GAVeCeLT 2024 BOLOGNA

Cateteri Midline oggi: tecnica appropriata di impianto e tip location.

Stefano Elli
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Fondazione IRCCS San Gerardo dei Tintori
Sistema Socio Sanitario Regione Lombardia
Bicocca Academy

Di cosa stiamo parlando?

Editorial

JVA The Journal of Vascular Access

Long peripheral catheters: Is it time to address the confusion?

The Journal of Vascular Access
2019, Vol. 20(5) 457–460

DOI: 10.1177/1129729818819730
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SAGE

Kirby R Qin[1], Ramesh M Nataraja[1,2] and Maurizio Pacilli[1,2]

Review

JVA The Journal of Vascular Access

European recommendations on the proper indication and use of peripheral venous access devices (the ERPIUP consensus): A WoCoVA project

The Journal of Vascular Access
1–18

DOI: 10.1177/11297298211023274
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Mauro Pittiruti[1], Ton Van Boxtel[2], Giancarlo Scoppettuolo[1], Peter Carr[3], Evangelos Konstantinou[4], Gloria Ortiz Miluy[5], Massimo Lamperti[6], Godelieve Alice Goossens[7], Liz Simcock[8], Christian Dupont[9], Sheila Inwood[10], Sergio Bertoglio[11], Jackie Nicholson[12], Fulvio Pinelli[13] and Gilda Pepe[1]

Midline catheter
15–25 cm
Infra/supraclavicular region
Antecubital fossa or upper arm
PUR, silicone
Catheter-over-guidewire with tissue dilator

(a) short peripheral catheters (SPC) (<6 cm): SPC may be further classified as "simple" or "integrated", based on their design and material;
(b) long peripheral catheters (LPC) (6–15 cm);
(c) midline catheters or "midclavicular" (MC) (>15 cm).

Editorial

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The NAVIGATE project: A GloVANet–WoCoVA position statement on the nomenclature for vascular access devices

The Journal of Vascular Access
1–8

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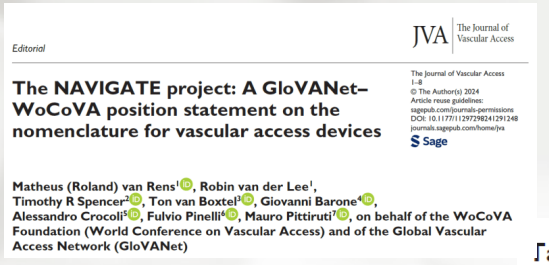
Matheus (Roland) van Rens[1], Robin van der Lee[1], Timothy R Spencer[2], Ton van Boxtel[3], Giovanni Barone[4], Alessandro Crocoli[5], Fulvio Pinelli[6], Mauro Pittiruti[7], on behalf of the WoCoVA Foundation (World Conference on Vascular Access) and of the Global Vascular Access Network (GloVANet)



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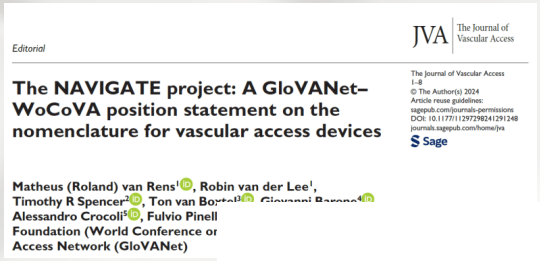
PVAD

Table 2. Main differences between long peripheral catheters (LPC) and midline catheters (MC).

