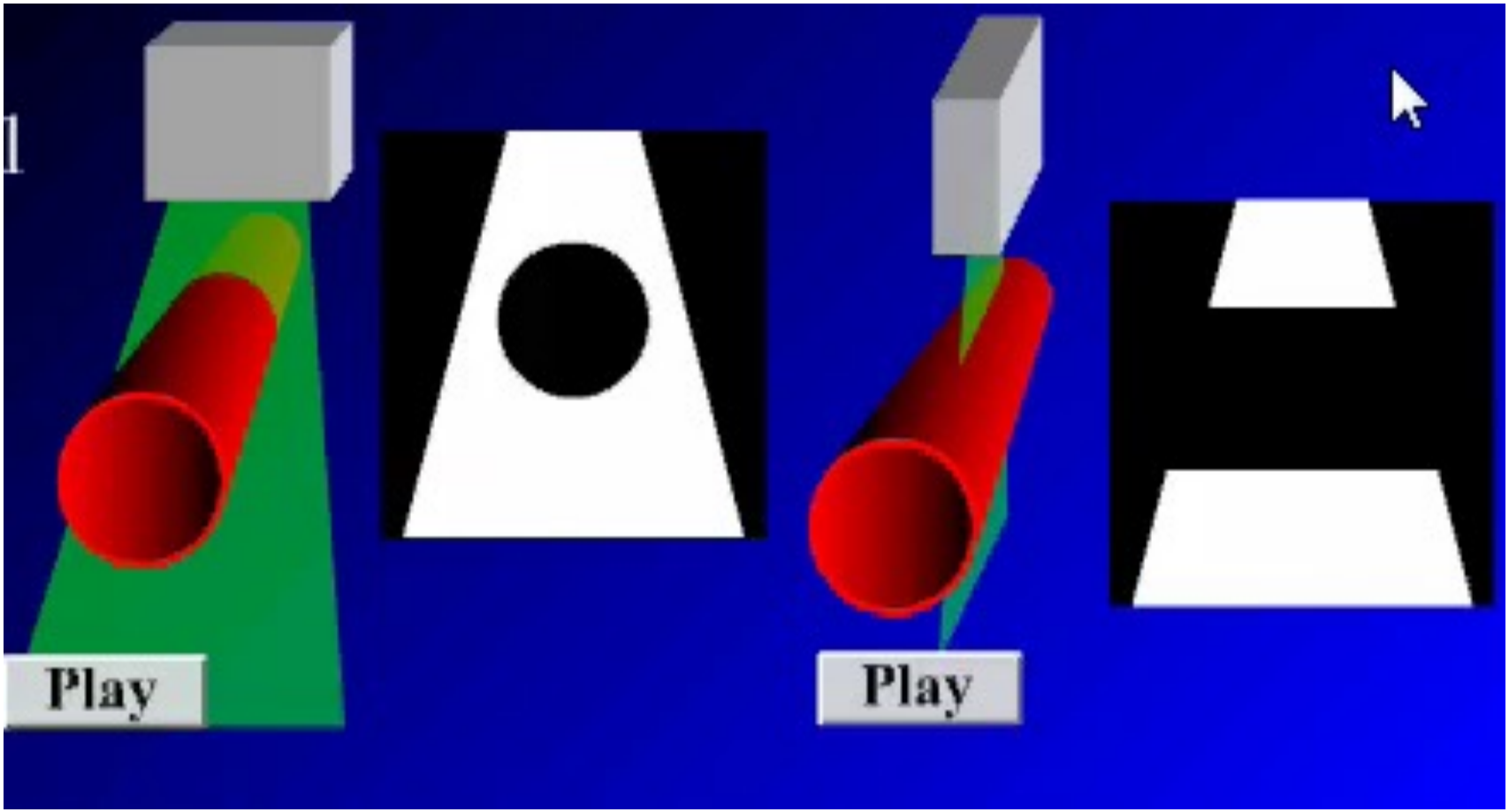


ASSE LUNGO

- Non da una visione panoramica
- Richiede un buon skill per mantenere la visione
- Buon controllo della traiettoria dell'ago se associata alla tecnica "in plane"



Visualizzazione: asse corto e asse lungo

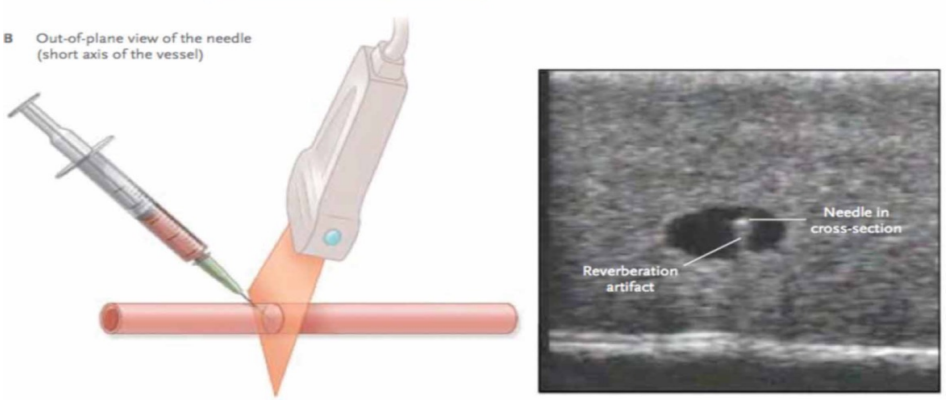


Rapporto tra Ago e Sonda

OUT OF PLANE

Traiettoria dell'ago non è contenuta nel piano della sonda

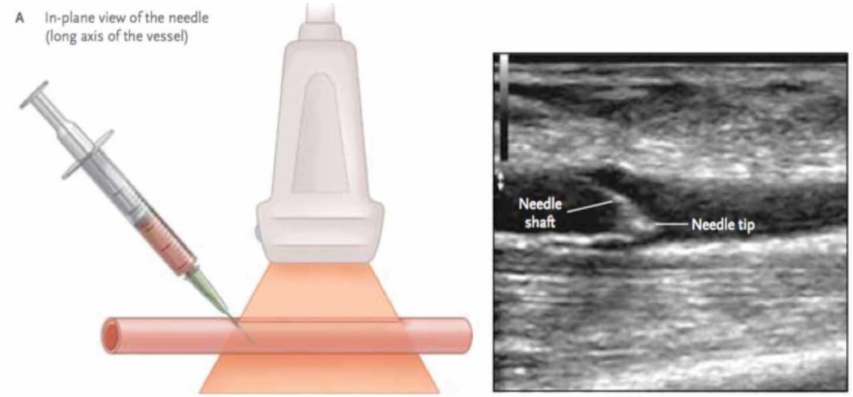
- Apparentemente più semplice e intuitiva
- Maggior rischio di lesioni accidentali di strutture contigue



IN PLANE

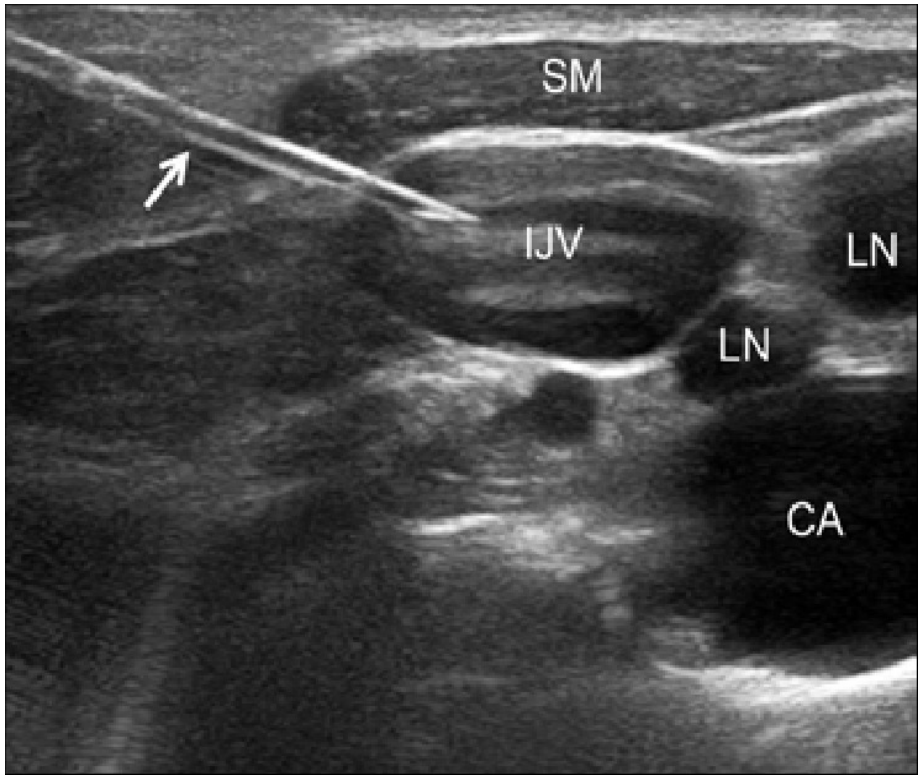
Traiettoria dell'ago è tutta contenuta nel piano della sonda

- Miglior controllo della traiettoria dell'ago
- Maggiore abilità dell'operatore nel matenere costantemente l'ago nella traiettoria di lettura della sonda

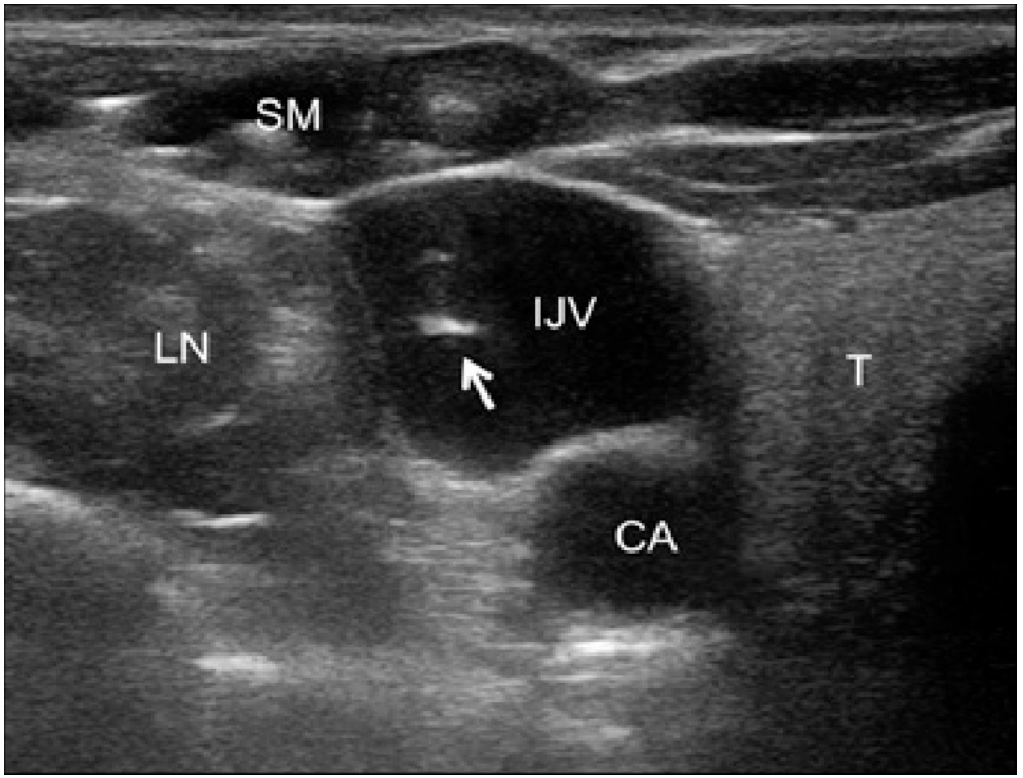


Corretta visualizzazione dell'ago

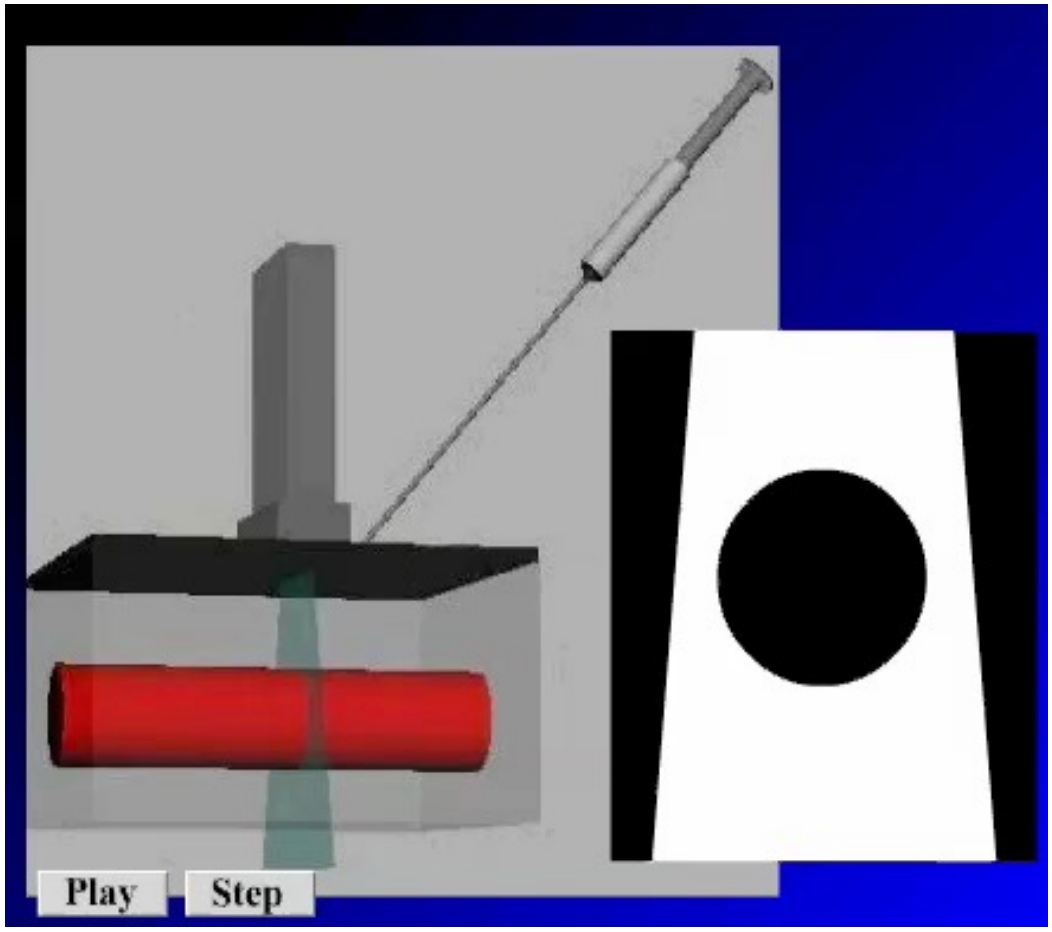
Linea luminosa, iperecogena, a doppio binario nella venipuntura 'in plane'

