



Bologna 2 – 3 dicembre 25

Malposizioni primarie dei PICC



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Di cosa parleremo



Il corretto posizionamento

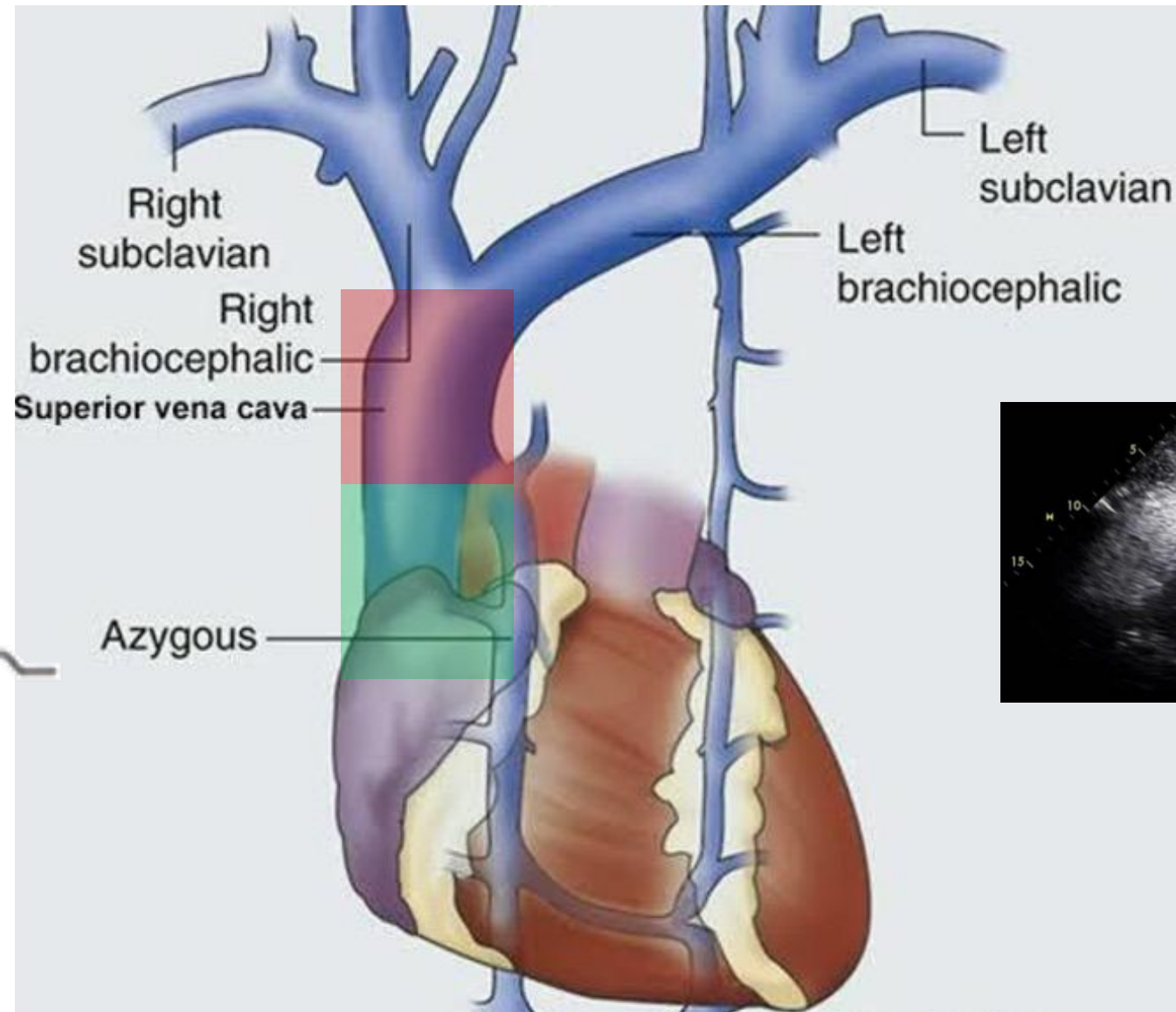
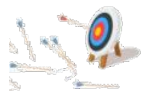
Come evitarlo



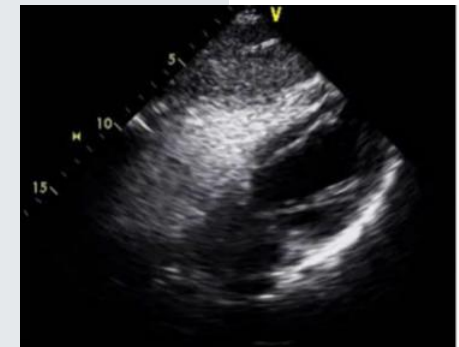
Tipi di malposizionamento



Come rimediare



Il corretto
posizionamento

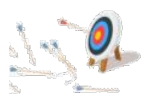
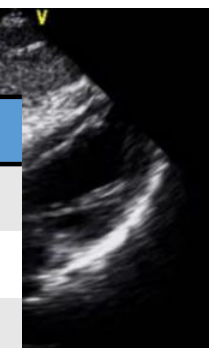




Il corretto
posizionamento



Guidelines	Indications
INS (SOP 2016)	Lower portion of the SVC at or near the CAJ
GAVECELT	In the lower part of the SVC or in the upper part of the RA
ONS, 2011	Distal third of the SVC
NKF, 2006	SVC or RA
AVA	Distal SVC close to CAJ
FDA/CDC	Lower one-third of SVC
ASPEN	Lower SVC adjacent to RA
SIR	Cavoatrial region or RA



A single institution experience of seven hundred consecutively placed peripherally inserted central venous catheters

