

The GAVeCeLT algorithm for choosing the most appropriate venous access device

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Why an algorithm?

A structured approach to the choice of the VAD is recommended by many guidelines and by many opinion leaders.

Advantages of an algorithm:

- Reduces the opinion-based variability
- Facilitates the education of the clinicians
- Improves the quality of care

Which algorithm?

- GAVeCeLT has developed an algorithm for the choice of the most appropriate VAD, based on the best evidence available in the international guidelines
- The algorithm has been recently adopted by the Hospital policies of the Catholic University Hospital (Rome, Italy)

Necessità accesso venoso nel paziente adulto per infusione, prelievi o monitoraggio emodinamico

Accesso venoso periferico

pH 5-9
farmaci con osmolarità <600
farmaci non vescicanti
farmaci non irritanti



Agocannula

vene superficiali del braccio disponibili
accesso periferico < 1 settimana
uso esclusivamente intraospedaliero

Cannula periferica lunga

vene superficiali del braccio non disponibili
accesso periferico > 1 settimana

Catetere Midline

accesso periferico > 3 settimane
accesso periferico ad uso extraospedaliero

Accesso venoso centrale

pH >9 o <5
farmaci con osmolarità >600
farmaci vescicanti
farmaci irritanti
nutrizione parenterale con osmolarità >800
necessità di prelievi ripetuti e frequenti
necessità di monitoraggio emodinamico

USO INTRA-OSPEDALIERO



Catetere ad inserzione periferica PICC

vene profonde del braccio disponibili
soltanto in elezione

Catetere ad inserzione centrale CICC

vene profonde del braccio non disponibili
inserzione in condizioni di urgenza
necessità di catetere 'medicato'
necessità di > 3 lumi

Catetere ad inserzione femorale

non tunnelizzato
in situazioni di emergenza
tunnelizzato
presenza di ostruzione vena cava superiore

USO EXTRA-OSPEDALIERO Day Hospital, Domicilio, Hospice



ACCESSI A MEDIO TERMINE (< 4 MESI)

PICC

- vene profonde del braccio disponibili

CICC tunnelizzato

- vene profonde del braccio non disponibili

ACCESSI A LUNGO TERMINE (> 4 MESI)

uso episodico: < 1/settimana:

Port

uso frequente: > 1/settimana:

Catetere Cuffiato Tunnelizzato CCT
ad inserzione periferica/centrale/femorale

GAVeCeLT
Gli Accessi Venosi Centrali a Lungo Termine

First step: choice between a
peripheral VAD and a central VAD

Indications to a central VAD

I.V. solutions with pH < 5 or > 9

Drugs with osmolarity > 600 mOsm/l

Parenteral nutrition

Vesicant drugs and any drug potentially associated with endothelial damage

Hemodynamic monitoring

Repeated blood samples

Need for medium or long term i.v. line (months or years)

Infusion Drug List: pH, Osmolality, reported phlebitis

Drug	Diluent	pH	mOsmol/L	Phlebitis
Acyclovir	NS @ 5mg/ml	10.5-11.6	316	yes
Amikacin	NS @ 5mg/ml	3.5-5.5	349	
Aminophylline	NS @ 5mg/ml	8.6 - 9	327	
Amiodarone	D5W @ 2mg/ml	4.1		yes
Amphotericin B	D5W @ 0.1mg/ml	5.7	256	yes
Amphotericin B Albecet	D5W @ 1-2mg/ml	5.5 - 6	~280	yes
Amphotericin B Ambisome	D5W @ 1-2mg/ml	5 - 6	~280	yes
Amphotericin B Amphotec	D5W @ 0.2-0.8mg/ml	5 - 6	~280	yes
Ampicillin - Sulbactam	NS 100ml	9 (8 - 10)	~400	yes
Ampicillin 1 & 2 gm	NS 100ml	9 (8 - 10)	328 - 372	
Amrinone	NS @ 2.5mg/ml	3.2 - 4	~300	yes
Azithromycin 500 mg	NS @ 2mg/ml	6.4 - 6.8	~280	yes
Aztreonam 1 gm	SWI 10ml	6 (4.5-7.5)		
Aztreonam 1 - 2 gm	NS 100 ml	6 (4.5-7.5)	315-352	
Aztreonam 1- 2 gm Frozen	Dextrose 50ml	5.0 - 5.6	270 - 330	
Bleomycin	NS@3units/ml	4.5 - 6	~300	
Carboplatin	D5W 0.2 - 2 mg/ml	5 - 7	~250	