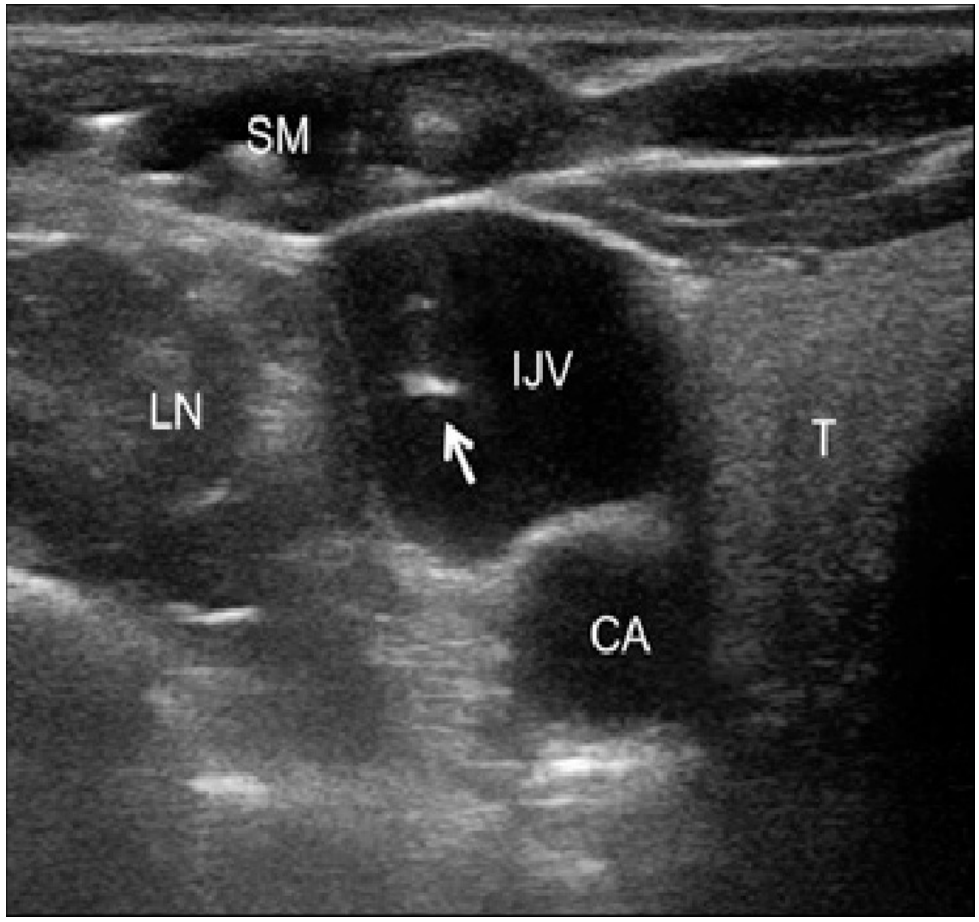


Punto iperecogeno a doppio binario nella venipuntura 'out of plane



Tecnica out of plane asse corto





Raccomandazioni

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

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International evidence-based recommendations on ultrasound-guided vascular access

Table 3 Recommendations on ultrasound vascular access in neonates and children

Ultrasound vascular access in neonates and children		
Domain code	Suggested definition	Level evider
D4.SD1.S1–2	Ultrasound guidance should be routinely used for short- and long-term central venous access in children and neonates	A
D4.SD1.S3	Ultrasound vessel imaging with ultrasound assistance as "a minimum" should be routinely performed before internal jugular vein puncture in neonates	A
D4.SD1.S4	In neonates, ultrasound screening should be used before subclavian vein puncture. Ultrasound-guided puncture should be considered for catheterization using the supra-clavicular route, but this technique requires experienced operators	C
D4.SD1.S5	Ultrasound vessel screening should be routinely used before femoral vein puncture. Ultrasound-guided femoral puncture is recommended to decrease inadvertent arterial puncture	B
D4.SD1.S6	Ultrasound guidance can be considered when difficult peripheral venous access is required in areas such as the antecubital fossa and ankle. Blind deep antecubital fossa puncture should disappear	C
D4.SD1.S7	Ultrasound-guided arterial catheterization improves first-pass success and should be used routinely in children and neonates	A
D4.SD1.S8	After central venous catheter placement in paediatric patients including neonates, 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	B
D4.SD1.S9	There is no ideal site for cannulation in children; the best site should be determined after ultrasound examination	A

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

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

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

- Is USG better that “any other technique” for
  - IJV
  - FV
  - AxV, BCV, SCV
  - Arterial cannulation
  - Peripheral veins (DIVA)

Valutazione ecografica preliminare

Rapid Central Veins Assesment (RaCeVA)

GAVeCeLT
Gli Accessi Venosi Centrali a Lungo Termine

Rapid Femoral Veins Assessment (RaFeVA)

- **Scegliere correttamente la vena**
- **Scegliere l'exit site piu' appropriato**
- **Minimizzare le complicanze**

Review

JVA | The Journal of Vascular Access

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

The Journal of Vascular Access
1–11

DOI: 10.1177/1129729818804718
journals.sagepub.com/home/jva
SAGE

Timothy R Spencer[1] and Mauro Pittiruti[2]

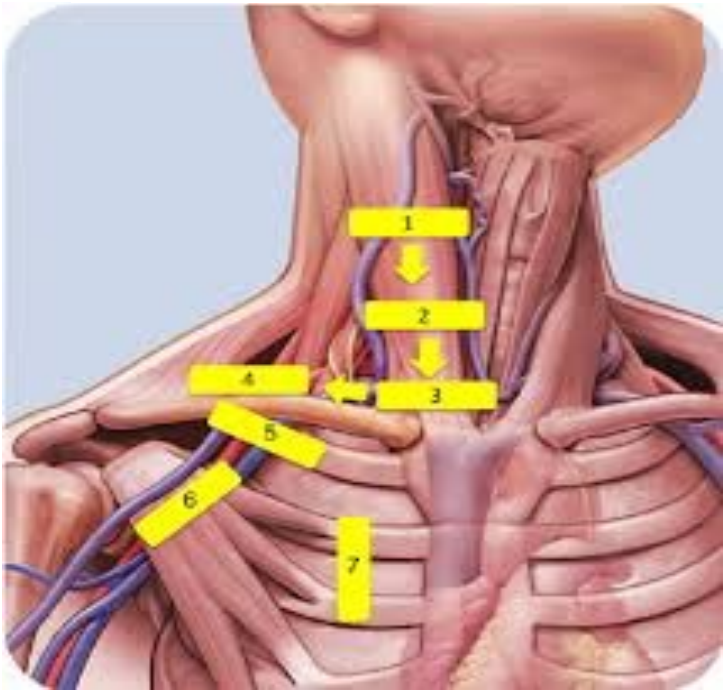
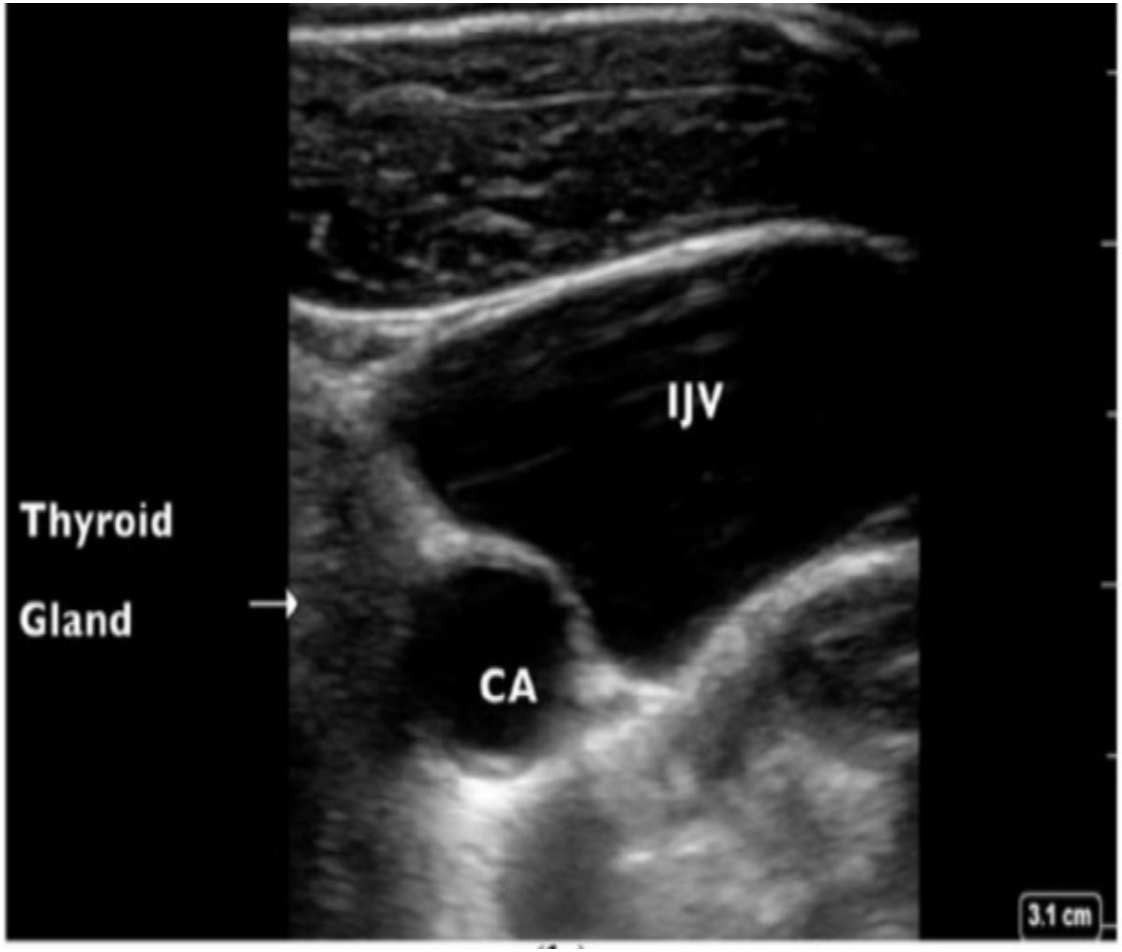


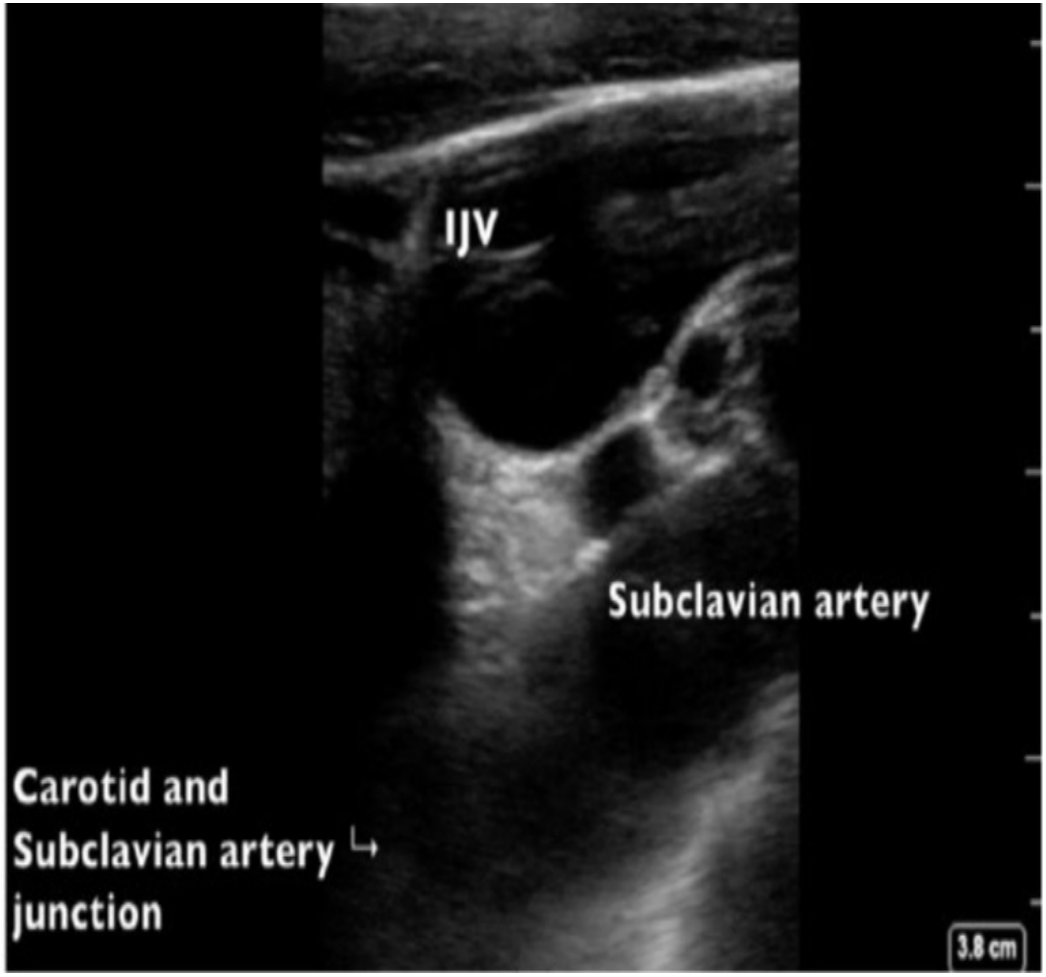
Table 1. The seven steps of the Rapid Central Vein Assessment (RaCeVA).

	Transducer position	Structures to be assessed	Surrounding structures
Step 1	Mid-neck (transverse)	Internal jugular vein Carotid artery	Thyroid gland Trachea
Step 2	Base of neck (transverse)	Internal jugular vein Carotid artery Subclavian artery	Trachea Phrenic and vagus nerve
Step 3	Sternoclavicular (transverse)	Internal jugular vein Brachiocephalic vein	Pleura (mediastinum) Phrenic nerve
Step 4	Supraclavicular (longitudinal)	Subclavian vein Subclavian artery External jugular vein	Pleura (lung apex)
Step 5	Infraclavicular (transverse)	Axillary vein Axillary artery Cephalic vein	Pleura Ribs
Step 6	Infraclavicular (longitudinal)	Axillary vein Axillary artery	Pleura Ribs
Step 7	Sliding lung (longitudinal)	Pleura (anterior chest wall)	Ribs