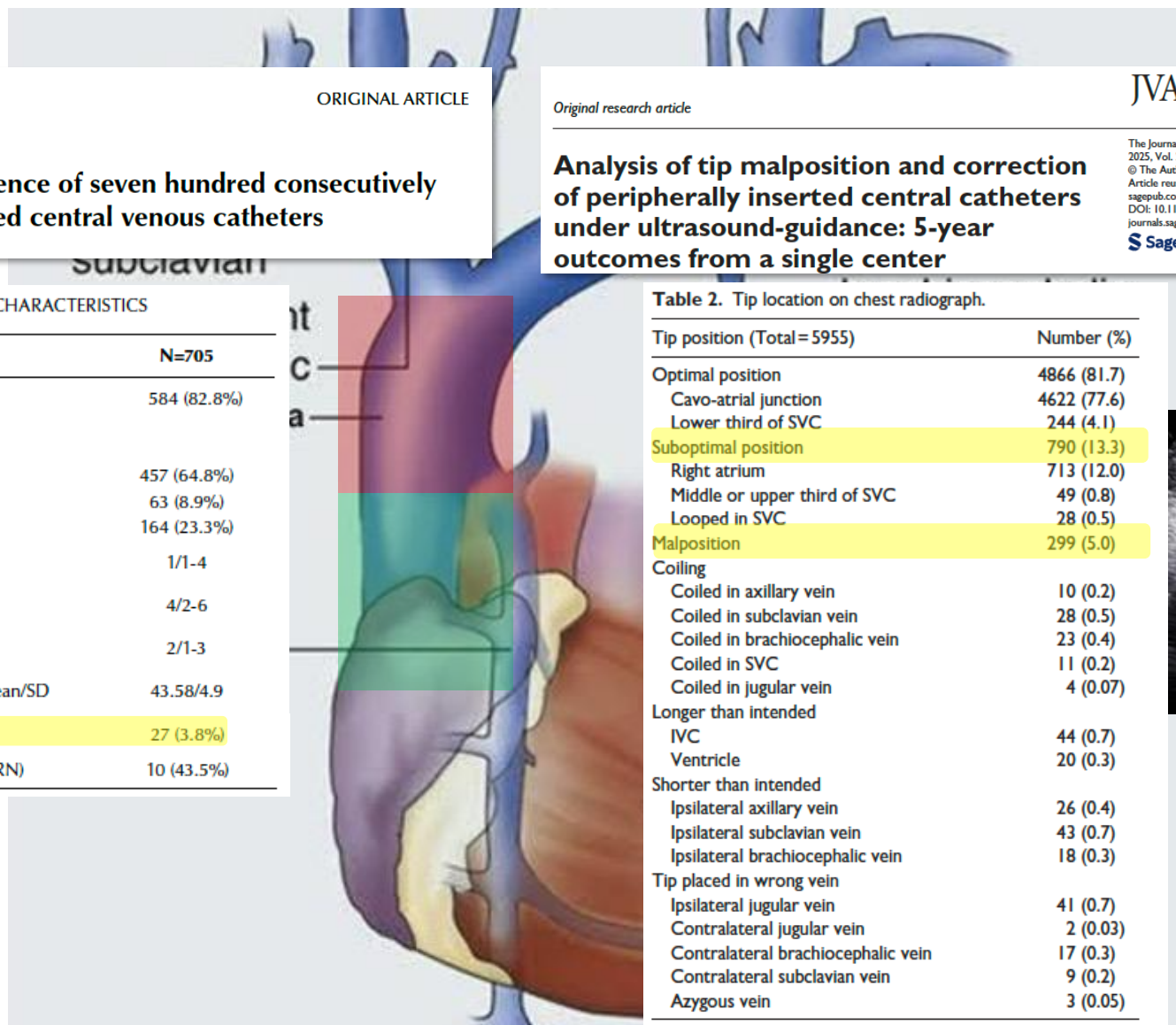
TABLE III - PICC LINE INSERTION CHARACTERISTICS

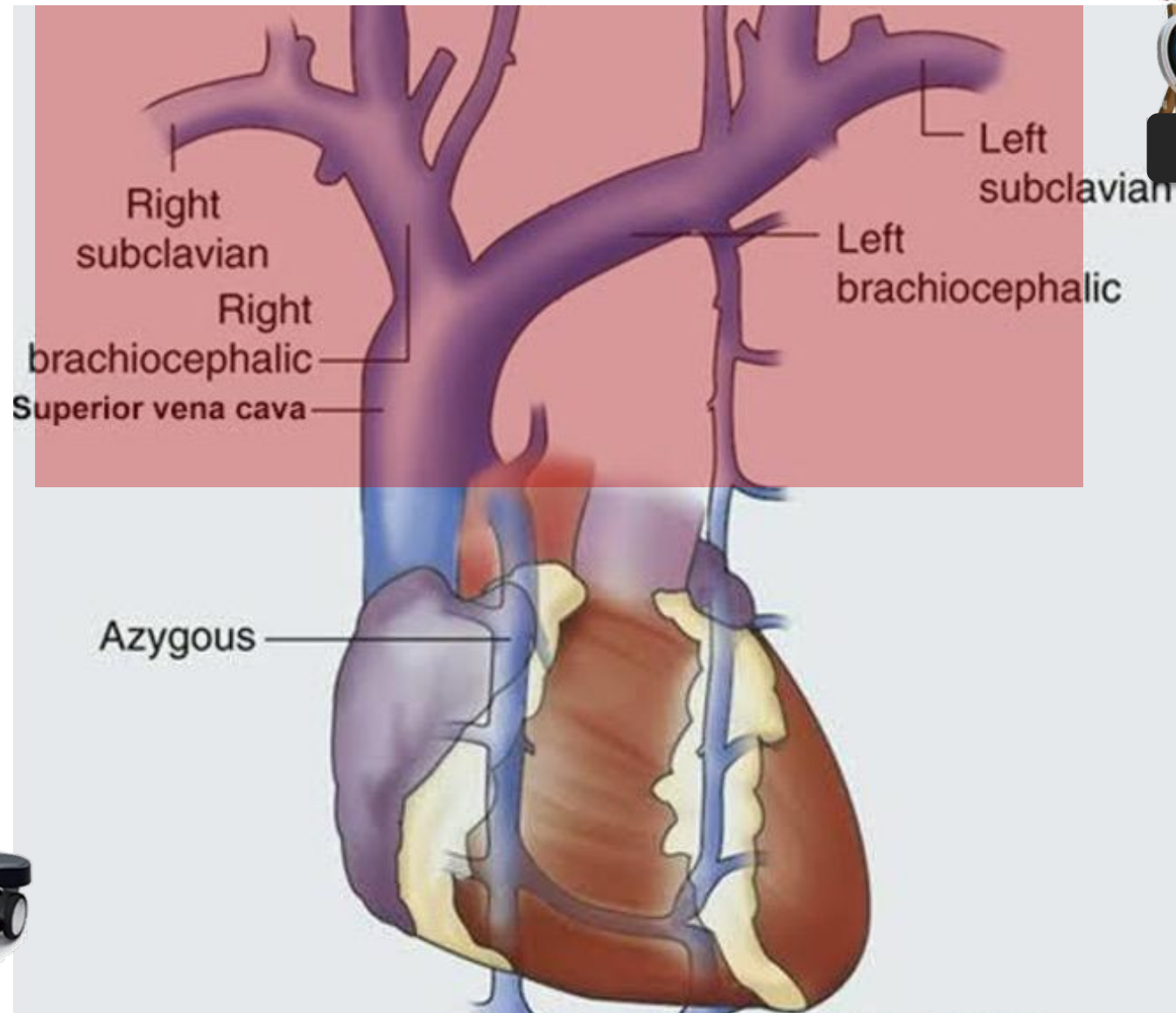
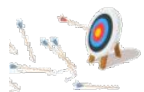
	N=705
1. Side insertion: Right	584 (82.8%)
2. Vein accessed	
Basilic	457 (64.8%)
Cephalic	63 (8.9%)
Brachial	164 (23.3%)
3. Attempts, Median/Range	1/1-4
4. Size (Fr), Median/Range	4/2-6
5. Lumens, Median/Range	2/1-3
6. Catheter length inserted (cm), Mean/SD	43.58/4.9
7. Malposition	27 (3.8%)
Reposition by Registered Nurse (RN)	10 (43.5%)

Analysis of tip malposition and correction of peripherally inserted central catheters under ultrasound-guidance: 5-year outcomes from a single center