Peripheral venous access

Short cannulas

pH 5 – 9

Osmolarity < 600 mOsm/l

Non-vesicant drugs

Non-irritant drugs

Long peripheral cannulas

Midline catheters

Peripheral VADs

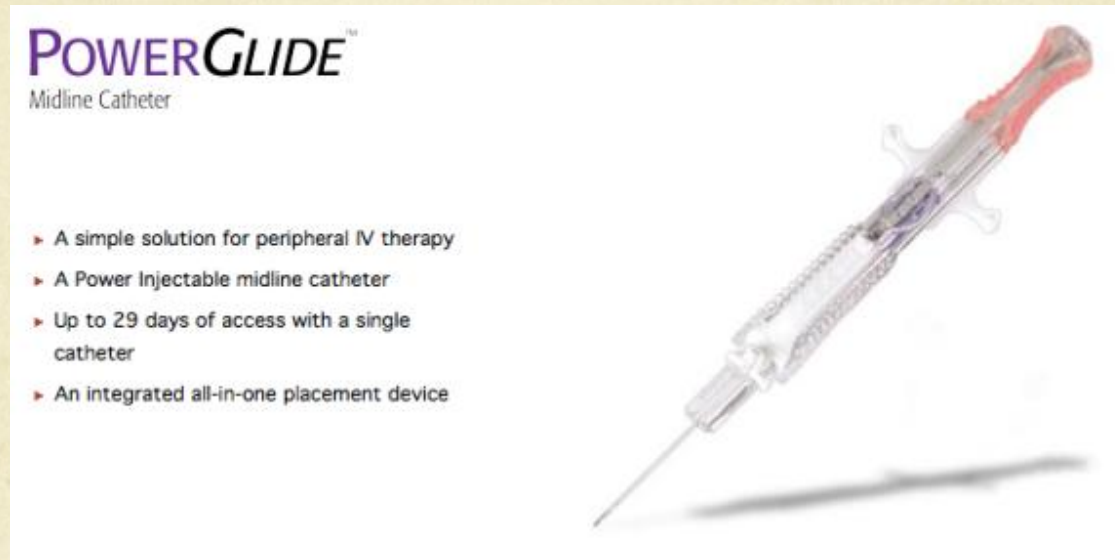
- Stainless steel needles
 - Appropriate only for bolus infusion
- Short cannulas (3-6 cm)
- Long peripheral cannulas (6-15 cm)
- Midline catheters (> 15 cm)