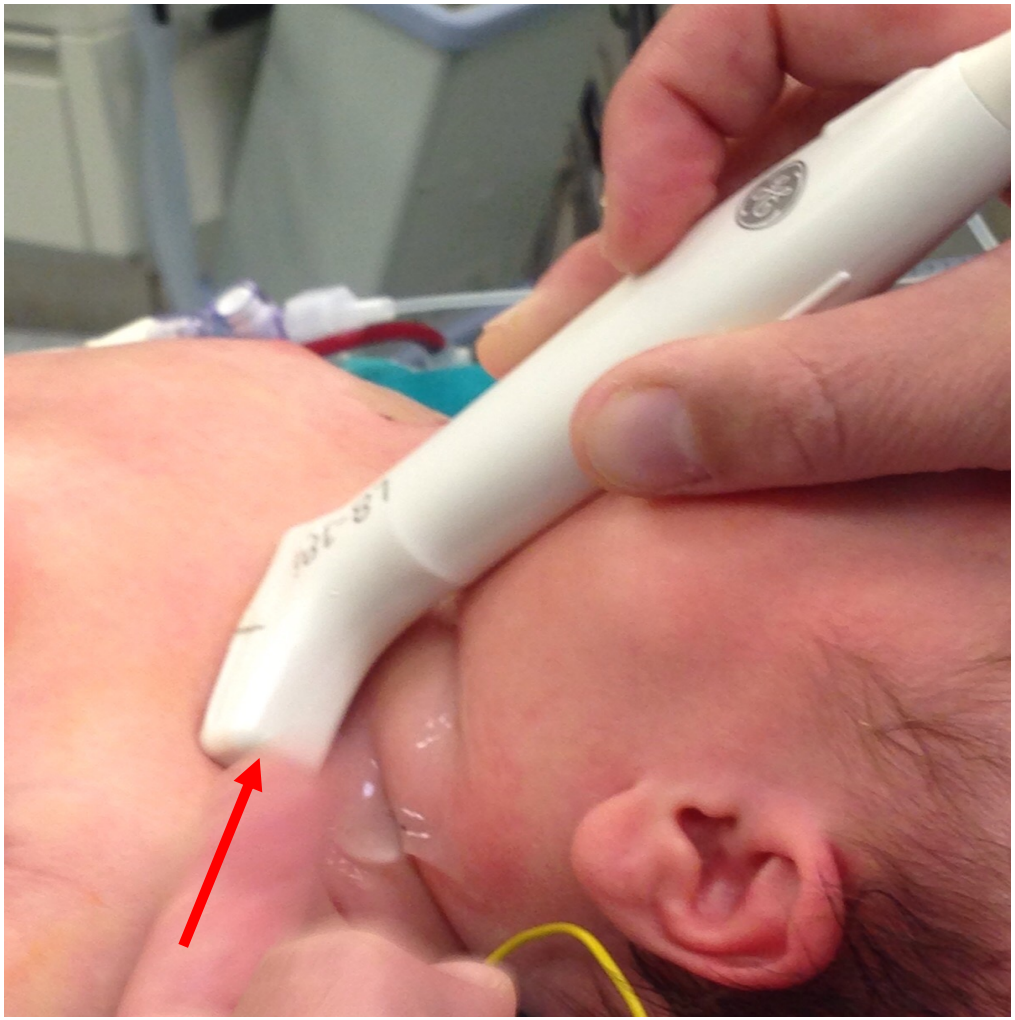
STEP 1: Visualizzazione IJV asse corto



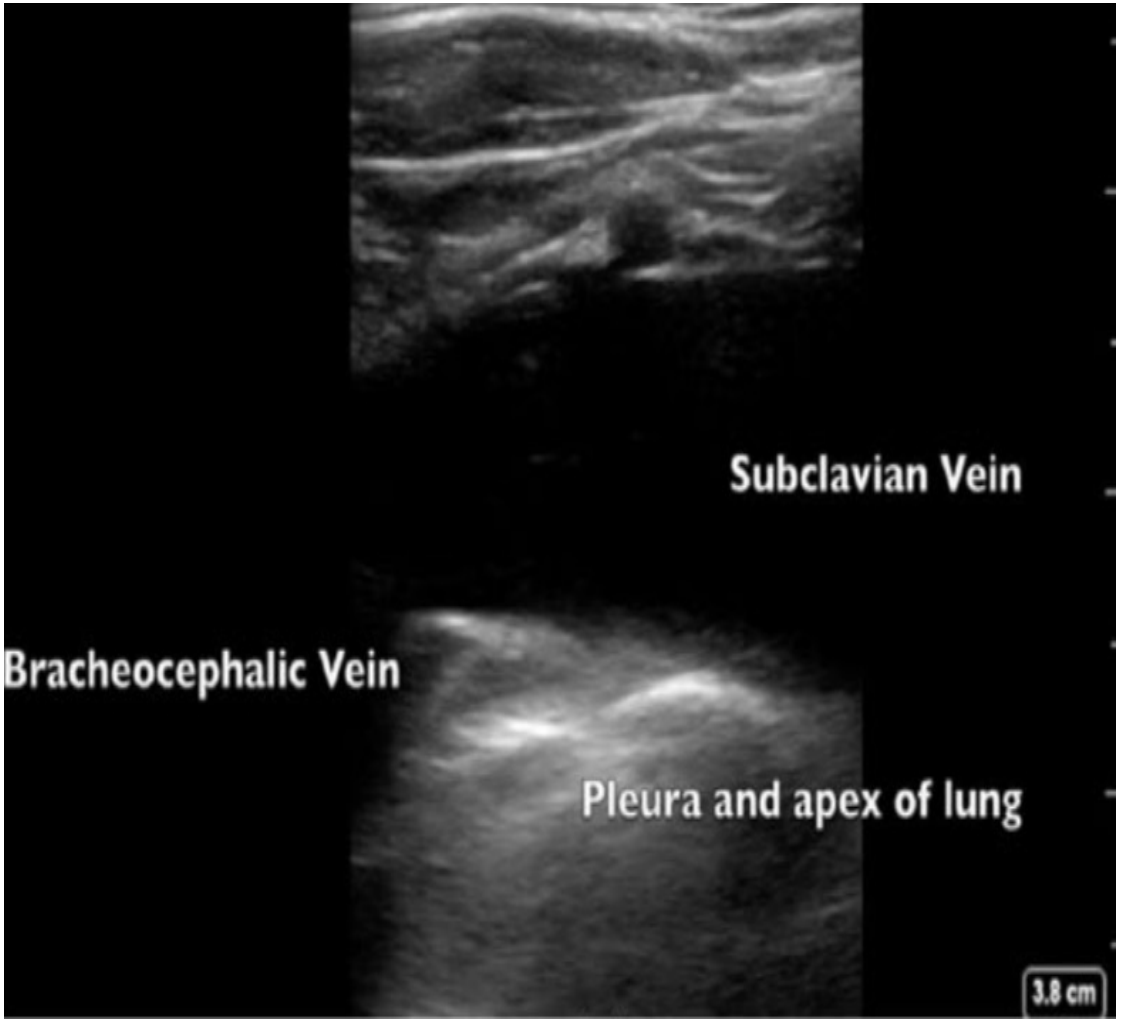
STEP 2: Visualizzazione Arteria Succlavia



STEP 3: Visualizzazione Vena Anonima

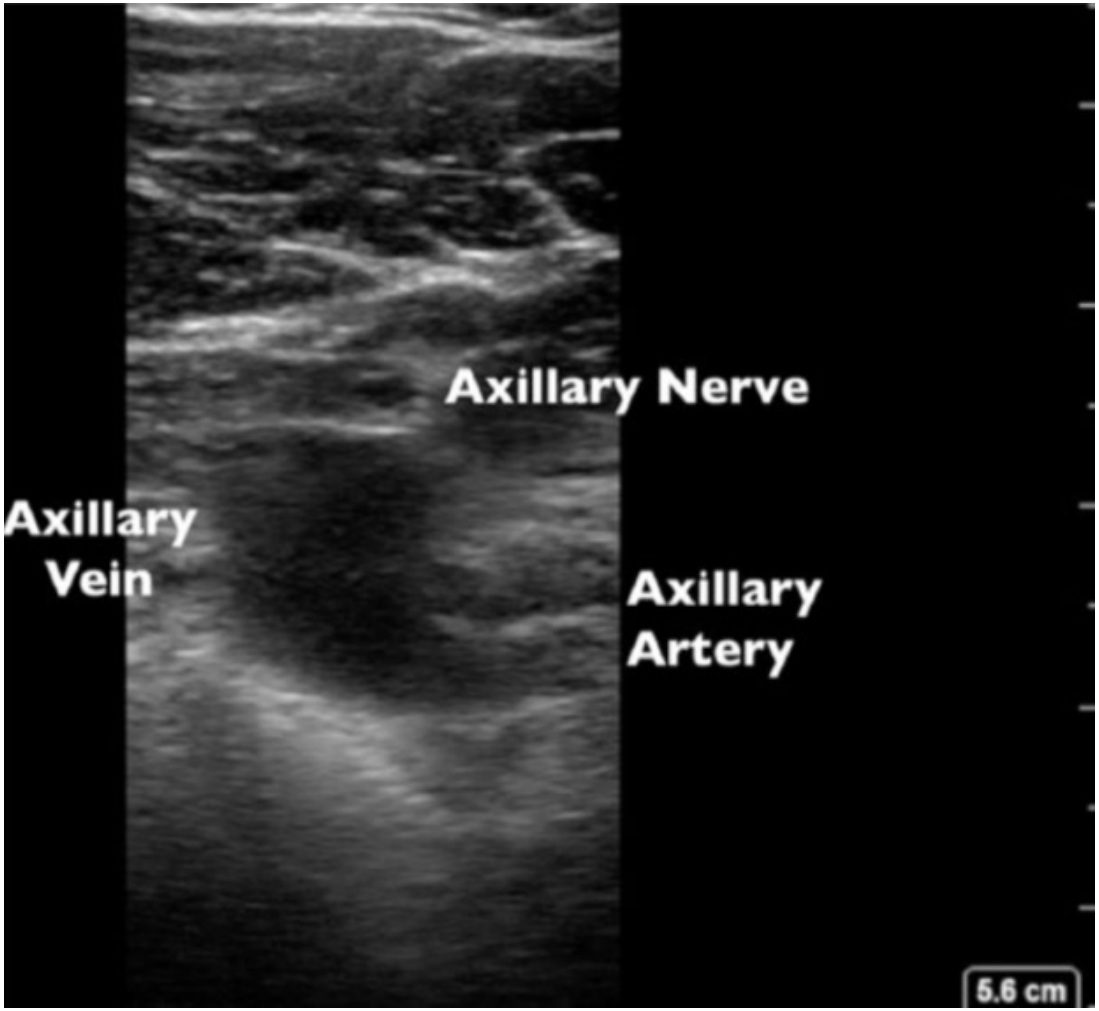


STEP 4 : Vena Succlavia



STEP 5: Arteria e Vena Ascellare

STEP 5: Arteria e Vena ascellare asse lungo



Ultimo STEP: controllo PLEURA

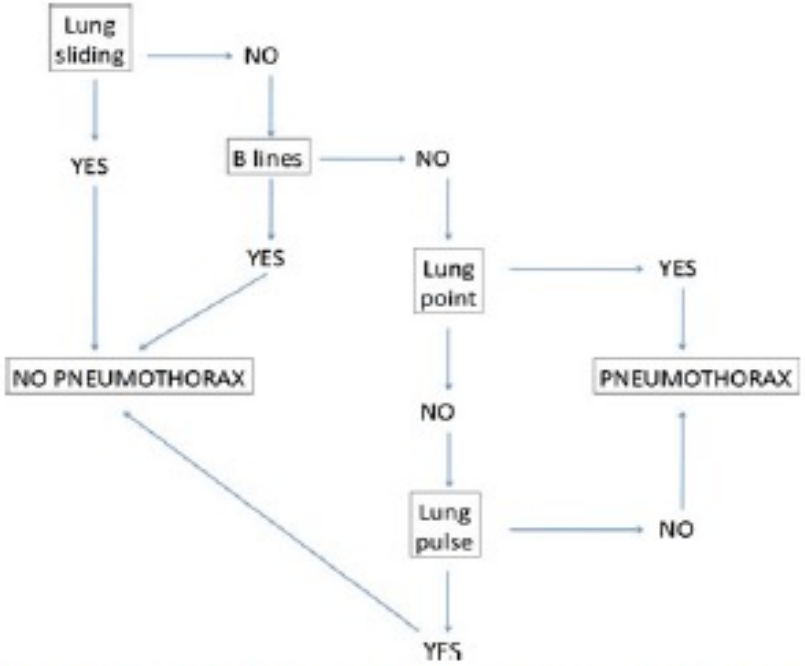
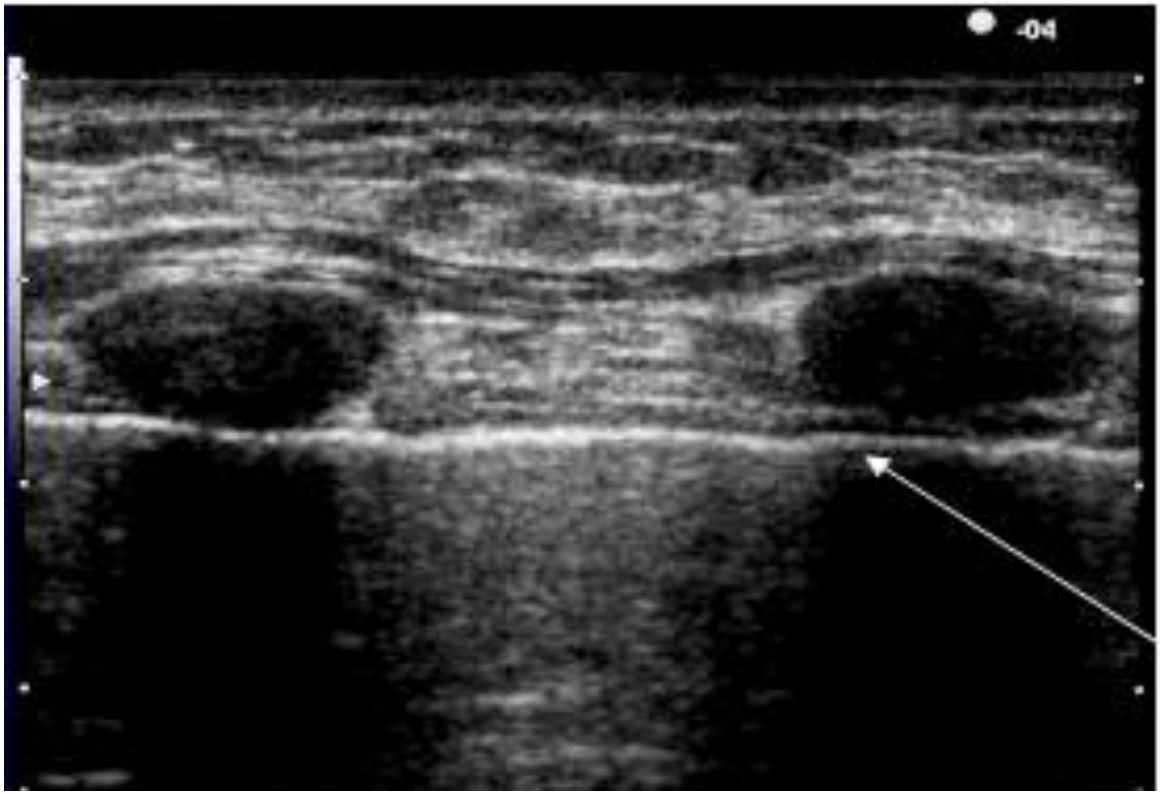
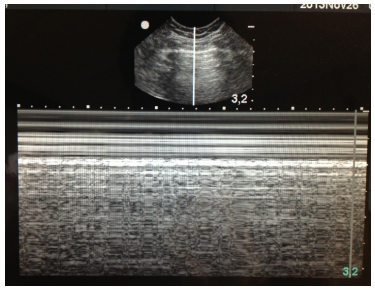


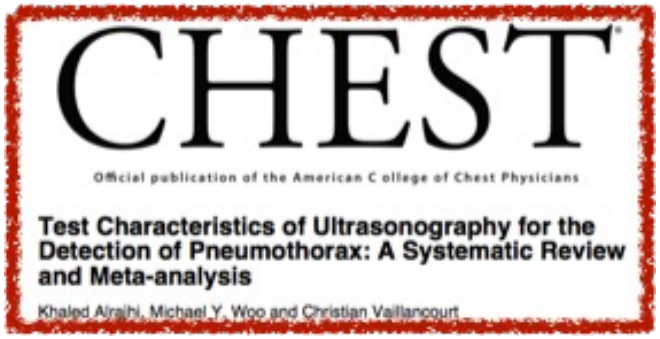
Fig. 1 Flow chart on diagnosing pneumothorax. This flow chart suggests the correct sequence and combination of the four sonographic signs useful to rule out or rule in pneumothorax



- Lung ultrasound more accurately rules out the diagnosis of pneumothorax than supine anterior chest radiography.