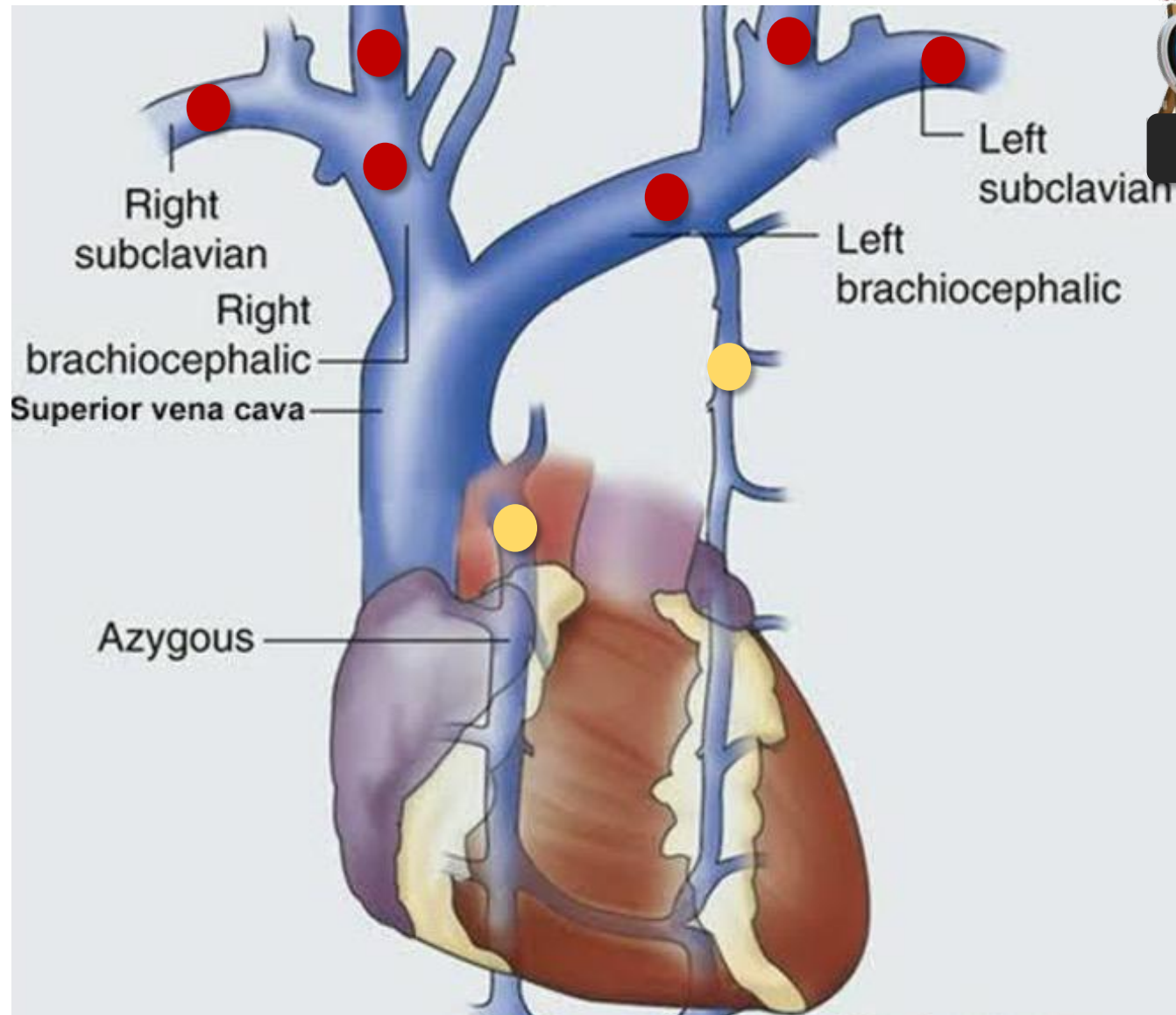
Table 2. Tip location on chest radiograph.

Tip position (Total = 5955)	Number (%)
Optimal position	4866 (81.7)
Cavo-atrial junction	4622 (77.6)
Lower third of SVC	244 (4.1)
Suboptimal position	790 (13.3)
Right atrium	713 (12.0)
Middle or upper third of SVC	49 (0.8)
Looped in SVC	28 (0.5)
Malposition	299 (5.0)
Coiling	
Coiled in axillary vein	10 (0.2)
Coiled in subclavian vein	28 (0.5)
Coiled in brachiocephalic vein	23 (0.4)
Coiled in SVC	11 (0.2)
Coiled in jugular vein	4 (0.07)
Longer than intended	
IVC	44 (0.7)
Ventricle	20 (0.3)
Shorter than intended	
Ipsilateral axillary vein	26 (0.4)
Ipsilateral subclavian vein	43 (0.7)
Ipsilateral brachiocephalic vein	18 (0.3)
Tip placed in wrong vein	
Ipsilateral jugular vein	41 (0.7)
Contralateral jugular vein	2 (0.03)
Contralateral brachiocephalic vein	17 (0.3)
Contralateral subclavian vein	9 (0.2)
Azygous vein	3 (0.05)