	LPC	MC
Design		
Length	6–15 cm	>15 cm
Technique of insertion		
Veins chosen for cannulation	Superficial and deep veins of forearm and arm	Deep veins of the arm
Technique of venipuncture	Direct venipuncture, or ultrasound guided venipuncture	Ultrasound guided venipuncture
Technique of catheter insertion	Catheter over needle, or catheter over guidewire (simple Seldinger technique)	Catheter through introducer (modified Seldinger technique)
Tunneling, if required	No	Yes
Position of the tip	Veins of the upper limb	Axillary vein (thoracic tract) or subclavian vein
Subcutaneous anchorage, if required	No	Yes
Performance		
Blood sampling	No	Yes
Expected duration	1–3 weeks	Months
Complications		
Risk of dislodgment	High	Low
Local thrombophlebitis	Frequent	Very rare
Risk of malfunction	High	Low



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Matheus (Roland) van Rens[1], Robin van der Lee[1], Timothy R Spencer[2], Ton van Bo[illegible], Giovanni Barone[4], Alessandro Crocoli[5], Fulvio Pinell[illegible] Foundation (World Conference o[illegible] Access Network (GloVANet)

Ok...ma vale anche per i Midline!

Editorial

JVA The Journal of Vascular Access

The SIP protocol update: Eight strategies, incorporating Rapid Peripheral Vein Assessment (RaPeVA), to minimize complications associated with peripherally inserted central catheter insertion

The Journal of Vascular Access
1–9

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Fabrizio Brescia[1], Mauro Pittiruti[2], Timothy R Spencer[3] and Robert B Dawson[4]

Infusion Therapy Standards of Practice

3. Use Surgical-ANTT for longer, complex procedures involving multiple or large Key-Parts (eg, central vascular access device [CVAD] insertion, CVAD exchange), while employing barrier precautions and appropriate use of PPE.[1,6,7,17] (I)

Editorial

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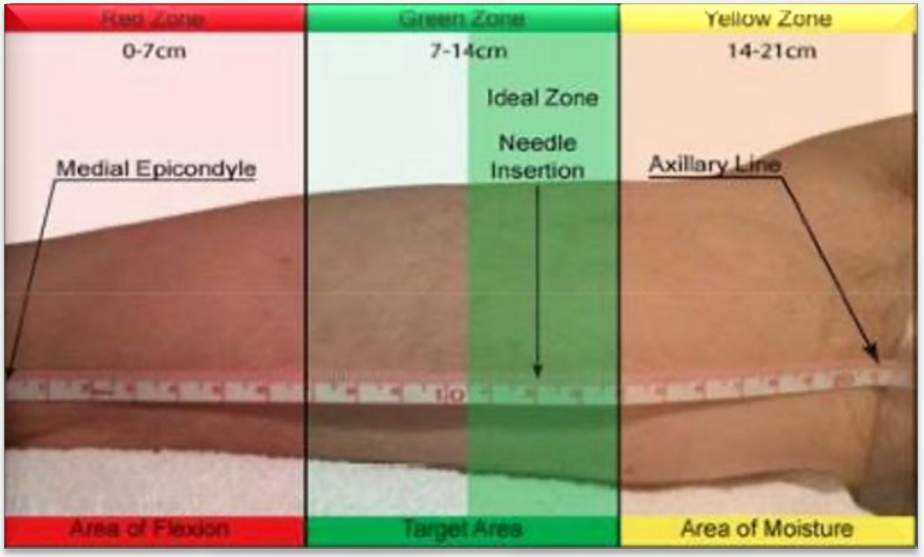
Fabrizio Brescia[1], Mauro Pittiruti[2], Timothy R Spencer[3] and Robert B Dawson[4]

C/V ratio ≤ 33%

Ok…ma vale anche per i Midline!

PICC Zone Insertion Method™ (ZIM™): A Systematic Approach to Determine the Ideal Insertion Site for PICCs in the Upper Arm

Robert B. Dawson



Exit site in Green Zone

Tunneling if required: Yes

Case report

JVA The Journal of Vascular Access

Tunnelling a midline catheter: When the traffic light shifts from yellow to green

Adam Fabiani[1], Lorella Dreas[1] and Gianfranco Sanson[2,3]

ORIGINAL ARTICLE

Pseudo-tunneling procedure:
an advantageous and safe technique
for brachial catheters in younger children

Stefano BENVENUTI [1, 2] *, Elena PORTERI [1], Rosanna CERESOLI [1, 3], Cristian PINTOSSI [1], Caterina ANNOVAZZI [1], Francesca ZANATTA [1], Fulvio PORTA [3], Daniele ALBERTI [2, 4]

Techniques in vascular access

JVA The Journal of Vascular Access

Tunneling technique of PICCs and Midline catheters

Davide Giustivi[1], Antonio Gidaro[3], Monica Baroni[1] and Stefano Paglia[1]

Ma è comunque un catetere periferico!