Intensive Care Med (2012) 38:577–591





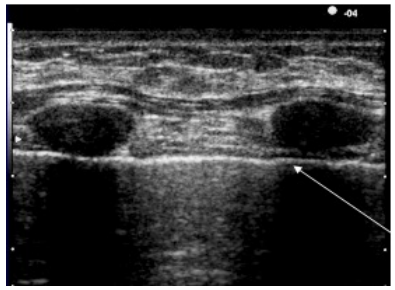


Table 2: Summary of sensitivity and specificity for included studies

Author	N	Ultrasonography		Chest X-ray	
		Sensitivity	Specificity	Sensitivity	Specificity
Blaivas[14]	176	98.1%	99.2%	75.5%	100.0%
Chung[15]	97	88.2%	89.3%	47.1%	94.0%
Garofalo[13]	184	95.7%	100%	-	-
Kirkpatrick[11]	133	48.8%	98.7%	20.9%	99.6%
Rowan[16]	27	100%	93.8%	36.4%	100.0%
Soldati[17]	186	98.2%	100%	53.6%	100.0%
Soldati[18]	109	92.0%	99.5%	52.0%	100.0%
Zhang[19]	135	86.2%	97.2%	27.6%	100.0%

Criteri di scelta della vena

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

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International evidence-based recommendations on ultrasound-guided vascular access

1. Dimensioni
2. Profondità
3. Pervietà
4. Rapporti con strutture circostanti
5. Collassabilità respiratoria
6. Praticità dell'exit-site

Current Drug Targets, 2012, *13*, 961-969

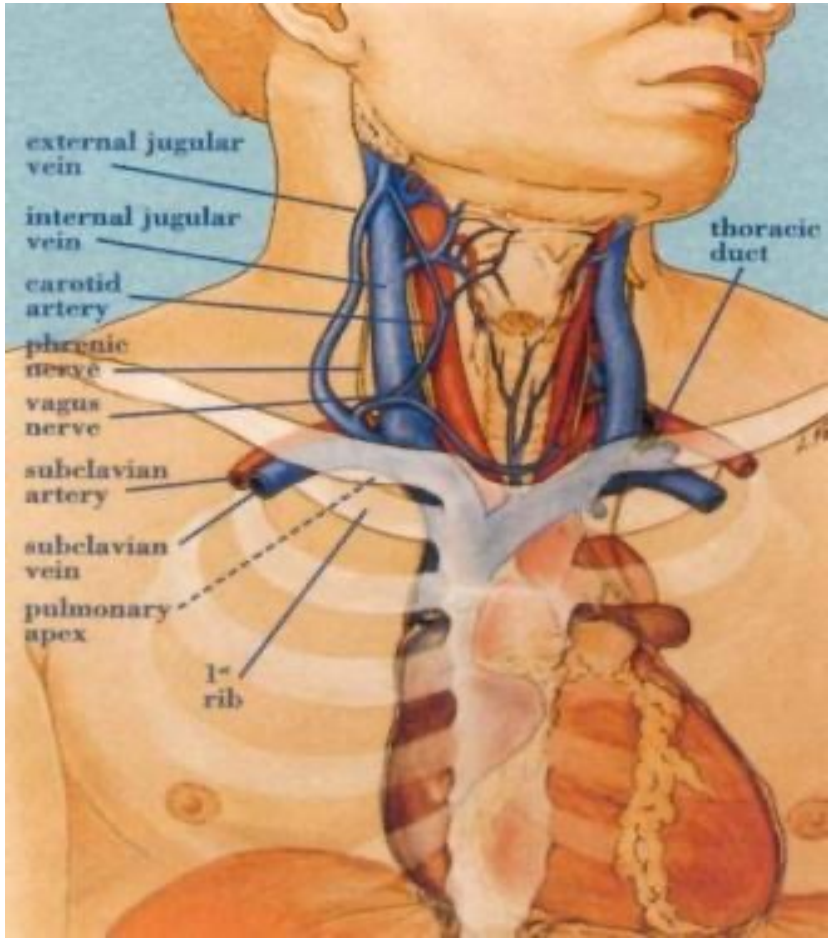
Ultrasound Guided Central Vascular Access in Neonates, Infants and Children

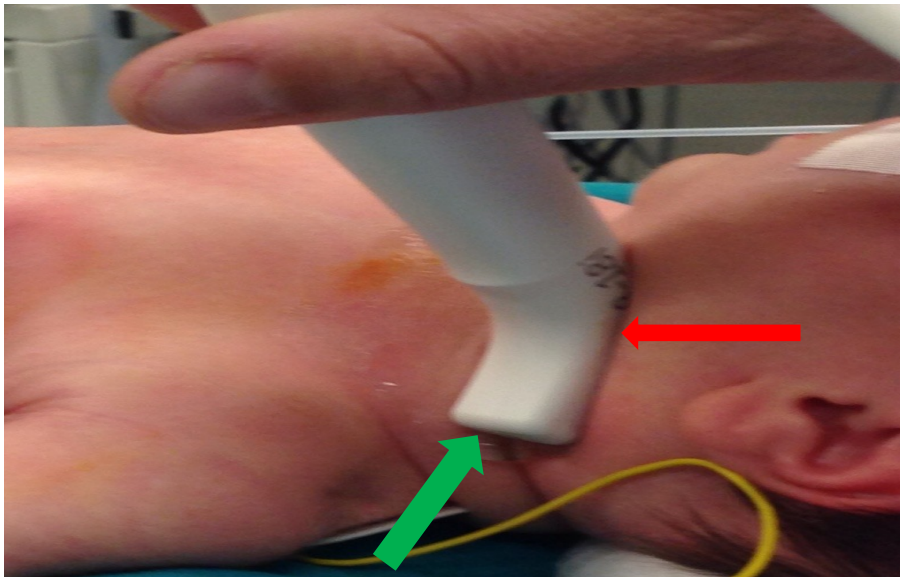
Mauro Pittiruti*

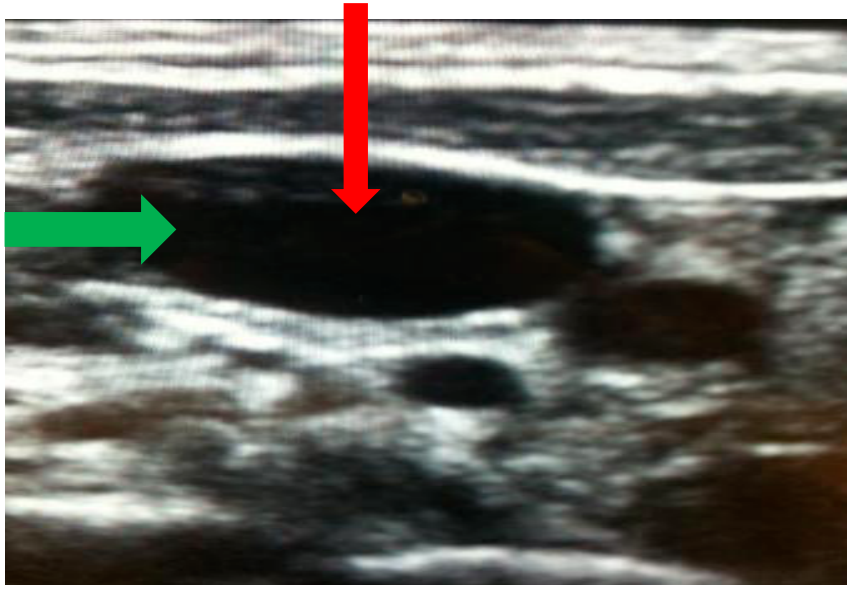
Department of Surgery, Catholic University, Largo Francesco Vito 1, 00168 Roma, Italy

Table 2. Ultrasound-Guided Venipuncture

• At neck – Internal jugular vein (*out of plane*)
• In the supra-clavicular area – Internal and external jugular, subclavian, brachio-cephalic vein (*in plane*)
• In the infraclavicular area – Axillary, cephalic vein (*out of plane/in plane*)
• At mid-arm – Basilic vein, brachial veins (*out of plane*)
• At the groin – Femoral, saphenous vein (*out of plane*)







Vena Giugulare Interna

Puntura in asse corto “out-of-plane”

Vantaggi: puntura più facile da apprendere

Svantaggi: difficile controllo della punta, exit-site sfavorevole, collassabilità respiratoria

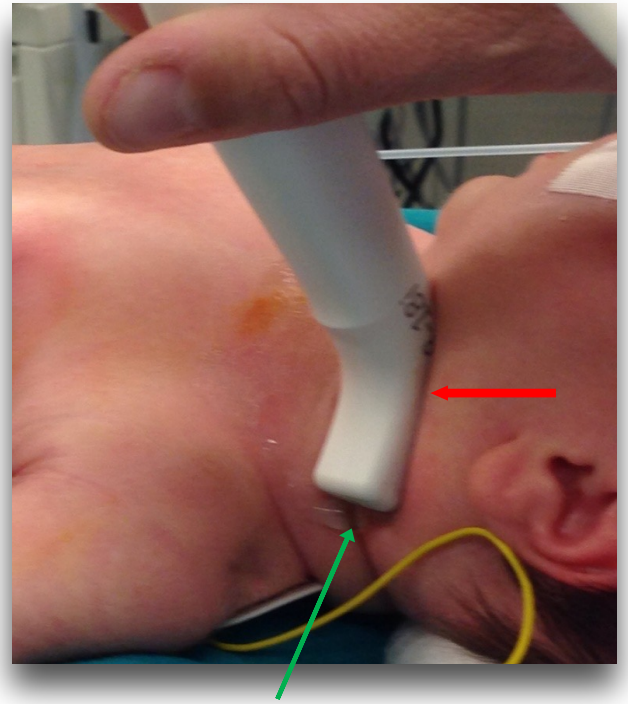
Puntura in asse corto “in-plane” (Jernigan-Pittiruti*)

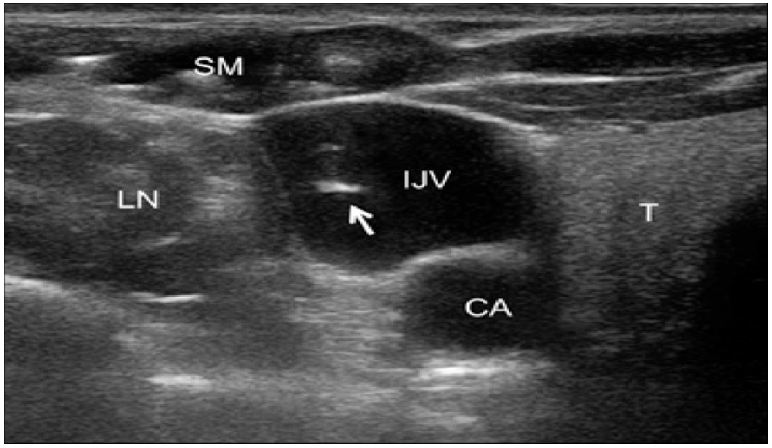
Vantaggi: completa visione dell’ago, puntura non in direzione della pleura, agevole entry-site per tunnellizzazione

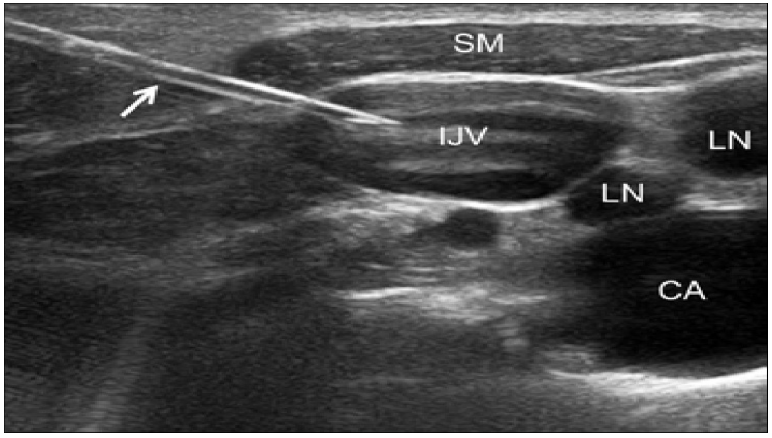
Svantaggi: più difficile da apprendere(in-plane), collassabilità respiratoria

*J Vasc Access. 2000 Jul-Sep;1(3):100-7

Venipuntura ecoguidata della IJV nei bambini



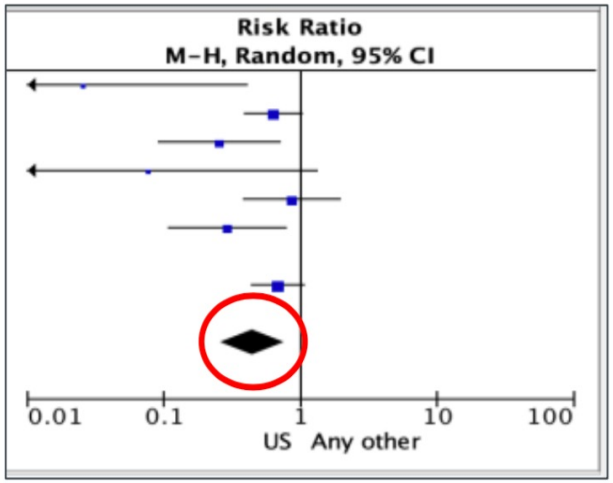




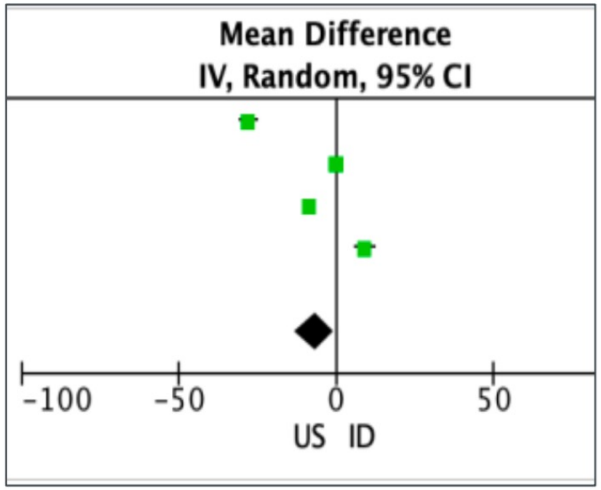
Venipuntura ecoguidata della IJV nei bambini

European Society of Anaesthesiology ESA

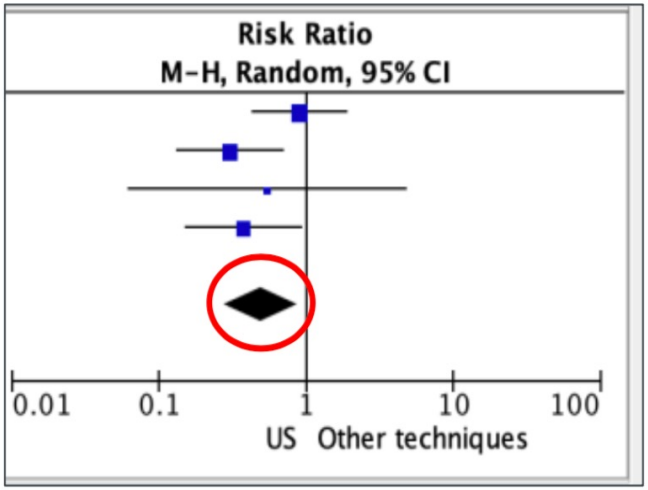
Overall success



Time



Complications



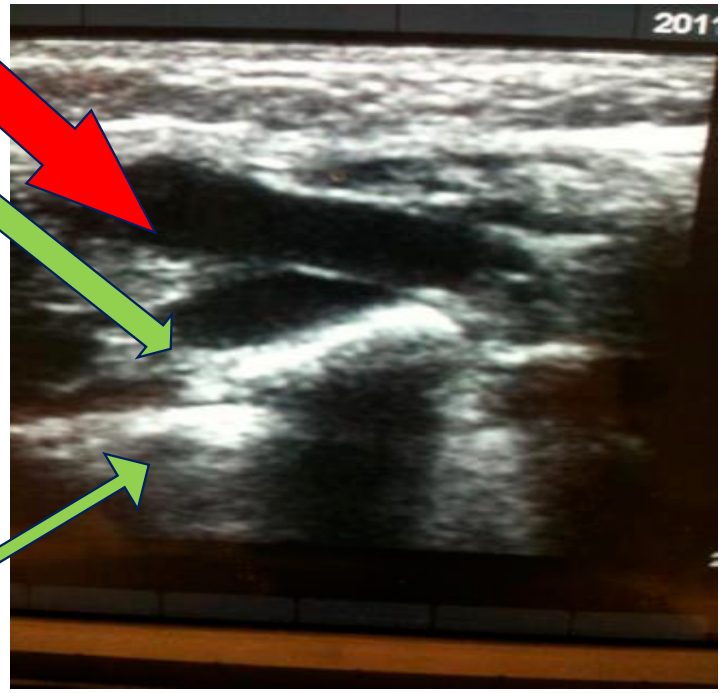
E’ raccomandato l'uso di USG per IJV nei bambini in quanto aumenta la percentuale di successo, riduce il tempo di cannulazione e insorgenza di complicanze (1B).