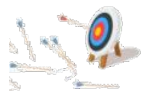
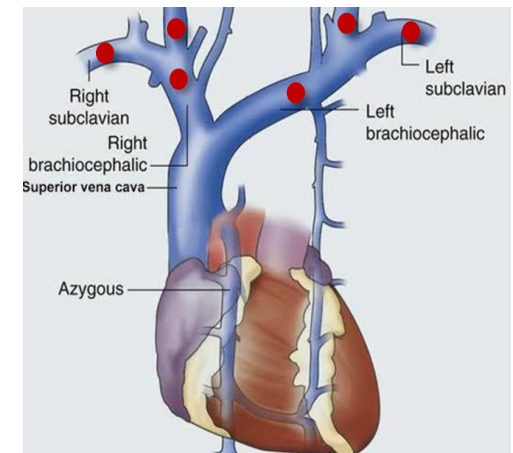
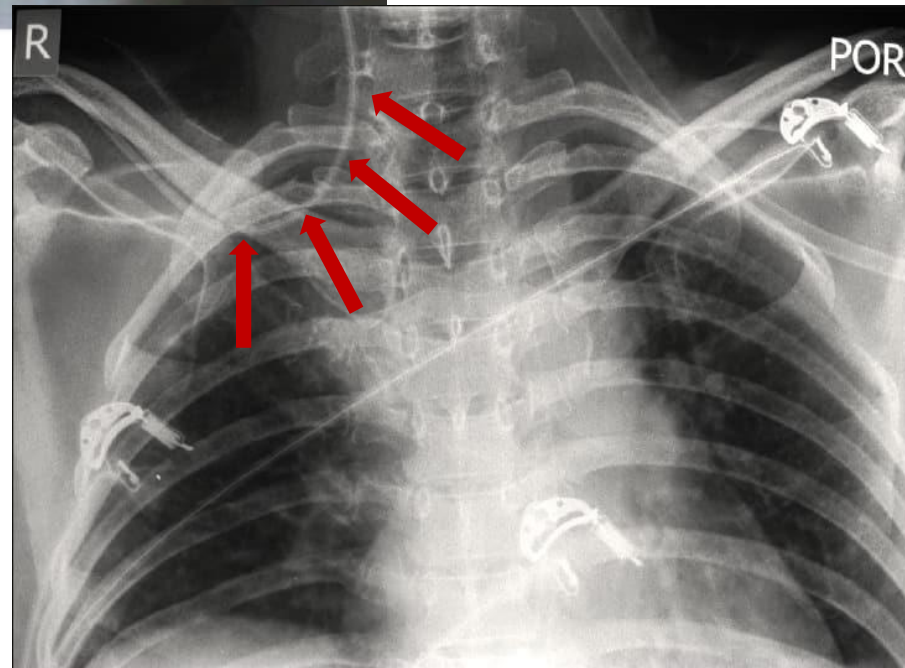
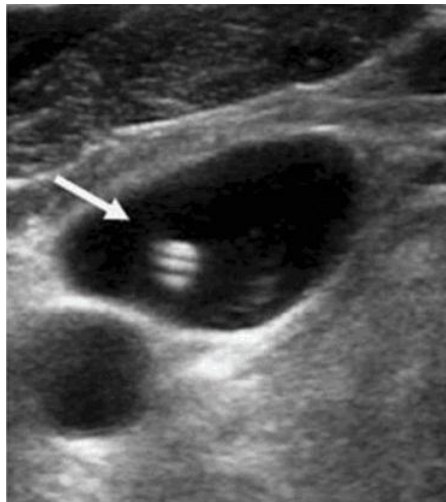
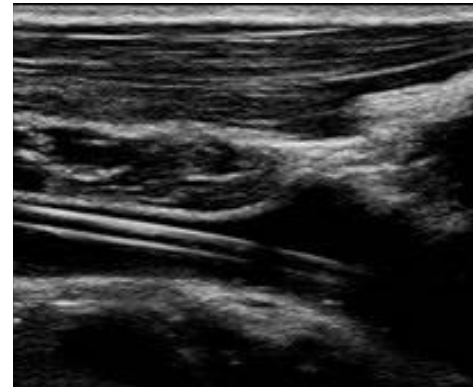
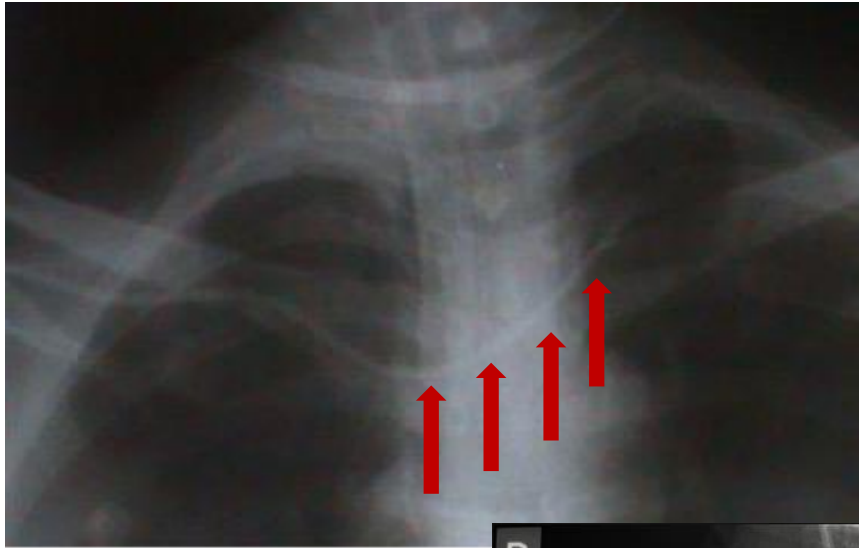


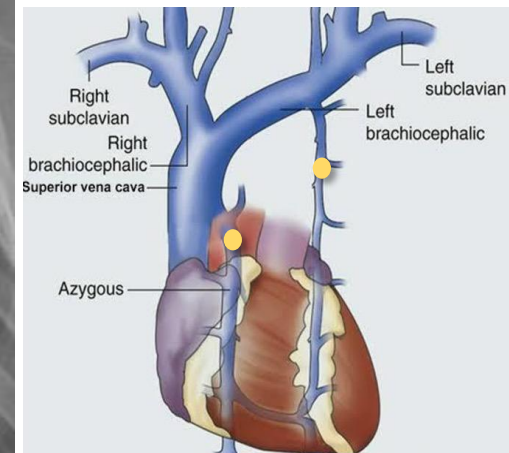
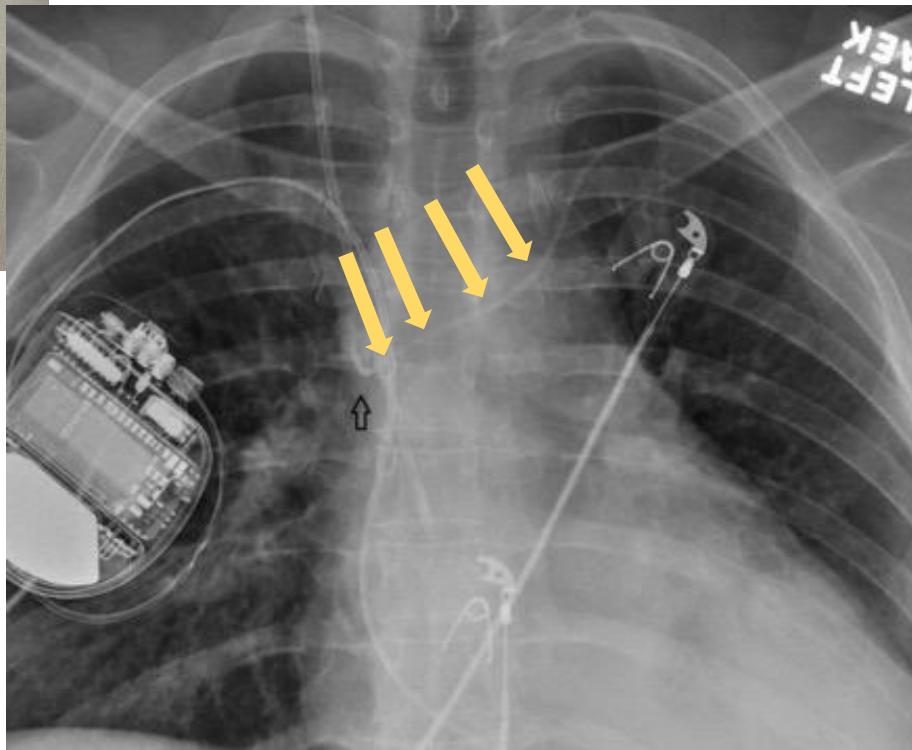
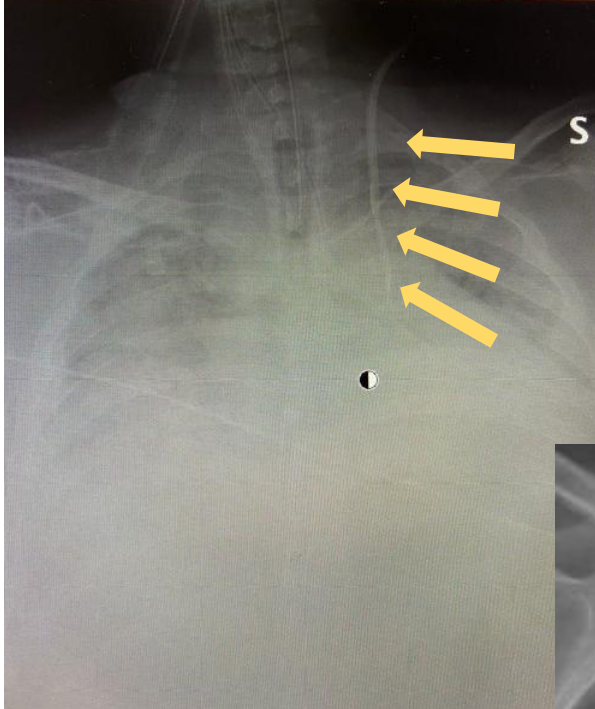