Short peripheral cannulas

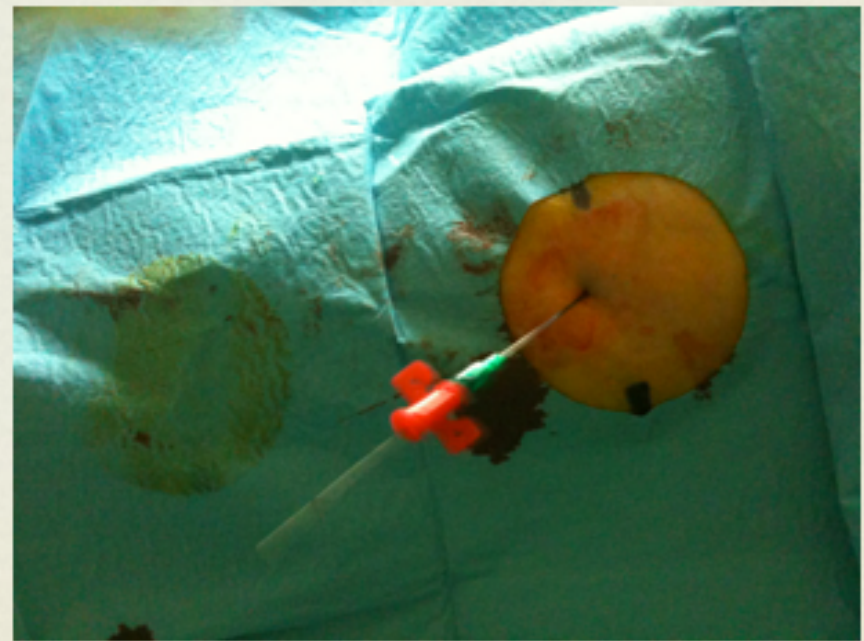
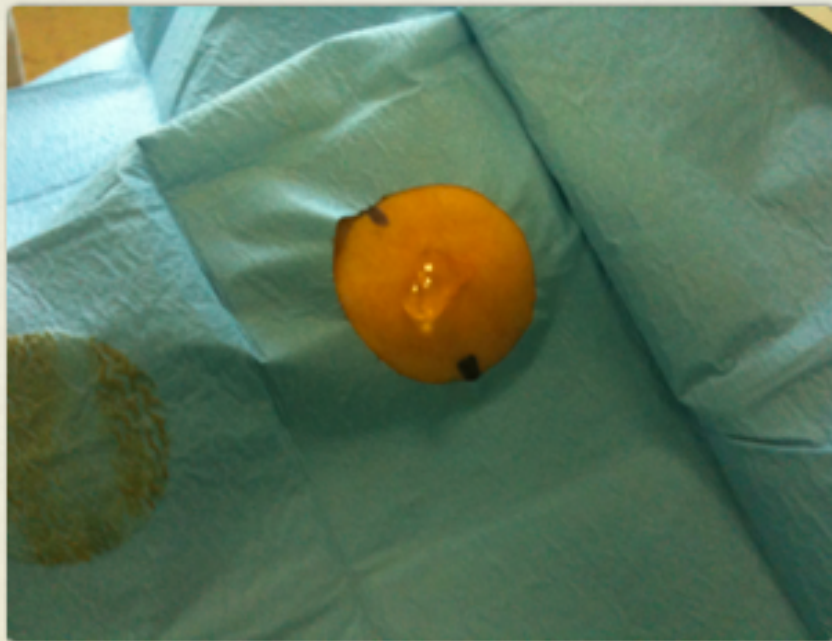
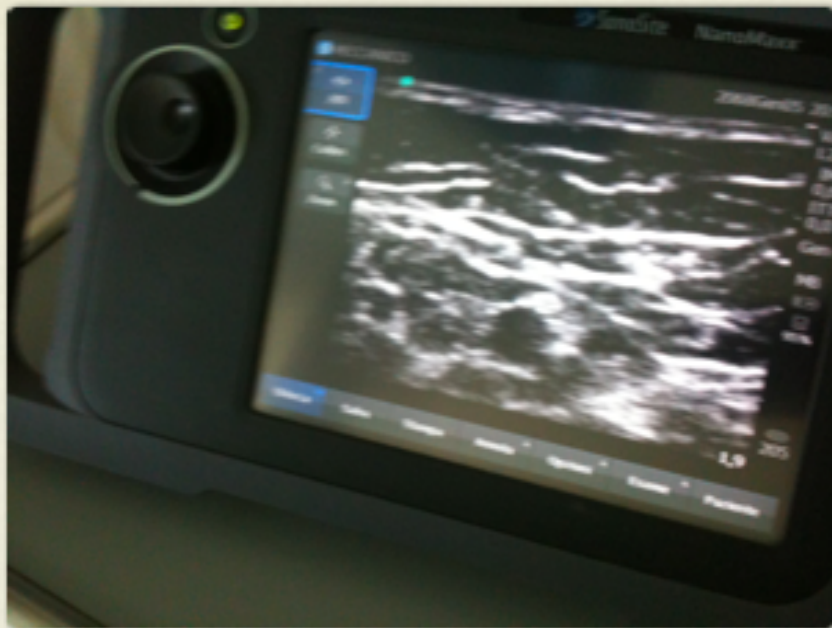


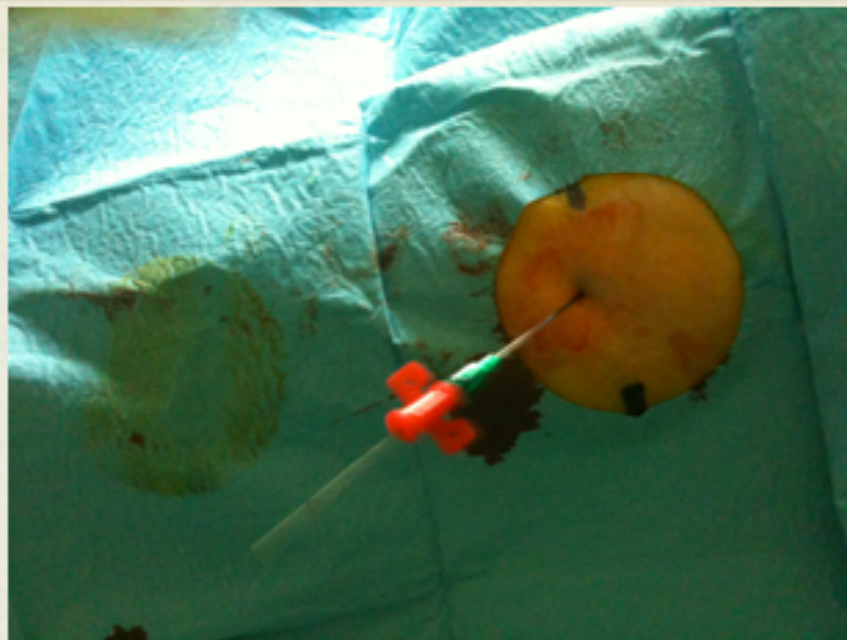
Only if superficial veins of the arm are visible/palpable
Only for limited period of time (days)
Only for intrahospital use