Review

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European recommendations on the proper indication and use of peripheral venous access devices (the ERPIUP consensus): A WoCoVA project

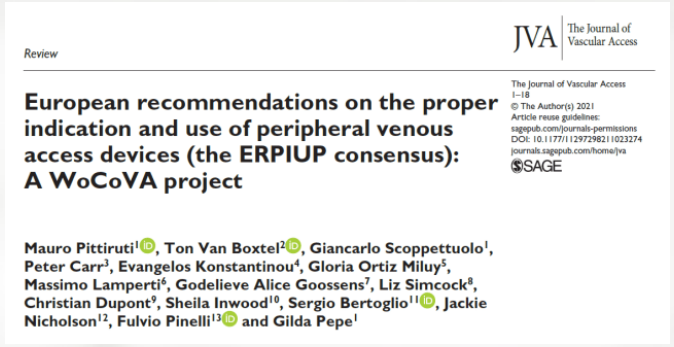
Mauro Pittiruti[1], Ton Van Boxtel[2], Giancarlo Scoppettuolo[1], Peter Carr[3], Evangelos Konstantinou[4], Gloria Ortiz Miluy[5], Massimo Lamperti[6], Godelieve Alice Goossens[7], Liz Simcock[8], Christian Dupont[9], Sheila Inwood[10], Sergio Bertoglio[11], Jackie Nicholson[12], Fulvio Pinelli[13] and Gilda Pepe[1]

PVADs are indicated in the following circumstances:

(1) *short to medium term infusion of peripherally compatible solutions*
- *solutions with pH 5–9*
- *drugs with osmolarity <600 mOsm/L*
- *parenteral nutrition with osmolarity <800–850 mOsm/L*
- *any drug or solution not associated with potential endothelial damage*

PVADs are contraindicated in the following circumstances:

- *infusion of vesicant drugs or prolonged infusion (>30 min) of peripherally incompatible solutions*
- *repeated daily blood sampling*
- *hemodialysis*
- *need for hemodynamic monitoring*
- *need for long term intravenous access (>3–4 months).*



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Drugs in R&D
https://doi.org/10.1007/s40268-020-00329-w

ORIGINAL RESEARCH ARTICLE

Standardization and Chemical Characterization of Intravenous Therapy in Adult Patients: A Step Further in Medication Safety

Silvia Manrique-Rodríguez[1,2,3] · Irene Heras-Hidalgo[1,2] · M. Sagrario Pernia-López[1,2,3] · Ana Herranz-Alonso[1,2,3] · M. Camino del Río Pisabarro[4,5] · M. Belén Suárez-Mier[4,6] · M. Antonia Cubero-Pérez[4,7] · Verónica Viera-Rodríguez[4,8] · Noemí Cortés-Rey[4,9] · Elizabeth Lafuente-Cabrero[4,10] · M. Carmen Martínez-Ortega[4,11] · Esther Bermejo-López[12,13] · Cristina Díez-Sáenz[14] · Piedad López-Sánchez[3,15] · M. Luisa Gaspar-Carreño[3,16] · Rubén Achau-Muñoz[3,16] · Juan F. Márquez-Peiró[3,17] · Marta Valera-Rubio[3,18] · Esther Domingo-Chiva[3,19] · Irene Aquerreta-González[3,20] · Ignacio Pellín Ariño[12,21] · M. Cruz Martín-Delgado[12,21] · Manuel Herrera-Gutiérrez[12,22] · Federico Gordo-Vidal[12,23] · Pedro Rascado-Sedes[12,24] · Emilio García-Prieto[12,25] · Lucas J. Fernández-Sánchez[26] · Sara Fox-Carpentieri[27] · Carlos Lamela-Piteira[3,28] · Luis Guerra-Sánchez[29] · Miguel Jiménez-Aguado[29] · María Sanjurjo-Sáez[1,2,3]