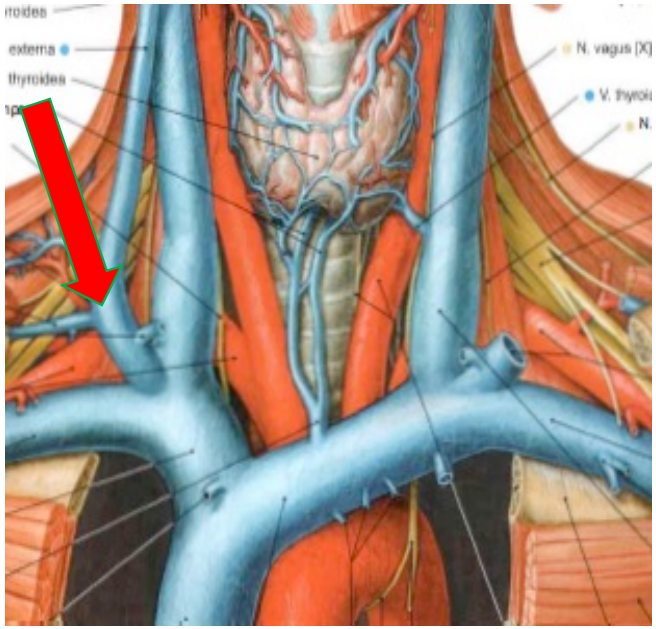
Vena Giugulare Esterna

Giug Esterna

Succlavia

Pleura



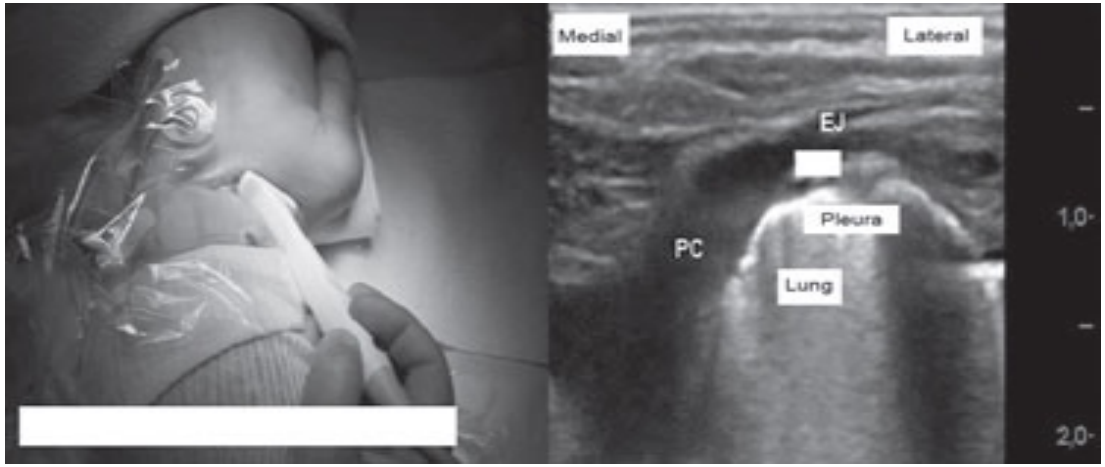


Vantaggi: a volte più grande della succlavia nei neonati e negli infanti, lontano dalla pleura, puntura in-plane

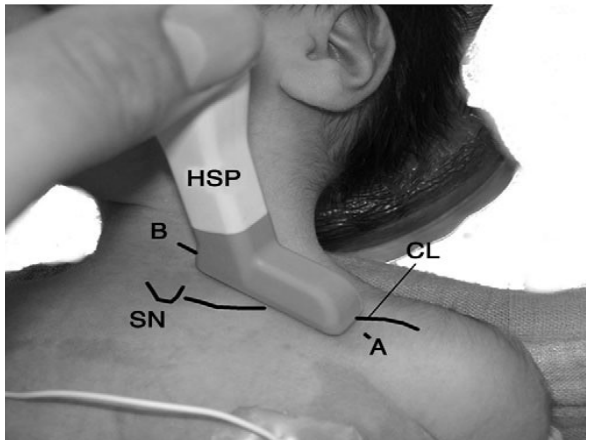
Svantaggi: molto variabile per dimensioni e anatomia, exit-site sopraclaveare, può variare con il respiro

Pittiruti M. Current Drug Targets 2012; 13:961-9

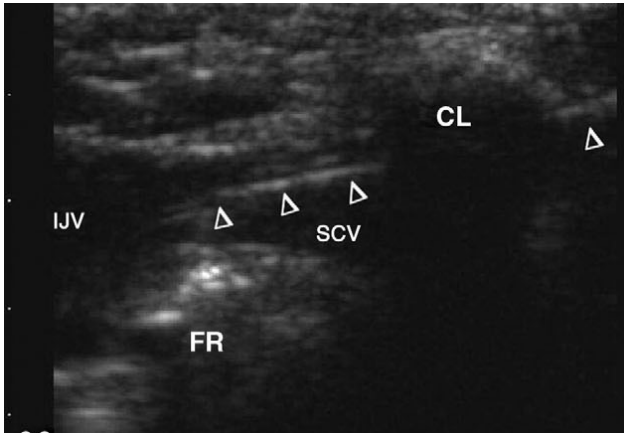
Vena Succlavia



Rhondali O. Pediatric Anesthesia 21 (2011) 1136–1141



Pirotte t. Br J Anaesth 2007; 98: 509–14

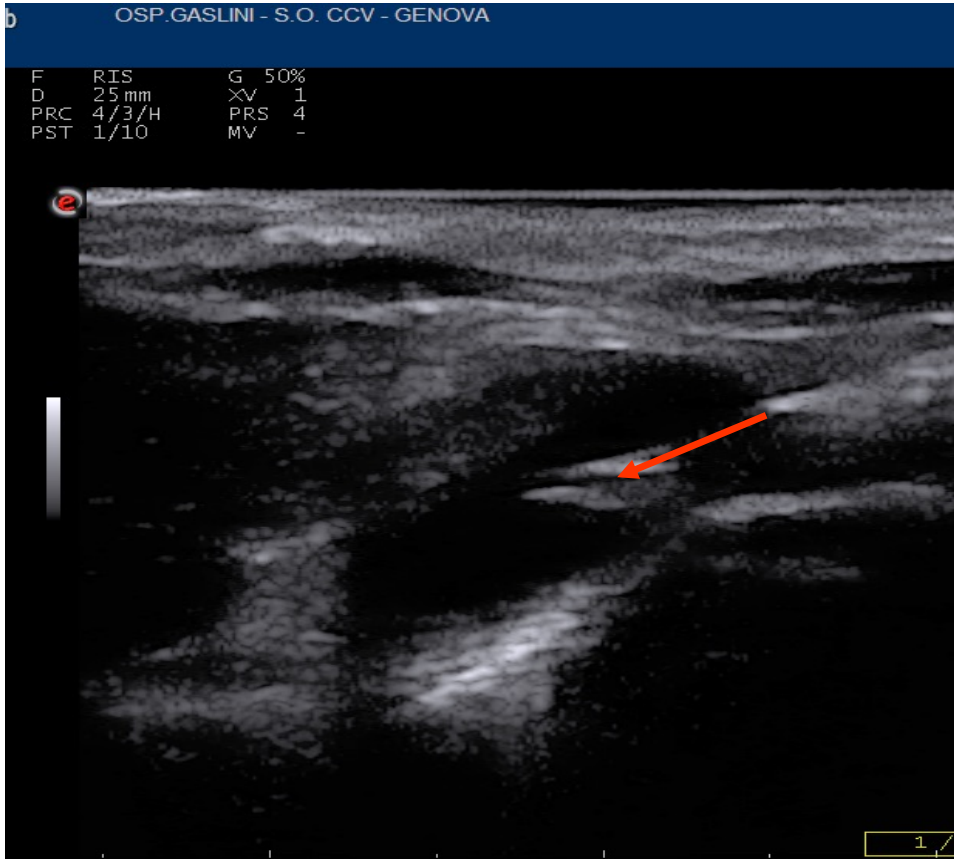


*Breschan C, BJA 2010;105(2):179-84

Vantaggi: puntura in-plane, modica o scarsa variabilità con il respiro, possibile a volte già nel neonato, exit-site sottoclaveare

Svantaggi: si punge in direzione della pleura, tendenzialmente più piccola della giugulare, tratto "cieco" (Pirotte), possibilità di pinch-off(?)

Venipuntura centrale ecoguidata della BCV nei bambini

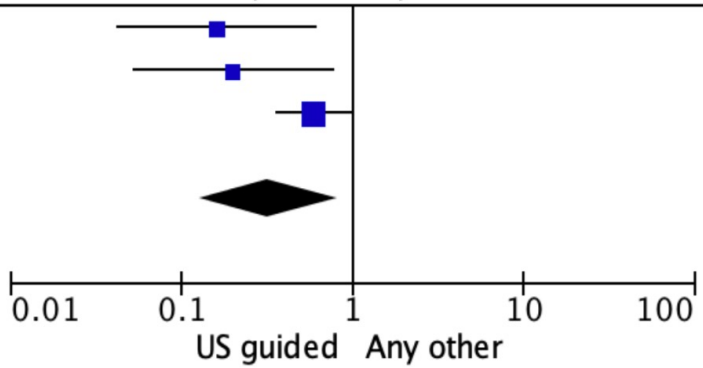


BCV- Complications

Study or Subgroup	US guided Events	Total	Any other Events	Total	Weight	Odds Ratio M-H, Random, 95% CI
Iwashima_2008	3	43	14	44	25.9%	0.16 [0.04, 0.61]
Law_2014	3	48	12	48	25.8%	0.20 [0.05, 0.76]
Ouleg-Erroz_2018	41	323	35	177	48.2%	0.59 [0.36, 0.97]
Total (95% CI)		**414**		**269**	**100.0%**	**0.32 [0.13, 0.81]**
Total events	47		61			

Heterogeneity: $Tau^2 = 0.40$; $Chi^2 = 4.90$, df = 2 (P = 0.09); $I^2 = 59\%$

Test for overall effect: Z = 2.42 (P = 0.02)



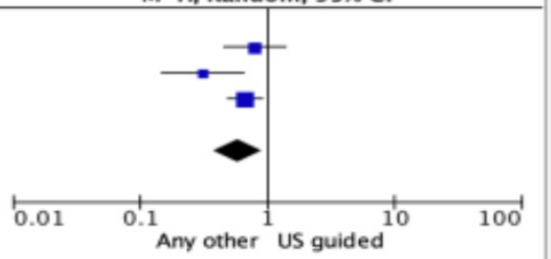
L'incannulamento per via sopraclaveare del BCV è associata a un tasso di successo della puntura globale superiore al 95%, un tasso di successo al primo tentaivo di circa il 75% e un tasso di lesioni involontarie dell'arteria <1%.

Questo gruppo di autori ritiene che la cannulazione del BCV nei piccoli neonati sia fattibile e sicura quando le mani degli esperti applicano la tecnica USG

Venipuntura ecoguidata della BCV a AxV e SBC nei bambini

Study or Subgroup	US guided Events	Total	Any other Events	Total	Weight	Risk Ratio (Non-event) M-H, Random, 95% CI
Byon_2013	0	0	0	0		Not estimable
Iwashima_2008	29	43	26	44	30.9%	0.80 [0.46, 1.39]
Law_2014	92	100	75	101	22.3%	0.31 [0.15, 0.65]
Ouleg-Erroz_2018	259	323	124	177	46.8%	0.66 [0.48, 0.91]
Total (95% CI)		**466**		**322**	**100.0%**	**0.59 [0.38, 0.92]**
Total events	380		225			

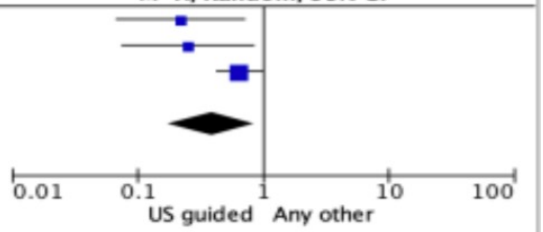
Heterogeneity: $Tau^2 = 0.08$; $Chi^2 = 4.35$, df = 2 (P = 0.11); $I^2 = 54\%$
Test for overall effect: Z = 2.34 (P = 0.02)



European Society of Anaesthesiology ESA

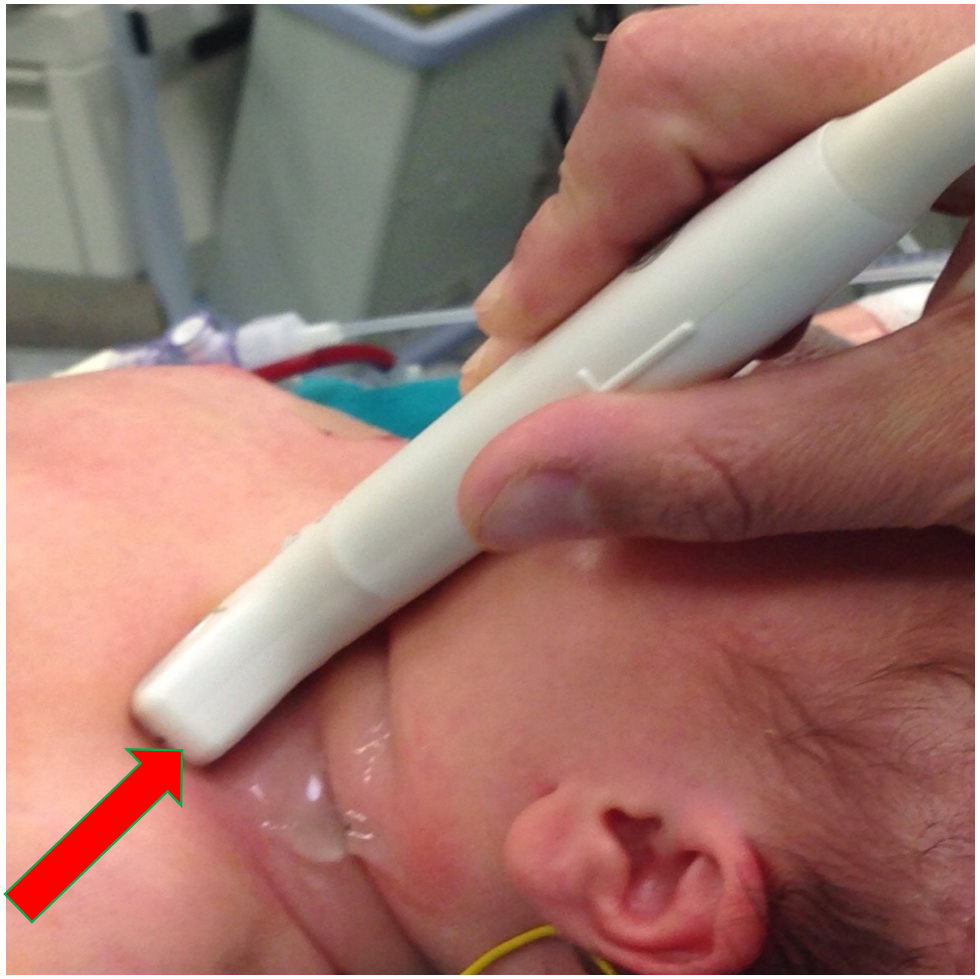
Study or Subgroup	US guided Events	Total	Any other Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Iwashima_2008	3	43	14	44	25.4%	0.22 [0.07, 0.71]
Law_2014	3	48	12	48	24.8%	0.25 [0.08, 0.83]
Ouleg-Erroz_2018	41	323	35	177	49.8%	0.64 [0.43, 0.97]
Total (95% CI)		**414**		**269**	**100.0%**	**0.39 [0.18, 0.85]**
Total events	47		61			