Long peripheral cannulas (‘mini-midline’)

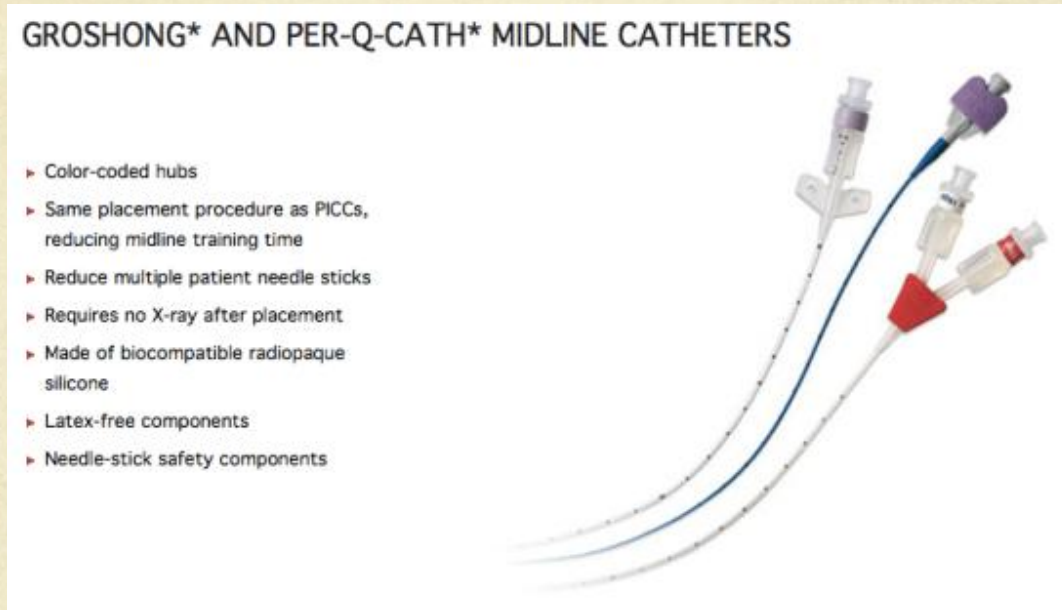


Either in superficial veins of the arm or in deep vein (US)
Appropriate for < 4 weeks





Midline catheters



Either in superficial veins of the arm or in deep vein (US)
Appropriate for weeks or months
Also for extra-hospital use

What is the difference between Midlines and 'mini-midline' ?

- It is not just a problem of length in cm
- The difference is CLINICAL, and it is related to the position of the tip

MIDLINE: tip in the infra/supraclavicular area (axillary or subclavian)

- if CRT occurs, it makes a bigger damage

MINI-MIDLINE: tip in a vein of the arm

- more prone to malfunction
- blood sampling is less reliable
- shorter duration

Peripheral VADs

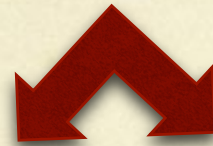
	Short cannulas	Long cannulas	Midline
Length	3-6 cm	6-15 cm	> 15 cm
Material	teflon	polyurethane	Polyurethane, silicon
Insertion	blind	Blind or US	Blind or US
Technique	Direct cannulation	Simple Seldinger	Modified Seldinger
Ok for emergency	yes	yes	no
Duration	days	weeks	months
Power injectability	if 20G or >	yes	no
Extra-hospital use	no	yes	yes

Peripheral venous access



For less than 4 weeks

For more than 4 weeks
(extrahospital use)



< 1 week

> 1 week



MIDLINE

Superficial veins
available

Superficial veins
not available



SHORT PERIPH. CANNULA



LONG PERIPHERAL CANNULA
(MINI-MIDLINE)

Peripheral VADs are not appropriate for:

pH < 5 or > 9

osmolarity > 600

parenteral nutrition

vesicant or irritant drugs

need for repeated blood samples

need for hemodynamic monitoring

IN SUCH CASES, A CENTRAL LINE IS NEEDED

How to choose the most appropriate central line ?

Central line for intrahospital use

- PICC - Peripherally inserted central catheters
 - 'Brachial CVC'
- CICC – Centrally inserted central catheters
 - 'Chest CVC' or 'cervico-thoracic CVC'
- FICC – Femorally inserted central catheters
 - 'Groin CVC'

All central lines should be placed by ultrasound guidance !

Intensive Care Med
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**International evidence-based
recommendations on ultrasound-guided
vascular access**

US guidance is the state of the art, not only for CICC's, also for PICCs



INTERNATIONAL & RESEARCH



No Going Back: Advantages of Ultrasound-Guided Upper Arm PICC Placement

Liz Simcock, RCN, BA Hons.