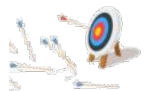
Tipi di
malposizionamento



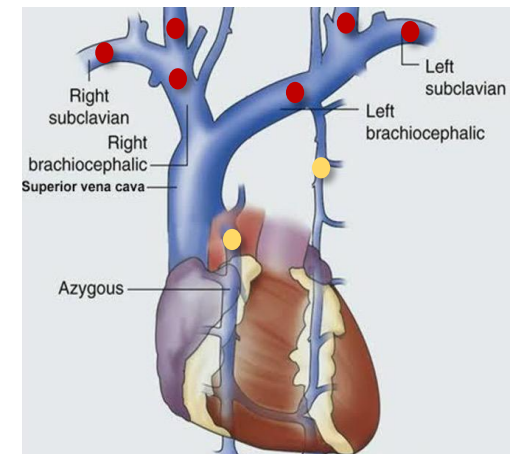
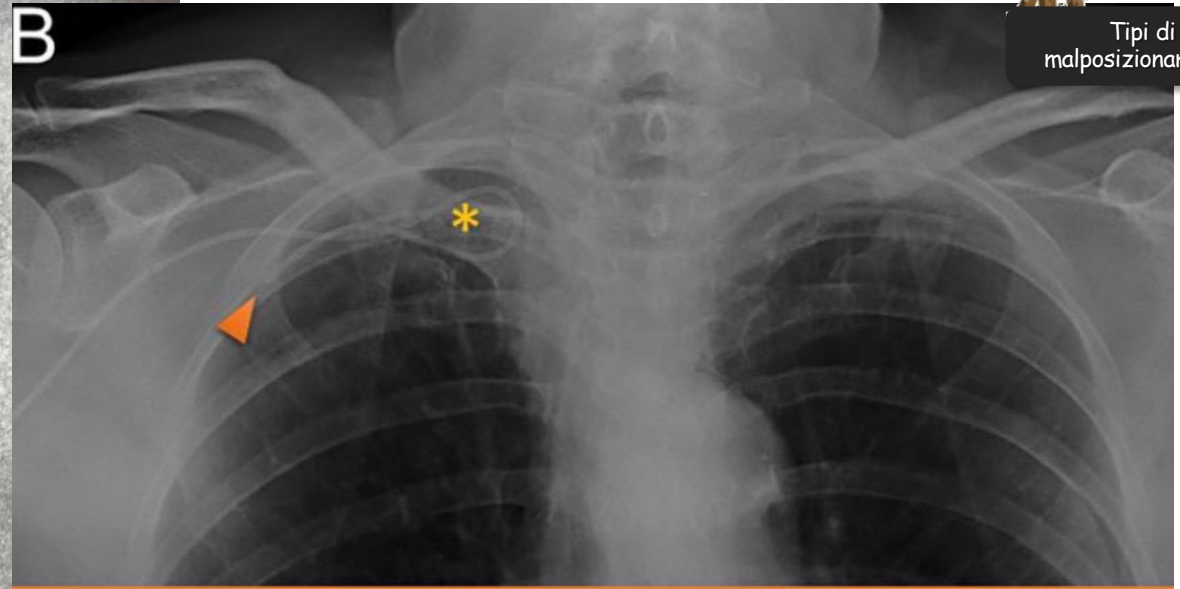
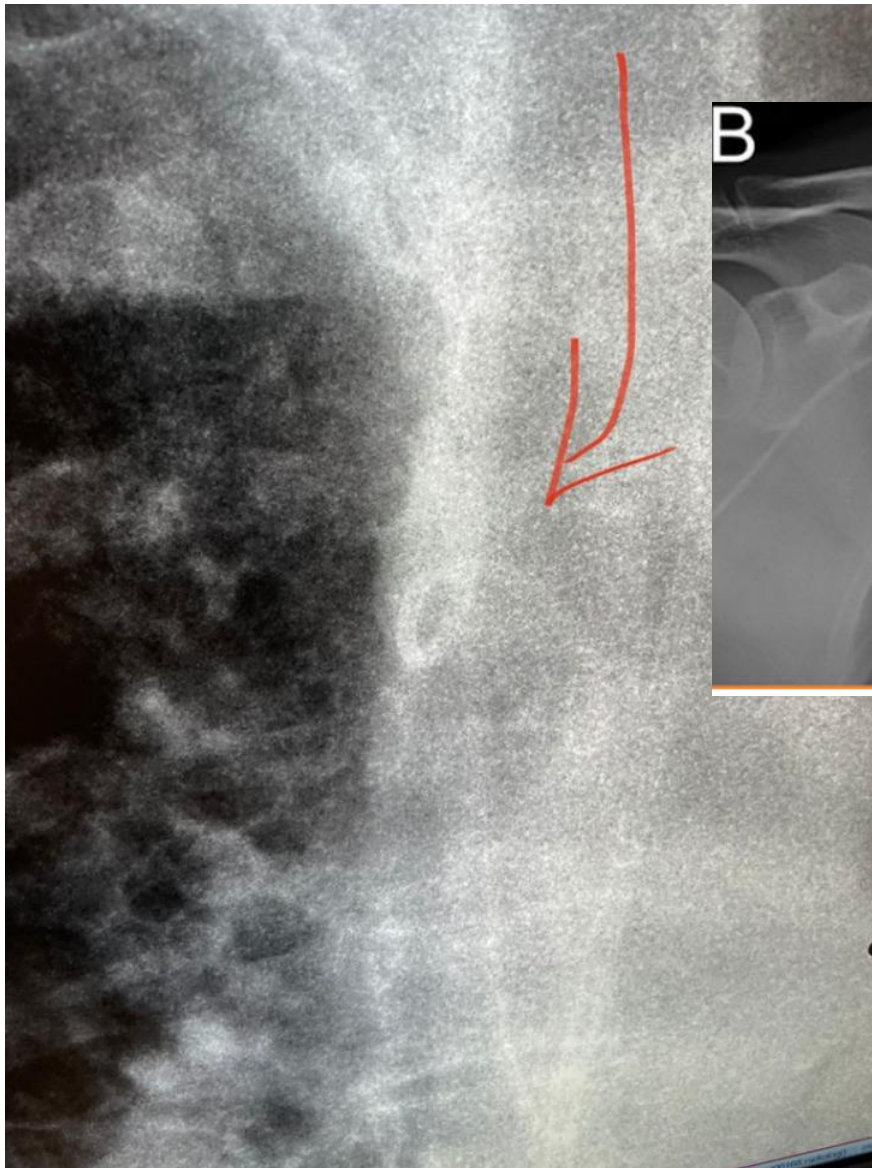
Tipi di
malposizionamento