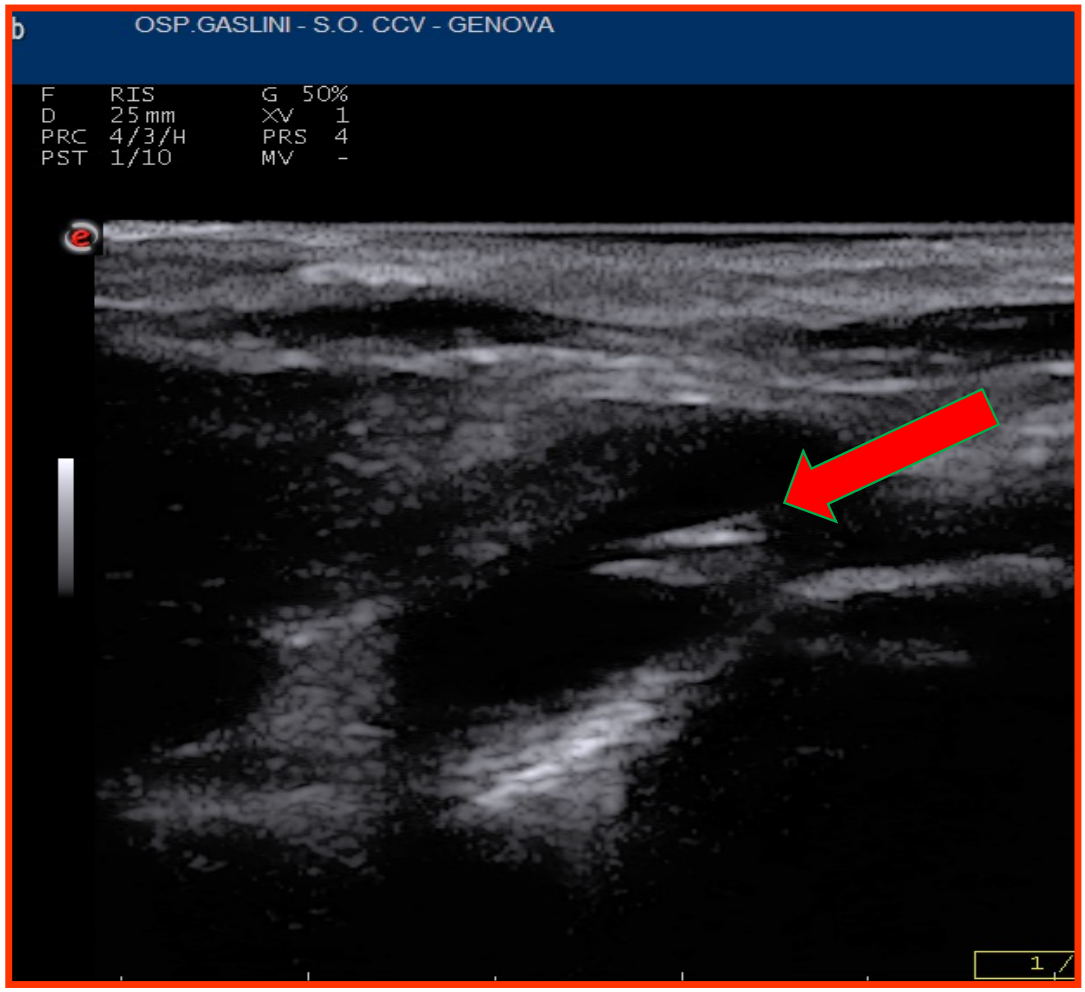
Heterogeneity: $Tau^2 = 0.28$; $Chi^2 = 4.63$, df = 2 (P = 0.10); $I^2 = 57\%$
Test for overall effect: Z = 2.35 (P = 0.02)



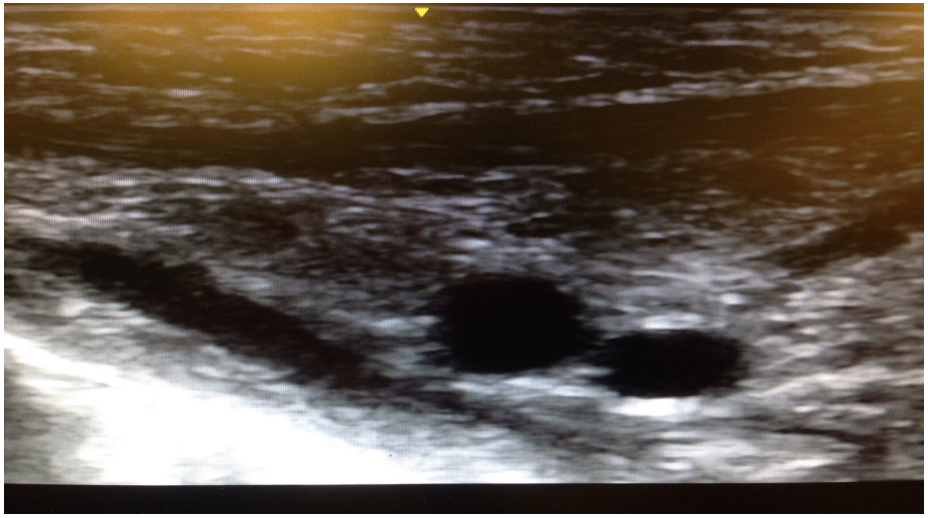
Per la venipuntura ecoguidata di queste vene raccomanda l'uso dell'ecografia solo in mano a esperti

Vena Anonima (o brachiocefalica)





Venipuntura centrale ecoguidata AxV



Perchè preferire la Vena Anonima nel neonato?

Maggior percentuale di successo della manovra

Minor probabilità al kinking del catetere

Piu‘ facile gestione della medicazione

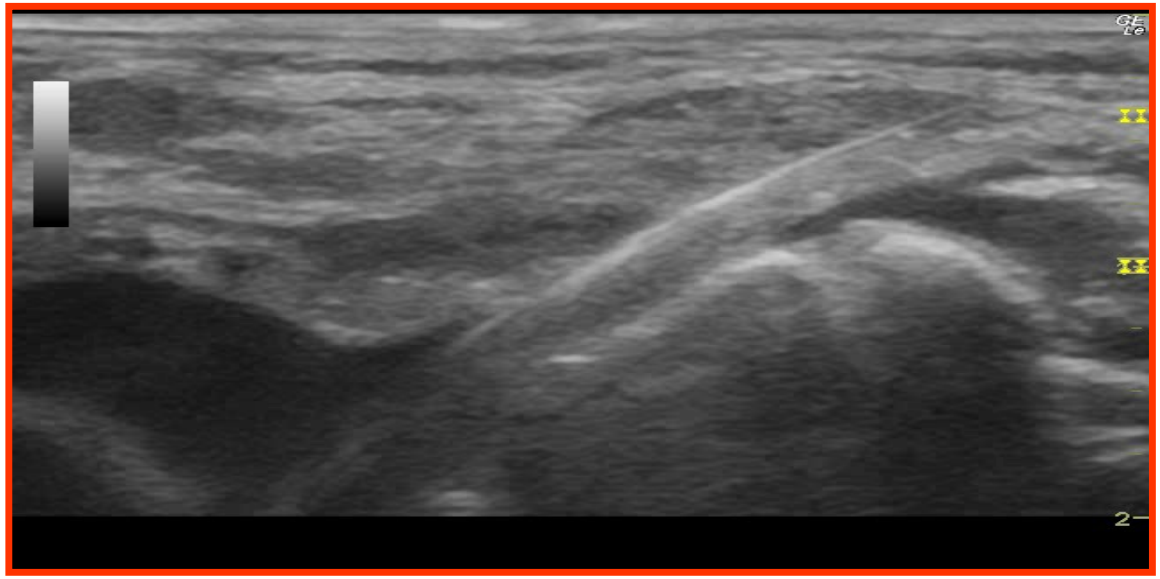
Received: 18 May 2016 | Revised: 16 July 2016 | Accepted: 20 July 2016
DOI: 10.1002/pbc.26202

RESEARCH ARTICLE

WILEY Pediatric Blood & Cancer

Brachiocephalic vein for percutaneous ultrasound-guided central line positioning in children: A 20-month preliminary experience with 109 procedures

Stefano Avanzini[1] | Leila Mameli[1] | Nicola Disma[1] | Clelia Zanaboni[1] | Andrea Dato[1] | Giovanni Montobbio[1] | Luigi Montagnini[1] | Michela Bevilacqua[1] | Filomena Pierri[1] | Massimo Conte[1] | Loredana Amoroso[1] | Giovanna Pala[1,3] | Sara Pestarino[3] | Elio Castagnola[1] | Angelo Claudio Molinari[1] | Concetta Micalizzi[1] | Giuseppe Morreale[1] | Girolamo Mattioli[1,2] | A Pini Prato[1]



Il paziente piu' piccolo all'operatore piu' "grande

British Journal of Anaesthesia **106** (5): 732–7 (2011)
Advance Access publication 17 March 2011 · doi:10.1093/bja/aer031

BJA

REGIONAL ANAESTHESIA

Consecutive, prospective case series of a new method for ultrasound-guided supraclavicular approach to the brachiocephalic vein in children

C. Breschan[1*], M. Platzer[1], R. Jost[2], H. Stettner[3], A.-S. Beyer[3], G. Feigl[4] and R. Likar[1]

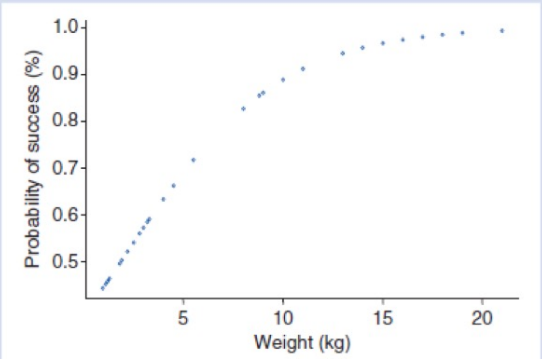


Fig 4 Probability of success at first venous puncture plotted against patient weight. This relationship was statistically significant ($P<0.01$) by logistic regression modelling.

Il paziente più piccolo all'operatore più "grande"..

Table 2. Clinical outcomes by catheter placement method and weight

	Overall						Low Weight (<Median of 16.3 kg)						High Weight (≥Median of 16.3 kg)					
	Landmark		Ultrasound				Landmark		Ultrasound				Landmark		Ultrasound			
	%	Count	%	Count	OR	*p*	%	Count	%	Count	OR	*p*	%	Count	%	Count	OR	*p*
Success	88.2	82/93	90.8	108/119	1.32	0.54	83.0	44/53	79.3	42/53	0.78	0.62	95.0	38/40	100.0	66/66	—	0.14
Placement					<.001						0.23						<.001	
attempts																		
1	34.4	32/93	54.6	65/119	1.00		28.3	15/53	35.9	19/53	1.00		42.5	17/40	69.7	46/66	1.00	
2	15.1	14/93	17.7	21/119	0.74		15.1	8/53	20.8	11/53	1.09		15.0	6/40	15.2	10/66	0.62	
3	10.8	10/93	7.6	9/119	0.44		11.3	6/53	7.6	4/53	0.53		10.0	4/40	7.6	5/66	0.46	
4+	39.8	37/93	20.2	24/119	0.32		45.3	24/53	35.9	19/53	0.63		32.5	13/40	7.6	5/66	0.14	
Complications																		
Arterial puncture	19.4	18/93	8.5	10/118	0.39	0.03	24.5	13/53	15.4	8/52	0.56	0.33	12.5	5/40	3.0	2/66	0.22	0.10
Other	17.2	16/93	12.6	15/119	0.69	0.44	26.4	14/53	22.6	12/53	0.82	0.82	5.0	2/40	4.6	3/66	0.91	1.00

	Med.	(Q1, Q3)	n	Med.	(Q1, Q3)	n	*p*	Med.	(Q1, Q3)	n	Med.	(Q1, Q3)	n	*p*	Med.	(Q1, Q3)	n	Med.	(Q1, Q3)	n	*p*
Time to wire (sec)	269	(75, 900)	82	150	(76.5, 435)	108	0.14	281	(96, 1354)	44	213	(112, 695)	42	0.62	212	(46, 619)	38	100	(47, 345)	66	0.45

OR, odds ratio; Med., median.

Editorial

JVA | The Journal of Vascular Access

The Journal of Vascular Access
1–10

DOI: 10.1177/1129729820965063
journals.sagepub.com/home/jva
SAGE

Rapid Femoral Vein Assessment (RaFeVA): A systematic protocol for ultrasound evaluation of the veins of the lower limb, so to optimize the insertion of femorally inserted central catheters

Fabrizio Brescia[1], Mauro Pittiruti[2], Matthew Ostroff[3] and Daniele G Biasucci[4]

Table 1. The seven steps of the Rapid Femoral Vein Assessment (RaFeVA).