The Art and Science of Infusion Nursing

Geniene Stokowski, BScN, RN

Denise Steele, RN

Donna Wilson, PhD, RN

The Use of Ultrasound to Improve Practice and Reduce Complication Rates in Peripherally Inserted Central Catheter Insertions

Final Report of Investigation

The use of peripherally inserted central catheters (PICCs) in the UK has been introduced in 1995. Ultrasound-guided upper arm placement - which has become the standard - is gradually attracting interest amongst PICC placers in the UK. The literature improves insertion success rate (Hockley, Hamilton, Young, Chapman, Taylor, Creed, Gaike, Gaike, Gaike & Maraveyas, 2008) and patient satisfaction (Polak, Anderson, 2000; McMahon, 2002). Following a switch to upper arm placement at her institution from before and after the change in practice to see if there were other measur-

four-year period shows that upper arm placement in our patient population improves longevity, while reducing exit site infection, thrombosis and catheter migration. The study shows that ultrasound-guided upper-arm placement improves patient outcomes. The traditional antecubital approach should consider a change in practice.

But US-guidance is not enough

- Successful puncture and cannulation of the vein is not enough
- We need proper placement of the tip of the central line:

EKG guidance

EKG-guide has become the state of the art, not only for CICCs, also for PICCs

J Vasc Access 2011; 12 (4): 280-291

DOI: 10.5301/JVA.2011.8381

REVIEW

The electrocardiographic method for positioning the tip of central venous catheters

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J Vasc Access 2012; 13 (3): 357-365

DOI: 10.5301/JVA.2012.9020

The intracavitary ECG method for positioning the tip of central venous catheters: results of an Italian multicenter study

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RESEARCH & INTERNATIONAL

The EKG method for positioning the tip of PICCs: results from two preliminary studies

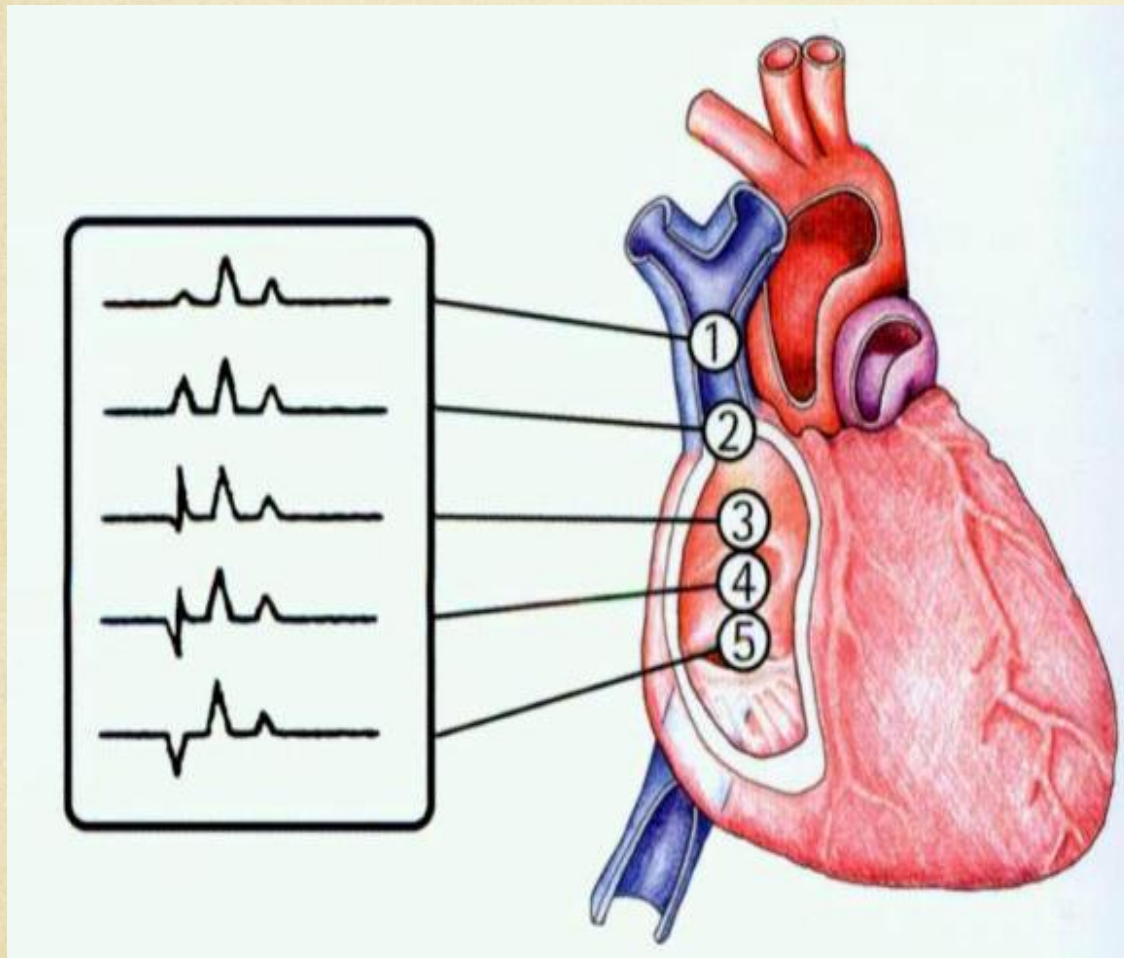
Mauro Pittiruti¹ MD, Giancarlo Scoppettuolo² MD, Antonio La Greca¹, MD, Alessandro Emoli³, RN, Alberto Brutti⁴, RN, Ivano Migliorini⁵, RN, Laura Dolcetti², RN, Cristina Taraschi², RN, Gennaro De Pascale¹, MD
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Abstract