Accepted: 9 November 2020

The Art and Science of Infusion Nursing

Development of an Evidence-Based List of Non-Antineoplastic Vesicants

2024 Update

Lisa A. Gorski, MS, RN, HHCNS-BC, CRNI®, FAAN • Jennie Ong, PharmD • Ruth Van Gerpen, MS, RN, APRN-CNS, AOCNS, BC-PMGT • Barb Nickel, APRN-CNS, CCRN, CRNI® • Kathy Kokotis, RN, BS, MBA • Lynn Hadaway, MEd, RN, CRNI®

antibiotics

MDPI

Systematic Review

Physicochemical Characteristics of Antimicrobials and Practical Recommendations for Intravenous Administration: A Systematic Review

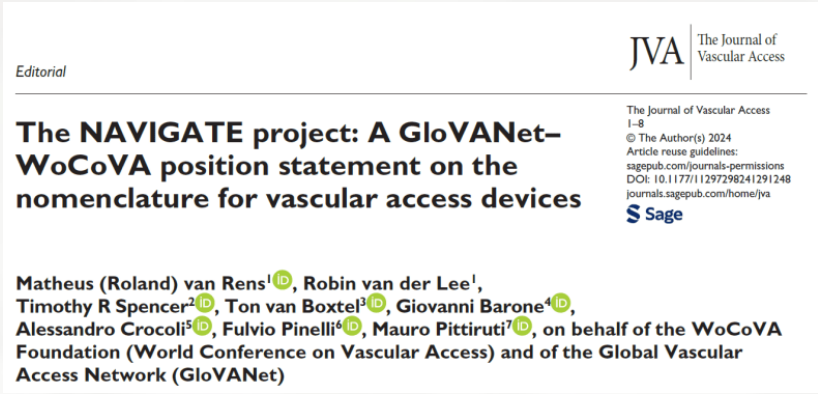
Fabio Borgonovo [1,†], Massimiliano Quici [2,†], Antonio Gidaro [2,*,†], Davide Giustivi [3,†], Dario Cattaneo [4], Cristina Gervasoni [1], Maria Calloni [2], Elena Martini [2], Leyla La Cava [2], Spinello Antinori [1], Chiara Cogliati [2], Andrea Gori [1] and Antonella Foschi [1,†]