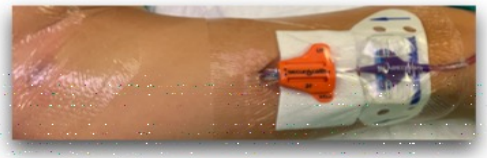
	Vascular structures to be assessed	Visualization of the vein
Step 1	Common femoral artery Common femoral vein	Short axis
Step 2	Common femoral vein External iliac vein	Long axis
Step 3	Common femoral artery Common femoral vein Saphenous vein	Short axis
Step 4	Superficial femoral artery Deep femoral artery Common femoral vein	Short axis
Step 5	Superficial femoral artery Deep femoral artery Superficial femoral vein Deep femoral vein	Short axis
Step 6	Superficial femoral artery Superficial femoral vein	Short axis
Step 7	Superficial femoral artery Superficial femoral vein	Oblique axis

RaFeVA (Rapid Femoral Vein Assessment)

Rapid Femoral Vein Assessment (RaFeVA): A systematic protocol for ultrasound evaluation of the veins of the lower limb, so to optimize the insertion of femorally inserted central catheters

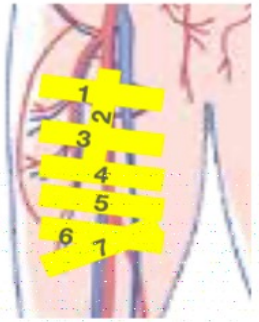
Fabrizio Brescia[1], Mauro Pittiruti[2], Matthew Ostroff[3] and Daniele G Biasucci[4]

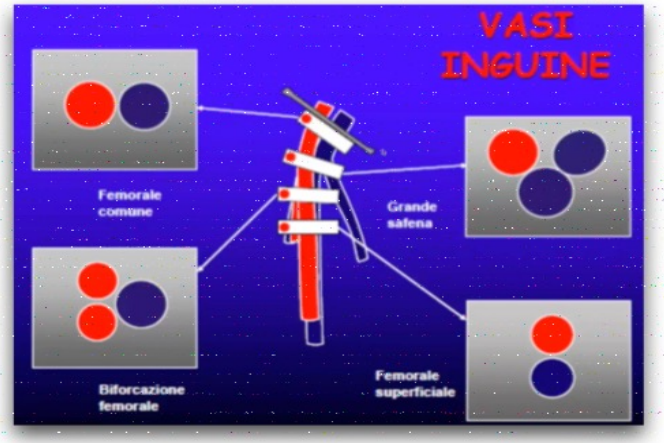
JVA The Journal of Vascular Access



FICC

(Femoral Inserted Central Catheters)





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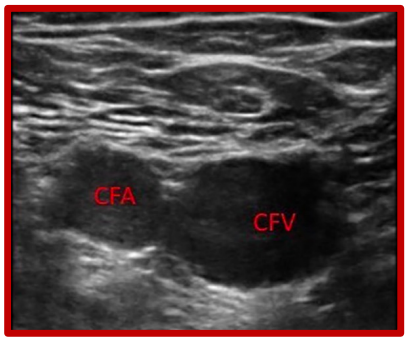
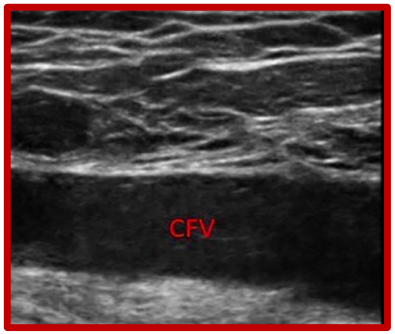
Step 6	Superficial femoral artery Superficial femoral vein	Short axis
Step 7	Superficial femoral artery Superficial femoral vein	Oblique axis

Date received: 17 July 2020; accepted: 12 September 2020

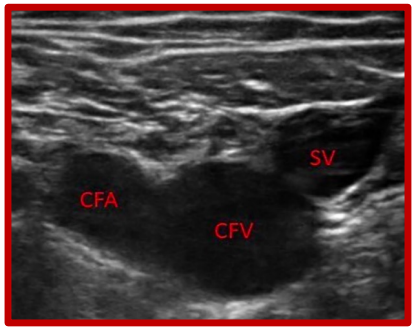
Step RaFeVA



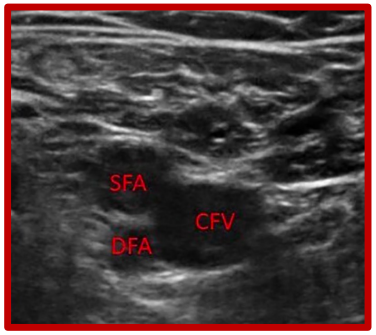
step1



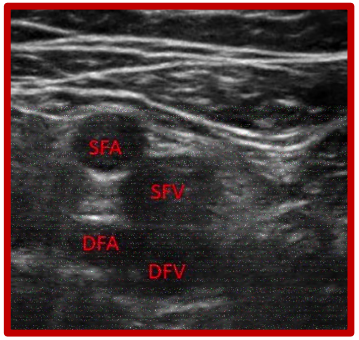
Step 2 (asse lungo)



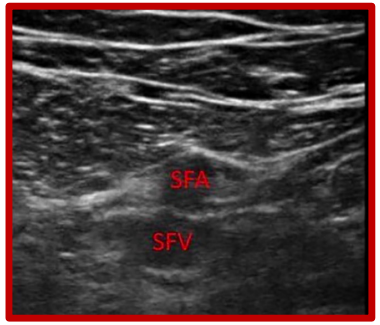
Step 3



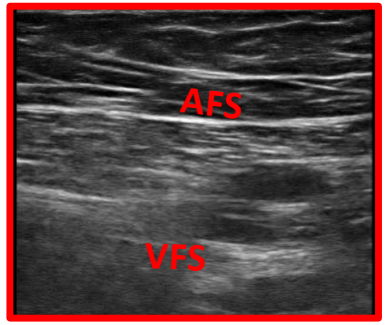
Step 4



Step 5



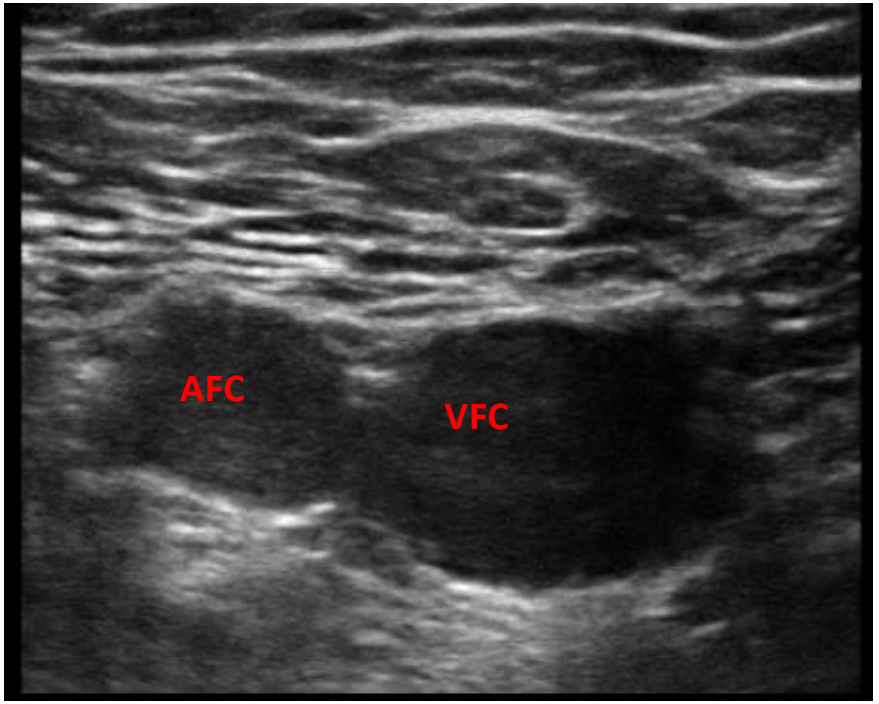
Step 6



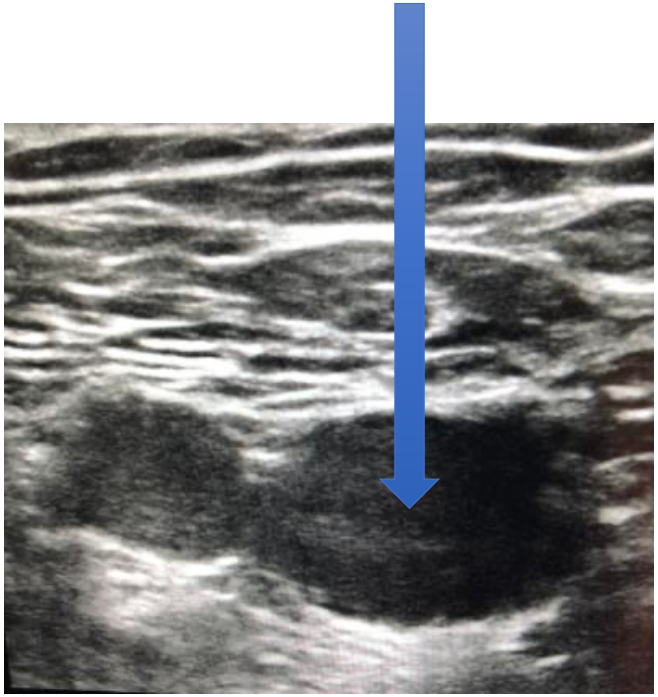
Step 7 (asse obliquo)

Step 1

Valutazione della arteria femorale comune e della vena femorale comune in asse corto, a livello del ligamento inguinale

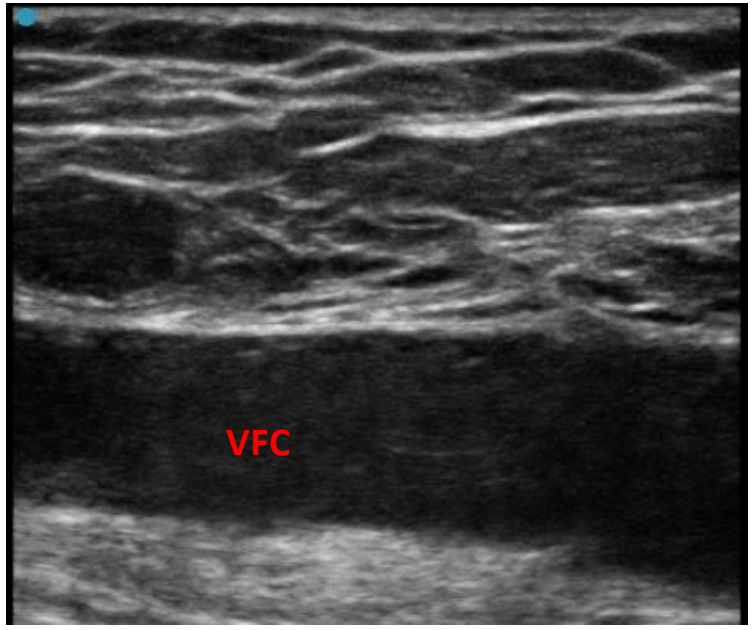


Puntura Step 1: *puntura della vena femorale comune in asse corto out of plane*

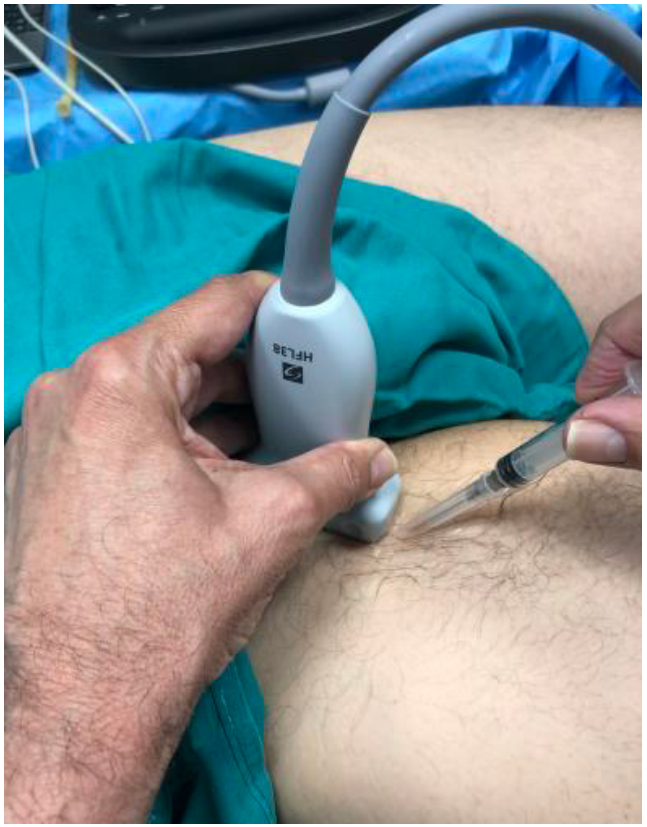


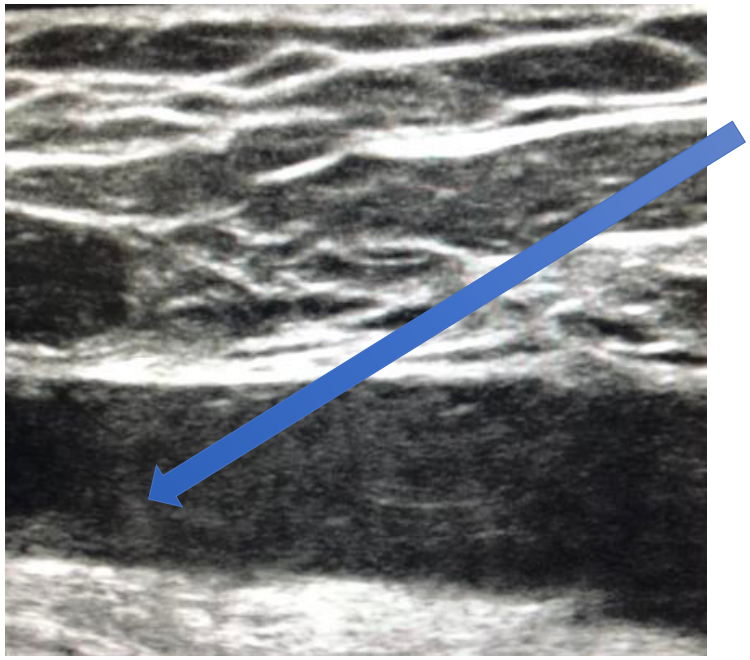
Step 2

Rotazione della sonda e visualizzazione della vena femorale comune e della vena iliaca esterna, in asse lungo



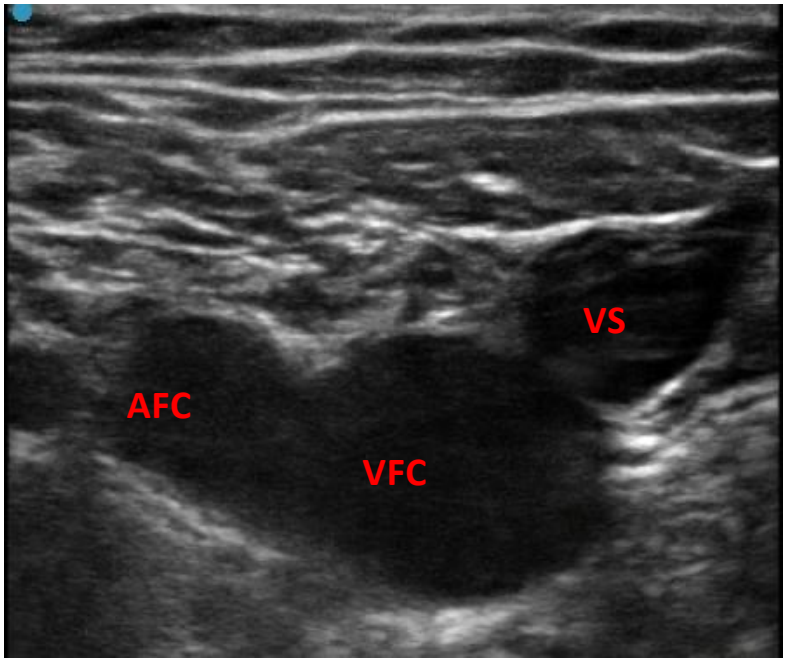
Puntura Step 2: *puntura della vena iliaca esterna o femorale comune in asse lungo in plane*





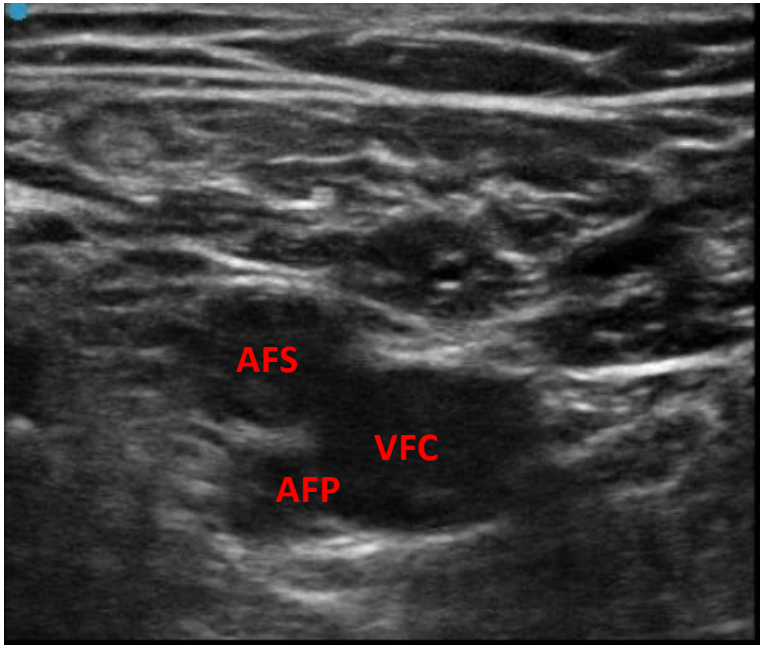
Step 3

Derotazione della sonda e spostamento in senso caudale: visualizzazione della arteria femorale comune, della vena femorale comune e della vena safena, in asse corto