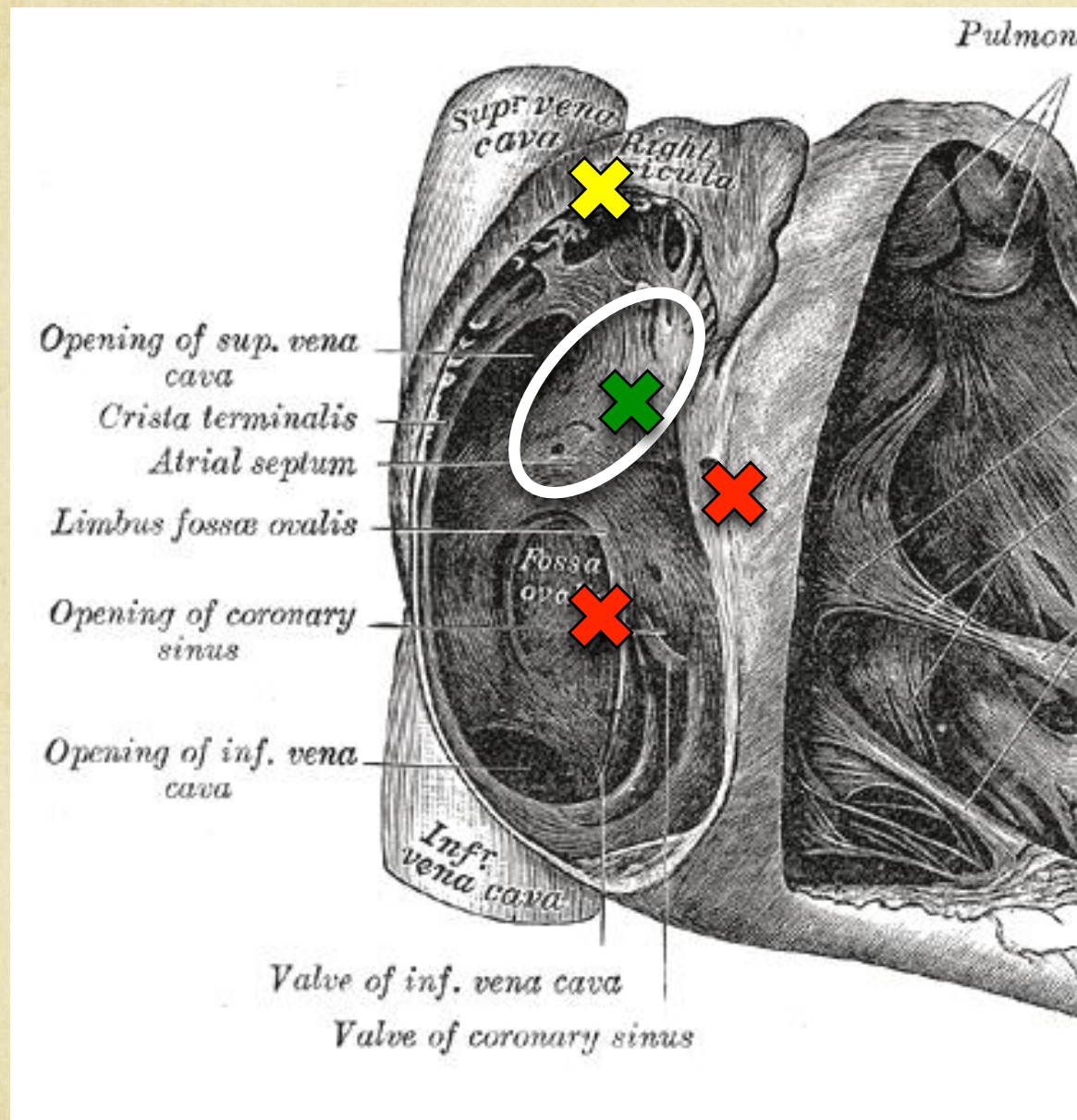
Two studies were conducted to determine feasibility of using the electrocardiography (EKG) method to determine the location when inserting a peripherally inserted central catheter (PICC). This method uses the guide-wire (or a column of saline contained in the catheter) as an intracavitary electrode. The EKG monitor to the intracavitary electrode. The reading on the EKG monitor reflects the closeness of the intracavitary electrode tip to the superior vena cava (SVC). The studies revealed that the EKG method was extremely accurate and confirmed using x-ray were located in the superior vena cava. In conclusion, the EKG method has clear advantages in terms of accuracy, cost-effectiveness, and feasibility in conditions where the use of x-ray is difficult or expensive to obtain. The method is quite simple, easy to learn and to teach, non-invasive, safe, and apt to minimize malpositions due to failure of entering the SVC.