Tipi di
malposizionamento

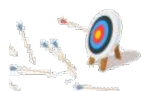
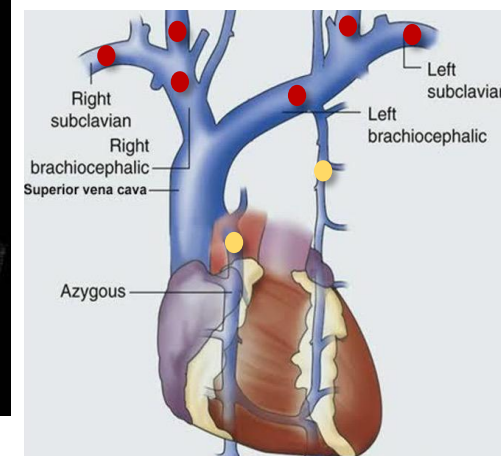
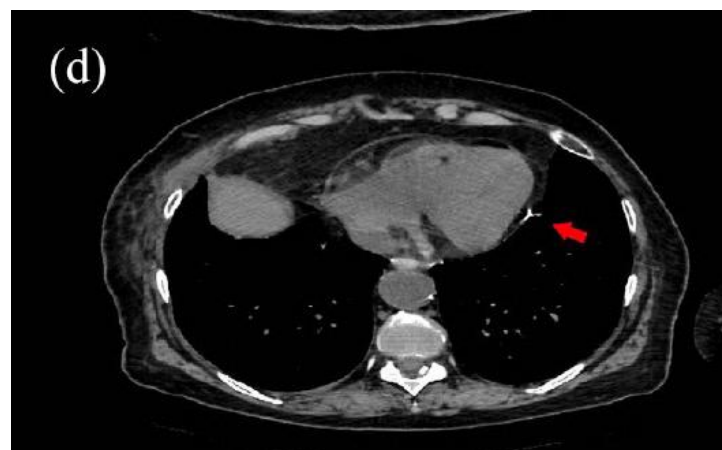


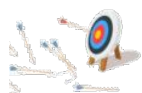
Unusual malposition of a peripherally inserted central catheter into the left pericardiophrenic vein: A case report

The Journal of Vascular Access
2022, Vol. 23(6) 969–972
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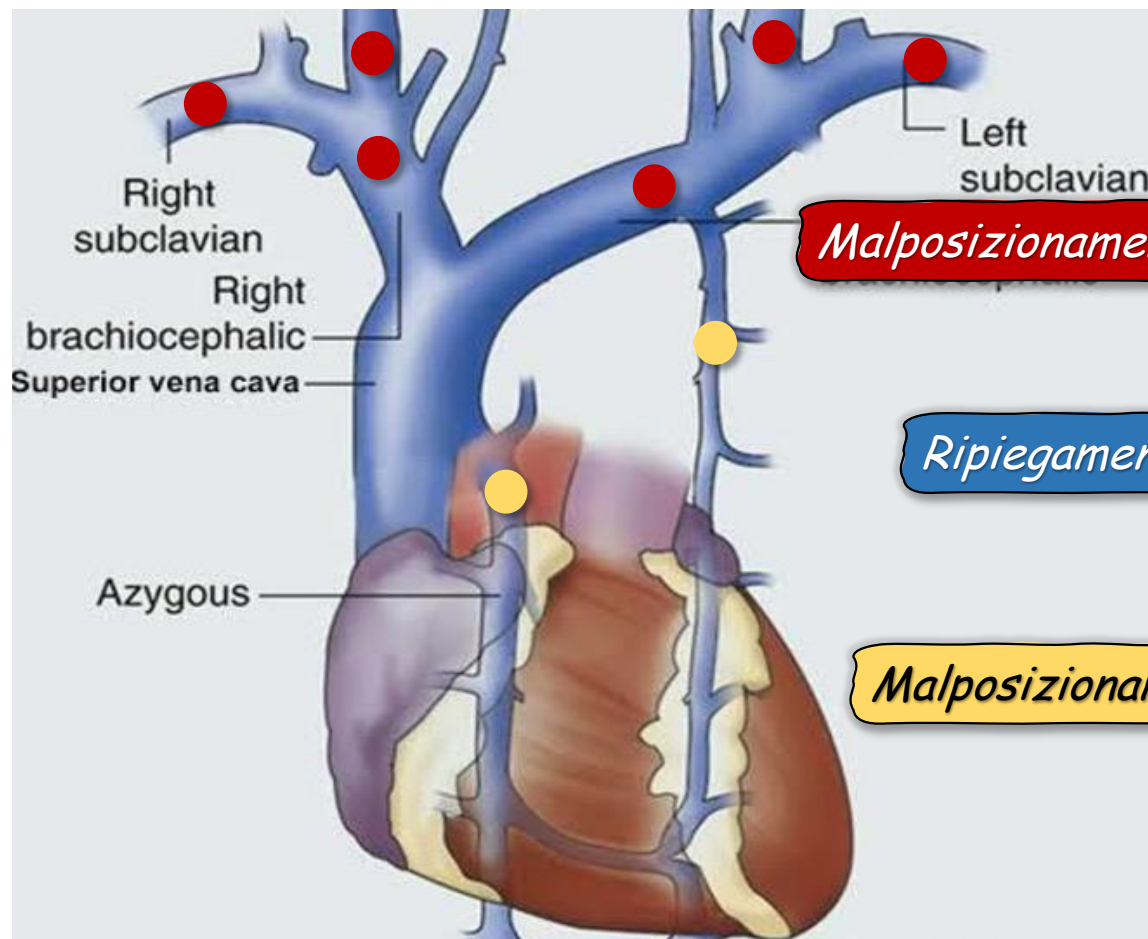


Tipi di
malposizionamento





Tipi di
malposizionamento



Malposizionamento nei vasi cervicotoracici

Ripiegamento del catetere o della punta

Malposizionamento fuori dai grandi vasi

Repositioning of central venous access devices using a high-flow flush technique - a clinical practice and cost review

Timothy R. Spencer



The **HFFT technique** can be described as a rapid manual flush using 10- to 20-cc 0.9% sterile sodium chloride, aseptically administered through the catheter via the distal lumen.

The upper half of the **patient's body is between 60 degrees and 90 degrees** in relation to the lower half of their body and is encouraged to perform several deep coughs prior to the administration of the flush.

Natural changes in intrathoracic pressure allows for catheter movement within the vessel due to changes in vessel size and flow dynamics. This process is repeated for every flush attempt.