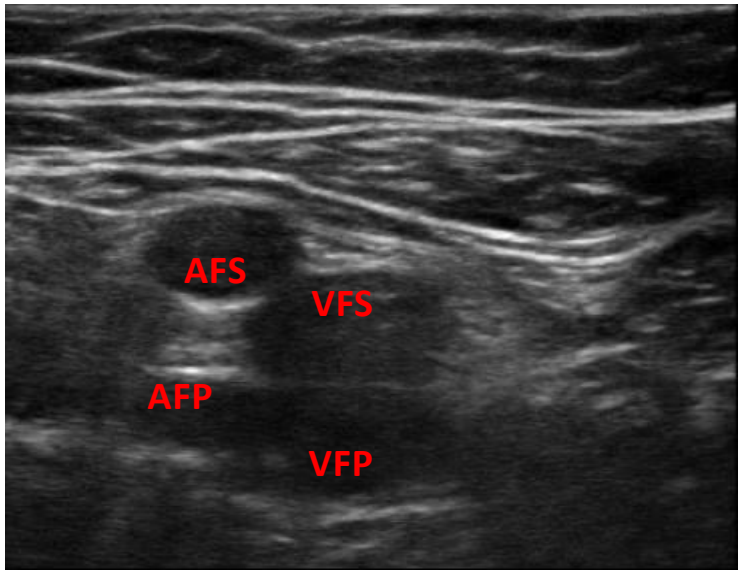
Step 4

Spostamento in senso caudale: visualizzazione della arteria femorale superficiale, della arteria femorale profonda e della vena femorale comune, in asse corto



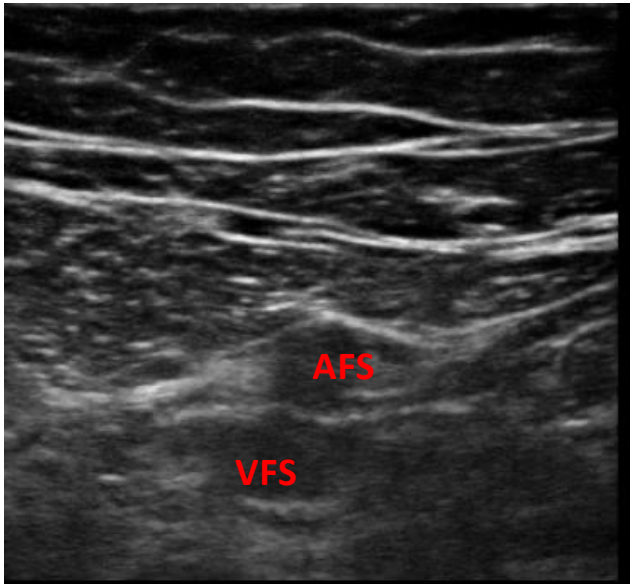
Step 5

Spostamento in senso caudale: visualizzazione della arteria femorale superficiale, della arteria femorale profonda, della vena femorale superficiale e della vena femorale profonda, in asse corto



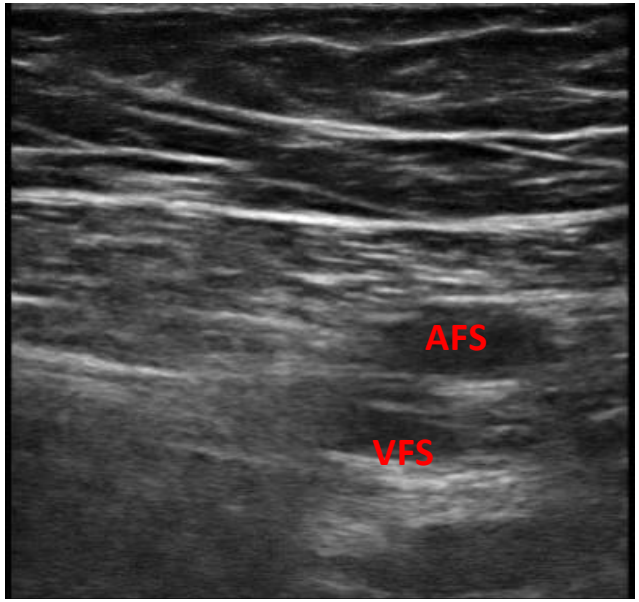
Step 6

Spostamento in senso caudale (verso metà coscia): visualizzazione della arteria femorale superficiale e della vena femorale superficiale, in asse corto.

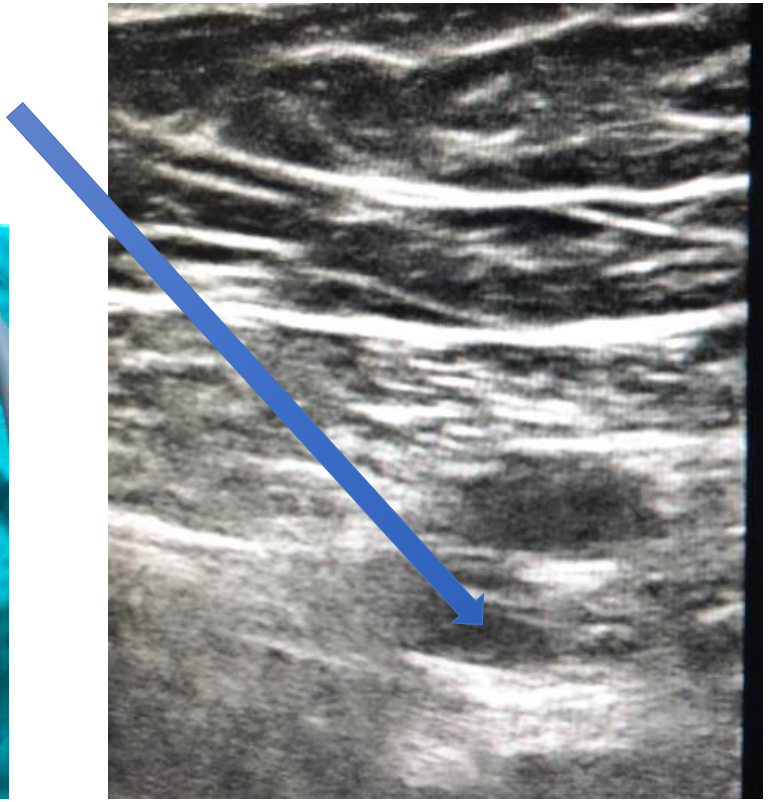


Step 7

Semi-rotazione della sonda e visualizzazione della arteria femorale superficiale e della vena femorale superficiale, in asse obliquo.



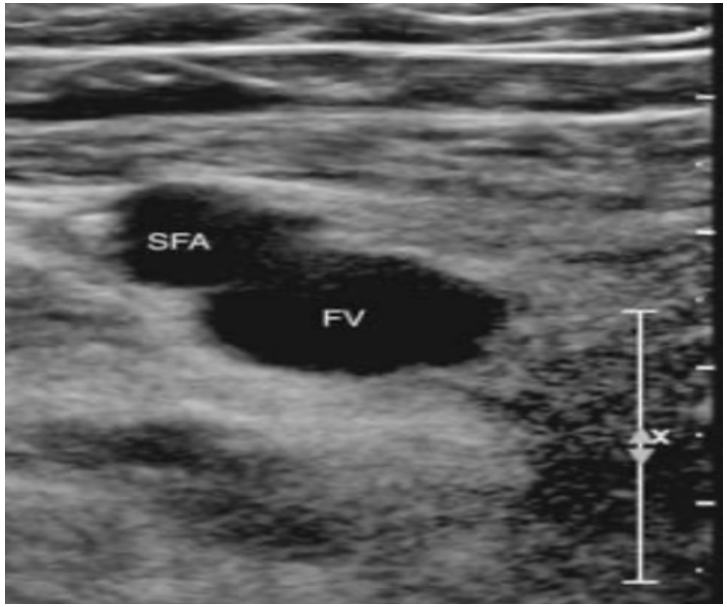
Step 7: puntura della vena femorale superficiale in asse obliquo in plane



RaFeVA

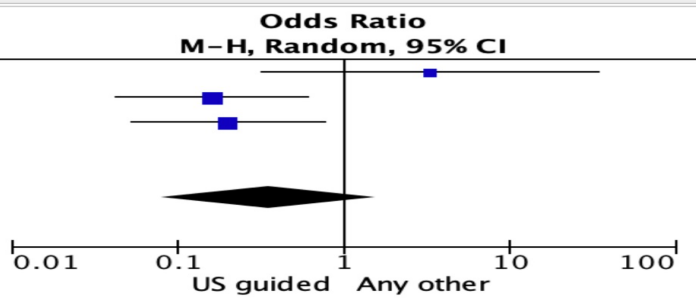
Step 1	a. femorale comune + v. femorale comune	ASSE CORTO
Step 2	v. femorale comune + v. iliaca esterna	ASSE LUNGO
Step 3	a. femorale com. + v. femorale com. + v. safena	ASSE CORTO
Step 4	a. femorale supf. + a. femorale prof. + v. femorale com	ASSE CORTO
Step 5	a. fem supf. + a. fem prof. + v. fem supf. + v fem prof.	ASSE CORTO
Step 6	a. femorale superficiale + v. femorale superficiale	ASSE CORTO
Step 7	a. femorale superficiale + v. femorale superficiale	ASSE OBLIQUO

Venipuntura della FV per il posizionamento dei FICC nei bambini



Study or Subgroup	US guided Events	Total	Any other Events	Total	Weight	Odds Ratio M-H, Random, 95% CI
Aouad_2010	3	24	1	24	23.4%	3.29 [0.32, 34.08]
Iwashima_2008	3	43	14	44	38.3%	0.16 [0.04, 0.61]
Law_2014	3	48	12	48	38.3%	0.20 [0.05, 0.76]
Ouleg-Erroz_2018	41	323	35	177		Not estimable
Total (95% CI)		**115**		**116**	**100.0%**	**0.35 [0.08, 1.57]**
Total events	9		27			

Heterogeneity: Tau² = 1.04; Chi² = 5.18, df = 2 (P = 0.08); I² = 61%
Test for overall effect: Z = 1.37 (P = 0.17)



Venipuntura ecoguidata della FV nei bambini

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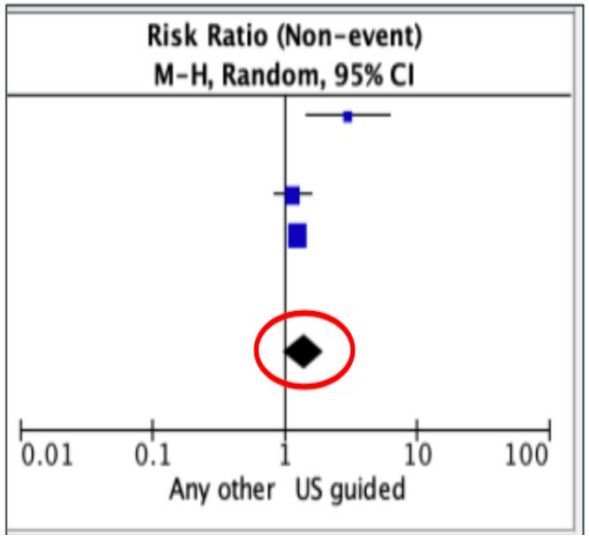
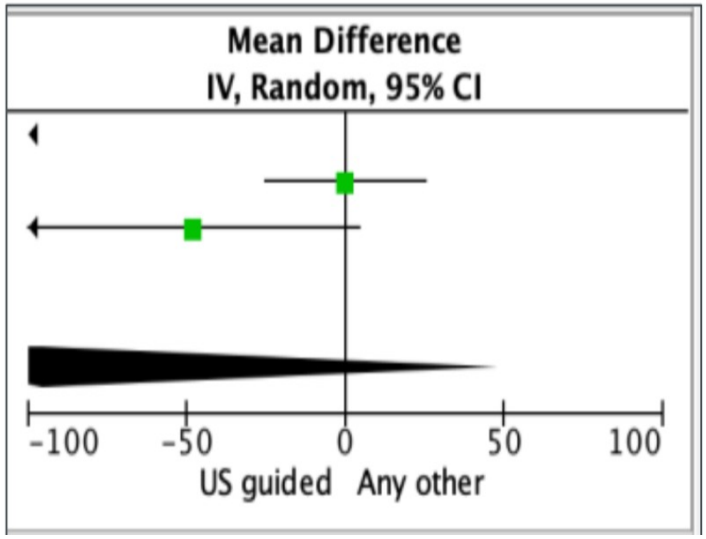
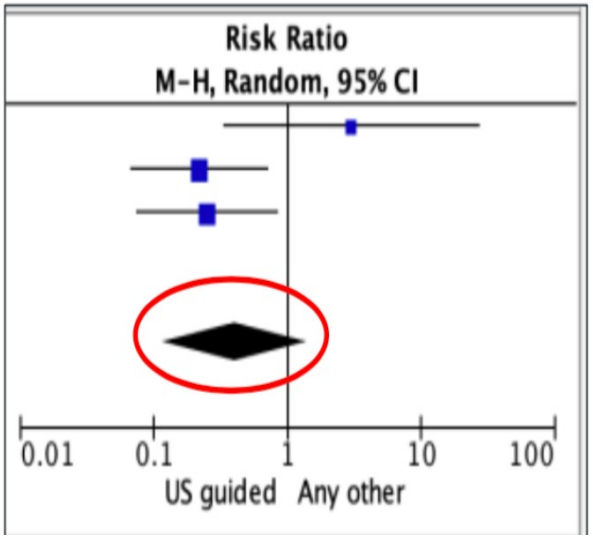
Overall success



Time



Complications



E’ raccomandata la venipuntura ecoguidata per il posizionamento dei FICC nei bambini in quanto aumenta il tasso di successo e riduce il rischio di complicanze (1B), anche se il tempo di cannulazione non è ridotto

Training

Modello proposto per l'addestramento nelle procedure di accesso vascolare

(1) lezioni didattiche sotto forma di lezioni frontali o insegnamento basato sul web;
(2) addestramento di laboratorio che include addestramento di simulazione;
(3) fase clinica che comprende una curva di apprendimento prima tutorata e poi non tutorata.

La Task Force raccomanda che dopo l'addestramento di laboratorio e la simulazione ogni tirocinante debba passare un esame teorico e pratico su un simulatore prima di iniziare l'addestramento clinico. Dopo un'adeguata formazione clinica, comprese le procedure supervisionate eseguite sui pazienti, il tirocinante deve completare ogni fase della valutazione finale al fine di ottenere la certificazione di competenza

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Take home message

- L’ecoanatomia delle vene della regione cervico-toracica, del braccio e della regione inguinale deve essere patrimonio di ogni specialista di accessi vascolari

- L’anatomia va indagata in tutti I pazienti in modo sistematico e ordinato, così da poter decidere in modo appropriato la vena da pungere e incannulare

- Il RaCeVA –RaPeVA e RaFeVA sono uno strumento facile e utile a tale scopo

Grazie per

l'attenzione