Antibiotics

Name	Red Flag and Vesicant Properties	pH	mOsm/L	Phlebitis Incidence ≥ 5%	Diluent	Dosage	Infusion Rate
Amikacin [15–19]		3.5–8.5	312–383	No	0.9% NaCl/D5W	15 mg/kg	Over 30–60 min
Amoxicillin/clavulanate [20,21]		8.9	280–442	No	0.9% NaCl	1–2 g q 8 h	At least 30 min
Ampicillin [22,23]		8–10	258–372	Yes	0.9% NaCl	2 g q 4 h	Over 15 min
Ampicillin/Sulbactam [24,25]		8–10	320–400	Yes	0.9% NaCl	3 g q 6 h	Over 30 min
Azithromycin [26–30]		6.4–6.8	280–321	Yes	0.9% NaCl/D5W	500 mg q 24 h	At least 60 min
Aztreonam [31–34]		6	315–352	No	0.9% NaCl/D5W	2 g q 6–8 h	Over 20–60 min
Cefazolin [23]		6	315–352	No	0.9% NaCl	1–2 g q 8 h	Over 30 min
Cefepime [35–38]		4–6	262–306	No	0.9% NaCl/D5W	1–2 g q 8–12 h	Over 30 min
Cefiderocol [40,41]		5.2–5.8	NA	Yes	0.9% NaCl	2 g q 6–8 h	At least 180 min
Cefmetazole [42]		5.5–7.5	300	No	0.9% NaCl	1–2 g q 12 h	Over 30–60 min
Cefodizime [43,44]		4.5–6.5	280–320	No	0.9% NaCl/D5W	1–3 g q 8–12 h	Over 30–60 min
Cefoperazone [45]		6–8	265–335	No	0.9% NaCl/D5W	2–4 g/day divided q 12 h	Over 30–60 min
Cefotaxime [23,46–48]		5.2–5.4	336–433	No	0.9% NaCl/D5W	2 g q 6–8 h	At least 15 min
Cefotetan [24,30,51]		4–4.5	300	No	0.9% NaCl/D5W	1–2 g q 12 h	At least 20 min
Cefoxitin [23,42,50–52]		4–7.5	240–361	No	0.9% NaCl/D5W	2 g q 6–8 h	Over 30–60 min
Ceftaroline [35,52,53–62]		4.6–6.5	265	Yes	0.9% NaCl/D5W	600 mg q 8–12 h	At least 30–60 min
Ceftazidime/Avibactam [17,18,36,63–73]		4.7	335–386	No	0.9% NaCl/D5W	2.5 g q 8 h	At least 120 min
Ceftizoxime [46]		5.5–7.5	300–360	No	0.9% NaCl/D5W	1–2 g q 8–12 h	Over 30–60 min
Ceftriaxone [36,22,28,34,74–78]		6.6–8.7	423	No	0.9% NaCl	2 g q 12–24 h	At least 30 min
Cefoperazone/Tazobactam [79]		5.9–6.1	307–320	No	0.9% NaCl/D5W	1.5 g q 8 h	At least 60 min
Cefuroxime [30]		5.2–8.5	276–357	No	0.9% NaCl/D5W	0.75–1.5 g q 8 h	Over 15–60 min
Ciprofloxacin [30,55–57,80–84]		3.3–4.6	285	Yes	0.9% NaCl/D5W	400 mg q 8–12 h	Over 60 min
Clarithromycin [29,90,91]		5.2–5.4	275–301	No	0.9% NaCl/D5W	500 mg q 12 h	At least 60 min

e la punta?

e la punta?



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Axillary vein (thoracic tract) or subclavian vein

International Journal of Nursing Studies 141 (2023) 104476

Contents lists available at ScienceDirect

International Journal of Nursing Studies

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

Midline catheter tip position and catheter-related complications in antimicrobial therapy: A multi-center randomized controlled trial☆

Linfang Zhao [a,*], Xiaopeng Fan [b], Lei Zhao [c], Zhiyun Cai [d], Fengya Jiang [e], Ruiyi Zhao [f]

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[b] Department of Discipline Inspection and Supervision, Kunshan First People's Hospital, Jiangsu Province, China
[c] Department of Bone Oncology, People's Hospital of Liaoning Province, Liaoning Province, China
[d] Department of Intravenous Therapy, Zhongshan Hospital, Xiamen University, Fujian Province, China
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antimicrobial therapy. These findings established that the overall incidence of catheter-related complications could be reduced if MC tips were placed in the subclavian or axillary vein at the chest wall ($p < 0.001$). Conversely, the results also indicated that if MC tips were placed in the distal axillary vein, the incidence of catheter-related complications increased. These findings are consistent with

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RESEARCH ARTICLE

NursingOpen WILEY

Impact of terminal tip location of midline catheters on catheter-related complications and indwelling duration in elderly patients

Jing Fu[1,2] | Lingling Zhao[2,3] | Yingmei Tian[1,2] | Yinmeng Liu[1,2] | Hongyu Zhang[1] | Haijun Li[1]

In conclusion, the present study suggested that the use of bedside ultrasound guidance to accurately locate the MC tip in the distal segment of the axillary vein may reduce the incidence of catheter-related complications, delay their occurrence and prolong the indwelling duration.