Site of insertion	Number of HFFT attempts		
	HFFT 1 46 (86.8%)	HFFT 2 5 (9.4%)	HFFT 3 2 (3.8%)
L) Basilic vein	25	4	1
R) Basilic vein	19	1	-
L) Internal jugular vein	1	-	-
R) Axillary vein	1	-	1

Research Article

Guidewire-Assisted Reduction Technology Combined with Postural Reduction Improves the Success Rate of Internal Vein Catheterisation



Control group

- The tip of the catheter was withdrawn from the internal jugular vein under US monitoring;
- The operator withdrew the guidewire by 3–5 cm and slowly pushed the catheter (including the guidewire) to the estimated length prior to an ultrasound examination of the internal jugular vein.
- This operation could be repeated two to three times until it was confirmed by ultrasound examination that there was no catheter in the internal jugular vein.

Experimental group (guidewire-assisted reduction combined with postural reduction technology)

- An assistant helped the patient to raise the head of the bed by 90° to a high Fowler position before the surgeon withdrew the guidewire by 3–5 cm

Group	Total	Success	P value
Control	43	30 (70)	<0.001
Experimental	56	53 (95)	

**Fattori associati a
malposizionamento**

Original research article

JVA | The Journal of
Vascular Access

**Analysis of tip malposition and correction
of peripherally inserted central catheters
under ultrasound-guidance: 5-year
outcomes from a single center**

The Journal of Vascular Access
2025, Vol. 26(1) 72-80
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Come evitarlo

Variable	OR	95% CI	P value
Height (cm)	1.044	1.028-1.061	<0.001
BMI (kg/m ²)	1.051	1.017-1.087	0.003
Failed attempts at peripheral IV access	1.718	1.215-2.428	0.002
Side (left)	3.467	2.457-4.891	<0.001
Catheter length (cm)	0.763	0.734-0.794	<0.001
History of previous CVC (times	1.069	1.004-1.140	0.038

JVasc Access 2014; 15 (6): 498-502
DOI: 10.5301/jva.5000248

ORIGINAL ARTICLE

**A single institution experience of seven hundred consecutively
placed peripherally inserted central venous catheters**

	Reference	OR/95% CI	p
Age years		0.98 (0.96-1.0)	0.22
Gender: Male	Female	1.49 (0.69-3.22)	0.30
Risk Factor: Present	Absent	2.59 (1.03-8.48)	0.04
Right upper extremity access	Left	0.328 (0.14-0.76)	0.09
>2 Attempts	<2 Attempt	2.97 (2.15-4.08)	0.00

Fattori associati a corretto posizionamento ?

JVA
ISSN 1129-7298

J Vasc Access 2016; 17 (3): 249-255
DOI: 10.5301/jva.5000506

ORIGINAL ARTICLE

Which arm and vein are more appropriate for single-step, non-fluoroscopic, peripherally inserted central catheter insertion?

Eui-Yong Jeon¹, Young K. Cho², Dae Y. Yoon², Jin Ho Hwang³



Come evitarlo

TABLE III - The causes of failure of the single-step, blind, peripherally inserted central catheter pushing method in accordance with the accessed vein

Access vein	Both arms	Right arm	Left arm
Cephalic vein	91.0% (51/56)*	61.5% (8/13)	100% (43/43)*
Brachial vein	50.7% (66/130)	51.1% (23/45)	50.6% (43/85)
Basilic vein	50.6% (282/557)	49.7% (95/191)	51.1% (187/366)

* Statistically significant difference ($p < 0.05$) as compared to other veins.

TABLE IV - Location of obstacles in the single-step, blind, peripherally inserted central catheter pushing method (n = 399)

Obstacles	Both arms	Right arm	Left arm
Subclavian vein	28.8% (115/399)	47.6% (60/126)	20.1% (55/273)
Axillary vein	24.3% (97/399)	22.2% (28/126)	24.5% (67/273)
Brachiocephalic vein	19.3% (77/399)	4.7% (6/126)	26.0% (71/273)
Cephalic arch	8.0% (32/399)	6.3% (8/126)	15.7% (43/273)
Junction between internal jugular vein and superior vena cava	7.2% (29/399)	9.5% (12/126)	4.4% (12/273)
Superior vena cava	4.5% (18/399)	1.5% (2/126)	4.0% (11/273)
Peripheral upper arm veins	7.7% (31/399)	7.9% (10/126)	5.1% (14/273)



Continuing Medical Education Article

A randomized, controlled trial evaluating postinsertion neck ultrasound in peripherally inserted central catheter procedures

William D. Schweickert, MD; Jean Herlitz, RN; Anne S. Pohlman, RN, MSN; Brian K. Gehlbach, MD; Jesse B. Hall, MD; John P. Kress, MD

	Insertion Technique		p Value
	Control (n = 149)	Neck Ultrasound (n = 151)	
Superior vena cava	87 (58.4%)	104 (68.9%)	0.06
Ipsilateral IJ	11 (7.4%)	1 (0.7%)	0.003
malposition			
Other proximal vein	31 (20.8%)	28 (18.5%)	0.62
Subclavian vein	13 (8.7%)	11 (7.3%)	0.65
Brachiocephalic vein	14 (9.4%)	13 (8.6%)	0.81
Axillary vein	4 (2.7%)	4 (2.6%)	>0.99
Distal position ^a	11 (7.4%)	10 (6.6%)	0.80
Unable to access	9 (6.0%)	8 (5.3%)	0.81

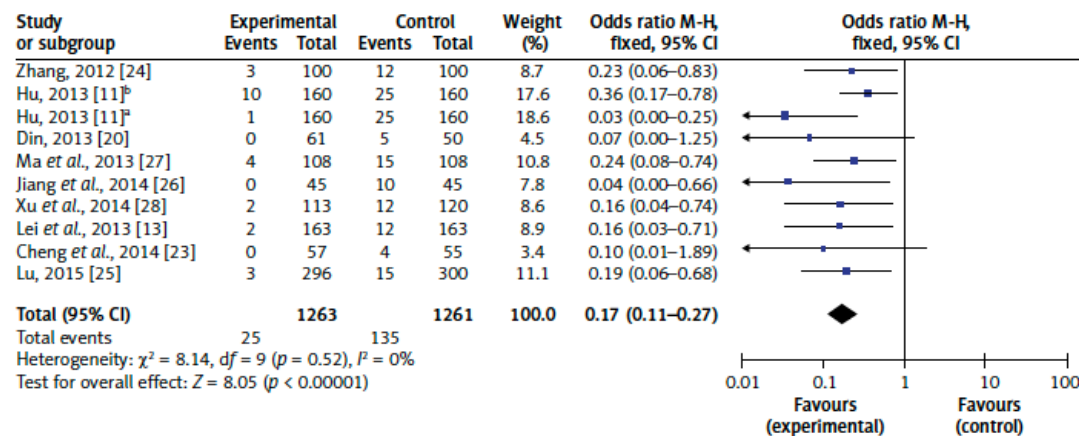
Eco per TIP navigation



Come evitarlo

Prevention of catheter tip malposition with an ultrasound-guided finger-pressure method to block the internal jugular vein during PICC placement: a meta-analysis

Yan Zheng¹, Hua-Jing Zhou², Nian Tao³, Yun Tian⁴, Shu-Wen Qin⁵, Bi-Yong Qin⁶, Yu Xia⁷