ORIGINAL ARTICLE

IC-EKG method



- Intracavitary ECG (lead II)
- The intracavitary electrode is the tip of the catheter
- Based on changes of P wave during the progression of the catheter into the central veins
- CAVO-ATRIAL JUNCTION: maximal peak of the P wave (= CRISTA TERMINALIS)



P increasing



Maximal P



**P decreasing
and/or diphasic**

IC-EKG

- Applicable in 91-93% of adults
- Feasible in 99%
- Safety 100%
- Accurate (maximal P = CAJ) in 91-99% of cases
 - 'real' accuracy (IC-EKG vs TEE): 99%
 - 'standard ' accuracy (IC-EKG vs Xray): 91-98%

Which is the first option as a CVC ?
PICC or CICC ?

Of course, we are exclusively talking
about US-guided PICCs...

US-PICC = a new venous access device

PICC

Very selected indications

High rate of failure at insertion

High rate of malpositions

High rate of late complications (infection, thrombosis)

No comfort for the patient

US-PICC

Wide indications

Success rate at insertion close to 100%

No malposition (IC-EKG)

Very low incidence of late complications (infection, thrombosis)

Maximal patient compliance



Why should we use a US-PICC and not a cervico-thoracic central line (CICC)?

Advantages of US-PICCs vs. CVCs

- Absolutely safe insertion, even in fragile and high-risk patients (coagulation abnormalities, tracheostomy, cardio-respiratory disorders, etc.)
- Low cost insertion (nurse-based, bedside)
- Low rate of bacteremic infections (CRBSI)
- More comfortable exit site
- Longer duration
- Appropriate also for extrahospital management

US-PICC = low risk of infection

Why ?

- Exit site is distant from nasal/oral/tracheal secretions
- Low contamination of arm skin
- Physical characteristics of arm skin (dry, thin)
- Exit site allows better cleaning and better stabilization of the dressing

US-PICC = low risk of infection

Studies on CRBSI with ultrasound-guided PICCs:

- 0/1000 days (Gebauer 2004 – pts on PN)
- 0.4/1000 days (Pittiruti 2006 – pts on PN)
- 0/1000 days (Harnage 2006)
- 0.3/1000 days (Scoppettuolo 2010 – infect.dis.pts)
- 0/1000 days (Cotogni 2013 – cancer pts on HPN)
- 0/1000 days (Botella 2013 – cancer pts on HPN)



Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevierhealth.com/journals/jhin



epic3: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England

H.P. Loveday^{a*}, J.A. Wilson^a, R.J. Pratt^a, M. Golsorkhi^a, A. Tingle^a, A. Bak^a, J. Browne^a, J. Prieto^b, M. Wilcox^c

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Selection of catheter insertion site

IVAD11 In selecting an appropriate intravascular insertion site, assess the risks for infection against the risks of mechanical complications and patient comfort.

Class D/GPP

IVAD12 Use the upper extremity for non-tunnelled catheter placement unless medically contraindicated.

Class C

Cost-effectiveness

- US-PICC means saving money
- To compare PICC vs. CICC is not just comparing the raw cost of two devices, but to compare the costs of two different clinical strategies:
 - PICCs = lower insertion cost, lower maintenance costs due to lower rate of complications, longer duration of the line, etc.