Heart & Lung 60 (2023) 39–44

Contents lists available at ScienceDirect

Heart & Lung

journal homepage: www.heartandlung.com

The catheter-to-vein ratio at the tip level, not the catheter type, as a risk factor for a catheter failure. A retrospective comparative study of polyurethane midline and long peripheral catheters

Adam FABIANI, MNS, RN[a,b], Marilena SANTORO, BNS, RN[a], Gianfranco SANSON, PhD, RN[c,*]

[a] Cardiothoracic-Vascular Department, Azienda Sanitaria Giuliano Isontina, Strada di Fiume 447, Trieste 34148, Italy
[b] Department of Biomedicine and Prevention, University of Rome Tor Vergata, Rome, Italy
[c] Clinical Department of Medical Surgical and Health Sciences, University of Trieste, Strada di Fiume 447, Trieste 34148, Italy

vein ratio below the critical threshold. Therefore, regardless of the catheter used, we suggest that adequate blood flow (i.e., a catheter-to-vein ratio <45%) is ensured at the tip level to reduce the risk of complications leading to a catheter failure.

Review

JVA The Journal of Vascular Access

The Journal of Vascular Access
1–10
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Comparison of complications and indwelling time of midline catheter at different tip locations: A systematic review and meta-analysis

Huixin Zhang[1*], Xin Li[2*], Weige Sun[1], Ran Zhang[1] and Weixin Cai[1]

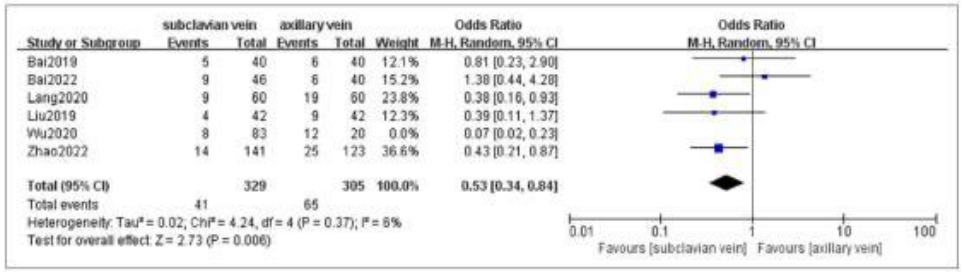

Figure 3. Forest plot of studies that assessed complication rates of MCs' tip located in subclavian vein and axillary vein.

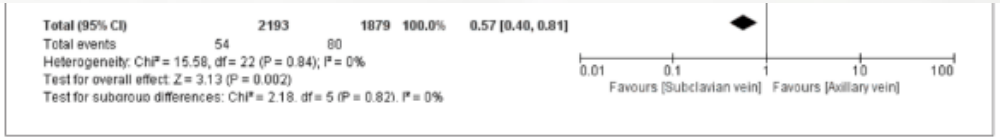

Figure 4. Forest plot of studies that assessed subgroup complications of MCs' tip located in subclavian vein and axillary vein.

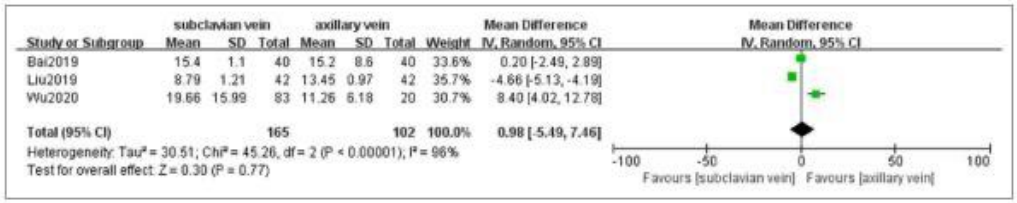

Figure 5. Forest plot of studies that assessed indwelling time of MCs' tip located in subclavian vein and axillary vein.

È davvero importante?