UGFCM (n = 300)	TPHM (n = 300)	P-value
5 (1.7)	31 (10.3)	< 0.001
3 (1.0)	27 (9.0)	0.000
0 (0)	1 (0.3)	0.317
n 1 (0.3)	1 (0.3)	
0 (0)	1 (0.3)	0.317
1 (0.3)	1 (0.3)	



Review

Meta-analysis of intracavitary electrocardiogram guidance for peripherally inserted central catheter placement

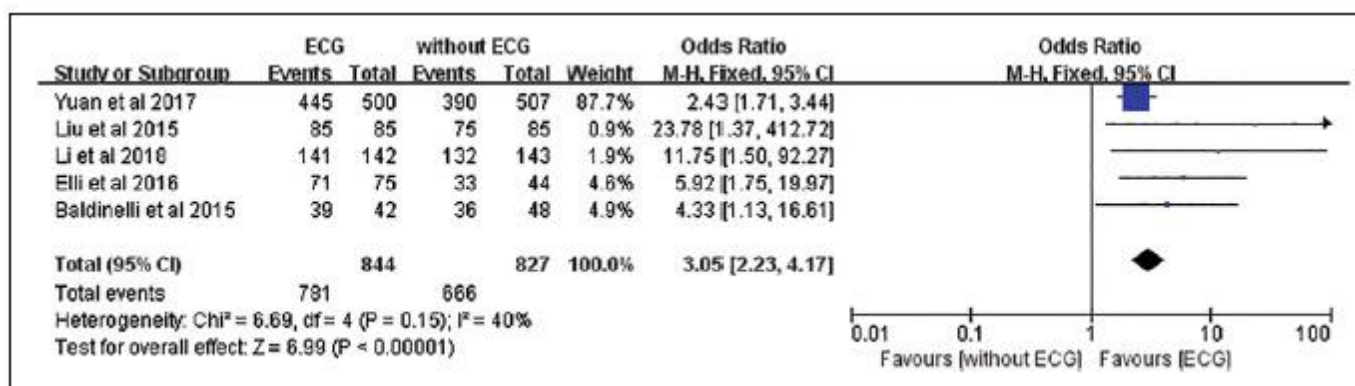
JVA The Journal of Vascular Access

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EKG per TIP location



Come evitarlo



The meta-analysis showed that the tip positioning accuracy of PICC in the IC-ECG group was higher than that in X-ray group (OR = 2.88, 95% CI: 2.15–3.87, $p < 0.01$).

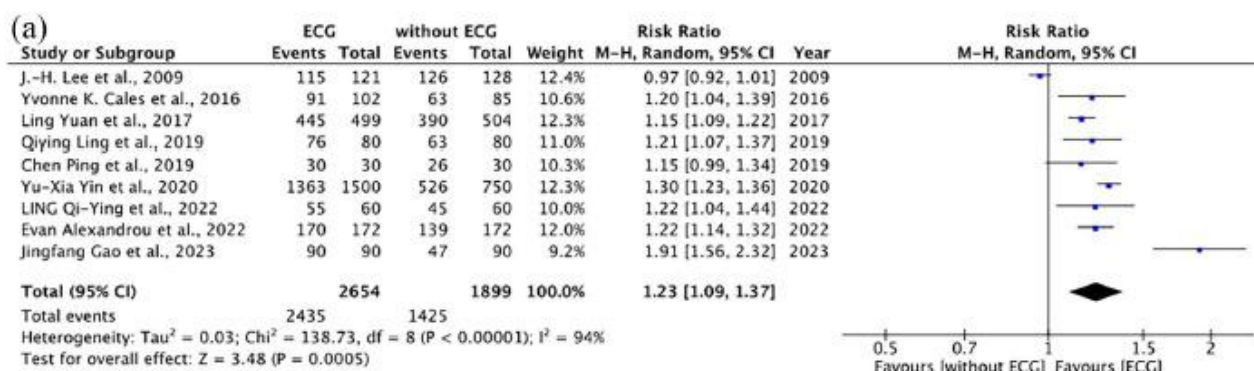
Intracavitary electrocardiogram guidance for peripherally inserted central catheter placement: A systematic review and trial sequential meta-analysis

The Journal of Vascular Access
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EKG per TIP location

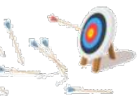


Come evitarlo



The total **incidence of complications** was significantly lower in the IC-ECG group than in the landmark group (RR = 0.34, 95% CI [0.18–0.65], $p = 0.001$)

Cumulative analysis showed no difference in **mean procedure time** between the IC-ECG and landmark groups (MD = -2.54, 95% CI [-7.09, 2.01], $p = 0.27$)

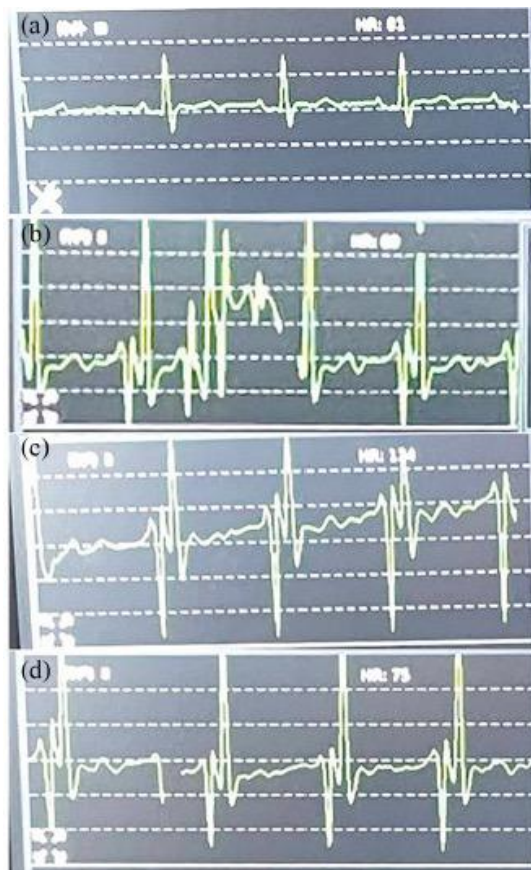


Case report

Intracavitary electrocardiogram guidance for peripherally inserted central catheter placement in a patient with persistent left superior vena cava: A case report

JVA | The Journal of
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EKG per TIP location



Come evitarlo

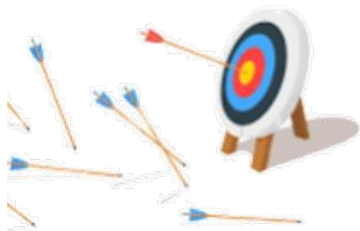
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Il corretto posizionamento dei PICC è nel terzo inferiore della VCS o alla giunzione CA



Il malposizionamento può avvenire con maggior frequenza nelle vene cervicotoraciche (VGI>V ascellare/succlavia) o in sistemi accessori



Si può rimediare utilizzando una guida metallica associando l'ecografia e l'ECG



Le vv brachiali e basilica del braccio destro riducono il rischio di malposizione, così come l'IC-ECG e la tip navigation con l'ecografo



PICC : malposizioni primarie



Thank you!



Gemelli



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Università Cattolica del Sacro Cuore

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