Review

JVA The Journal of Vascular Access

Comparison of complications and indwelling time of midline catheter at different tip locations: A systematic review and meta-analysis

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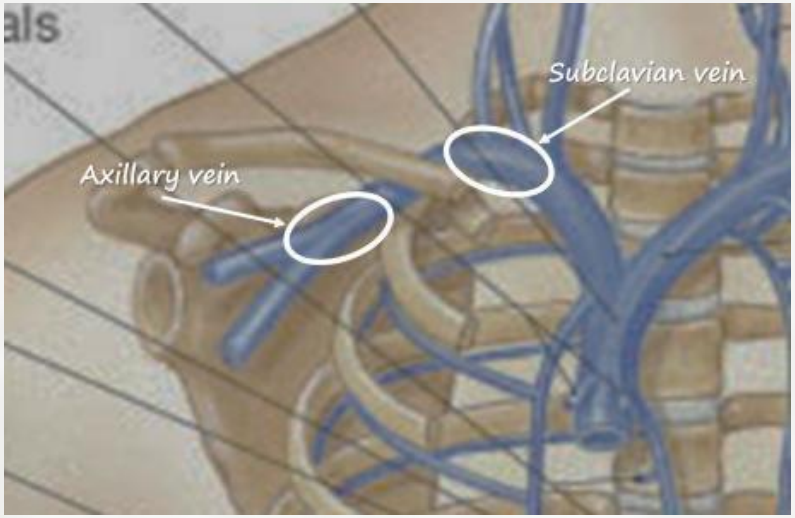

forse no...o forse si

Techniques in vascular access

JVA The Journal of Vascular Access

Ultrasound-guided tip location of midline catheters

The Journal of Vascular Access
1–5

DOI: 10.1177/1129729820907250
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Stefano Elli[1], Mauro Pittiruti[2], Valentina Pigozzo[1], Luigi Cannizzo[1], Luciano Giannini[1], Andrea Siligato[1], Egle Rondelli[1], Giuseppe Foti[1] and Alberto Lucchini[1]

- **Same patients**
- **Same insertion technique**
- **But different catheter length (25 to 20 cm)**

	Control group 1	Control group 2
MCs (n)	412	111
Age (mean ± SD)	67.2 ± 17.6	67.8 ± 16.9
Sex = M (%)	54.12	45.9
Medical/surgical disease (%)	86.4/13.6	88.2/11.8
CRT (n)	10	10
CRT (%)	2.42 →	9
CRT: group 1 vs study group	10	
CRT: group 2 vs study group		10

Techniques in vascular access

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- **Same patients**
- **Same insertion technique**
- **Same catheter length (20 cm)**
- **But US tip location**

	Control group 2	Study group
MCs (n)	111	458
Age (mean ± SD)	67.8 ± 16.9	67.6 ± 17.5
Sex = M (%)	45.9	51.64
Medical/surgical disease (%)	88.2/11.8	85.5/14.5
CRT (n)	10	12
CRT (%)	9 →	2.62
CRT: group 1 vs study group		12
CRT: group 2 vs study group	10	12

Techniques in vascular access

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Ultrasound-guided tip location of midline catheters

The Journal of Vascular Access
1–5

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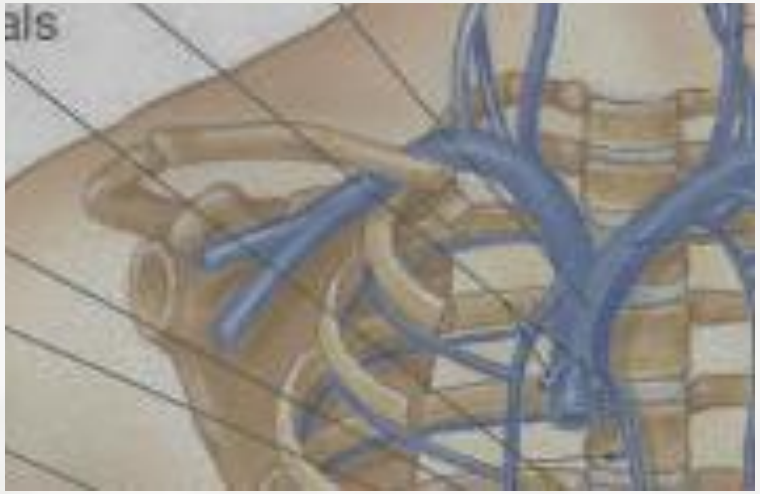


25 cm MC in green zone: punta probabilmente in vena succlavia

20 cm MC in green zone: punta probabilmente al passaggio ascellare / succlavi

20 cm MC in green zone e US tip location: punta sicuramente in vena ascellare

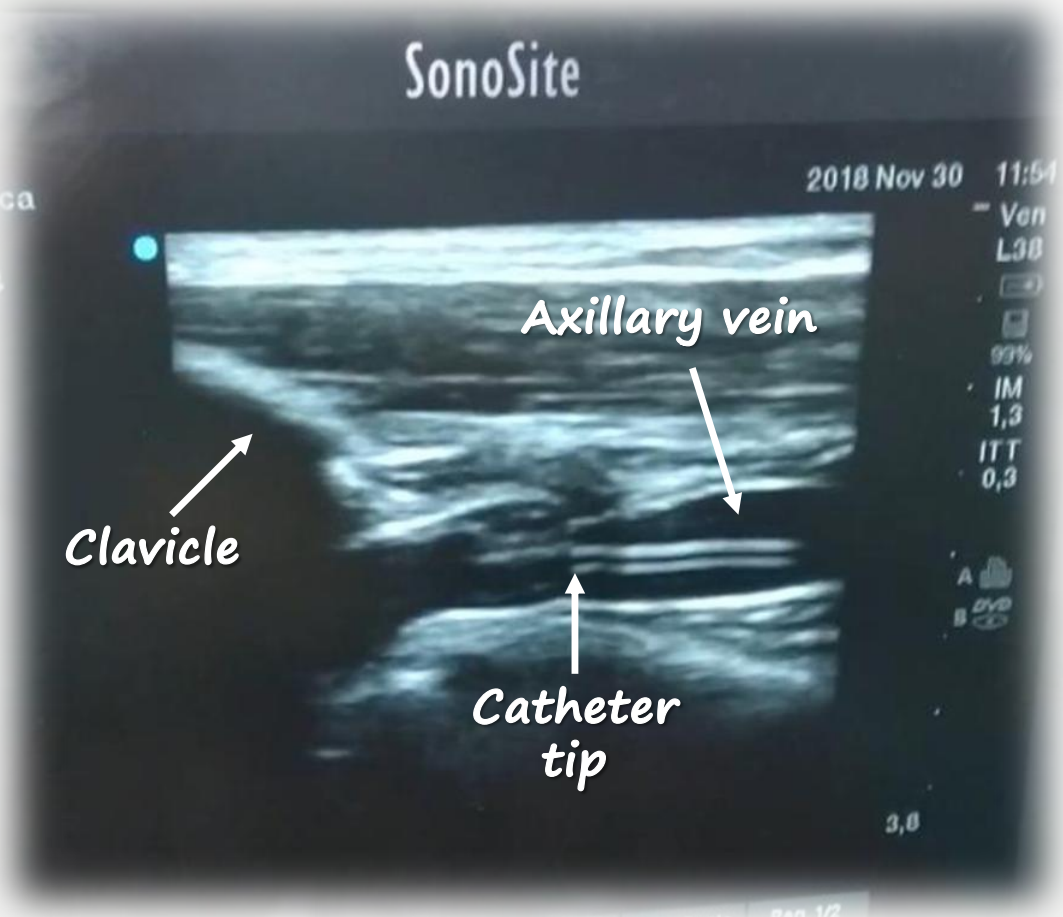
The choice between axillary or subclavian vein is up to you, but...

Ultra Sound guided tip location

Sonda lineare

Finestra sottoclaveare

Visualizzazione in asse lungo



…e poi?

Se voglio arrivare in succlavia devo inserire il catetere per <u>almeno</u> altri 4 cm

Altrimenti è meglio restare così

Take home messages

- Il Midline non è un LPC e richiede, nell'inserimento, le stesse precauzioni di un PICC
- Il Midline non è un PICC e richiede, nell'utilizzo, le stesse precauzioni di un LPC
- Il Midline può fermarsi in vena ascellare o succlavia…ma evitiamo di restare a metà strada
- Per un posizionamento a regola d'arte, la tip location ecoguidata non deve mai mancare

Grazie

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