Cost-effectiveness

Cost-effectiveness depends also on WHERE the US-PICC is inserted, HOW and by WHOM (Mary Smith, Wisconsin University 2011):

	WHO	WHERE	HOW	
\$ 5000	surgeon	operating room	fluoroscopy	+ nurse
\$ 2800	radiologist	radiology suite	fluoroscopy	+ technician
\$ 1800	anaesthesist	bedside	no fluoro	
\$ 875	nurse	bedside	no fluoro	

Cost-effectiveness

Cost-effectiveness of US PICCs (Catholic University, Rome, Italy 2012):

	WHO	WHERE	HOW	
€ 2500	surgeon	operating room	fluoroscopy	+ nurse
€ 1850	radiologist	radiology suite	fluoroscopy	+ technician
€ 280	nurse	bedside	IC-EKG	

PICCs = longer expectancy of duration, if compare to CICC

PICC



- Appropriate for short and medium term i.v. infusion, both for hospitalized and non-hospitalized patients
- To be placed by ultrasound guidance
- To be removed only if not necessary anymore or in case of complication

(CDC 2011, INS 2011, SHEA 2008, AuSPEN 2008, ESPEN 2009, EPIC 2014)

CICC



- Appropriate for short term i.v. infusion, only in hospitalized patients
- To be placed by ultrasound guidance
- To be removed only if not necessary anymore or in case of complication

(CDC 2011, INS 2011, SHEA 2008, AuSPEN 2008, ESPEN 2009, EPIC 2014)

Myth

- 'high incidence of thrombosis...'

NO

- if we do a proper insertion (SIP protocol), including the GAVeCeLT recommendations for preventing thrombosis (careful choice of the vein, matching the vein diameter with the PICC diameter; minimal-trauma, US-guided venipuncture; proper tip location; appropriate securement)

Myth

- 'low flow device...'

NO

if we use power-injectable polyurethane PICCs,
we can get up to 5 ml/sec !

Myth

- 'high rate of lumen occlusion...'

NO

- if we use power-injectable polyurethane PICCs
- if we adopt a proper policy of flushing (saline only !)

Myth

- 'cannot measure the CVP...'

NO

- if we use power-injectable polyurethane PICCs
- if we adopt a proper policy of flushing (saline only)
- if we use open-ended PICCs

If a central VAD is needed:
PICC is the first option !

A new (?) concept

PICC = the ideal VAD in hospitalized patients requiring a central line

BUT:

- 1) The PICC must be placed by properly trained clinicians (nurses or physicians)
- 2) The PICC must be used by properly trained nurses (appropriate care of the exit site + appropriate care of the infusion lines)

Key to uneventful insertion:

Use a bundle of evidence-based, cost-effective strategies:

- US assessment

- US guidance

- Intracavitary EKG guide

- microintroducer technique

- sutureless securement

-

The SIP protocol

A GAVeCeLT bundle for the safe
implantation of PICCs

The SIP protocol

1. Hand washing, aseptic technique and maximal barrier protection
2. Bilateral US scan of all veins at arm and neck
3. Choice of the appropriate vein at midarm (vein mm = or > cath Fr)
4. Clear identification of median nerve and brachial artery
5. Ultrasound guided venipuncture
6. US scan of IJV during introduction of the PICC
7. EKG method for assessing tip position
8. Securing the PICC with a sutureless device

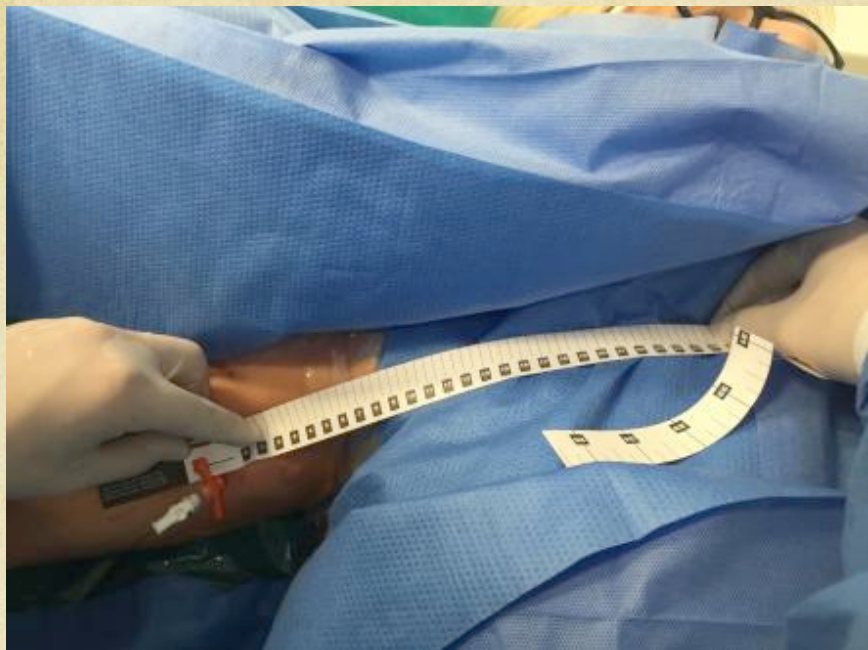
Goals of the SIP bundle

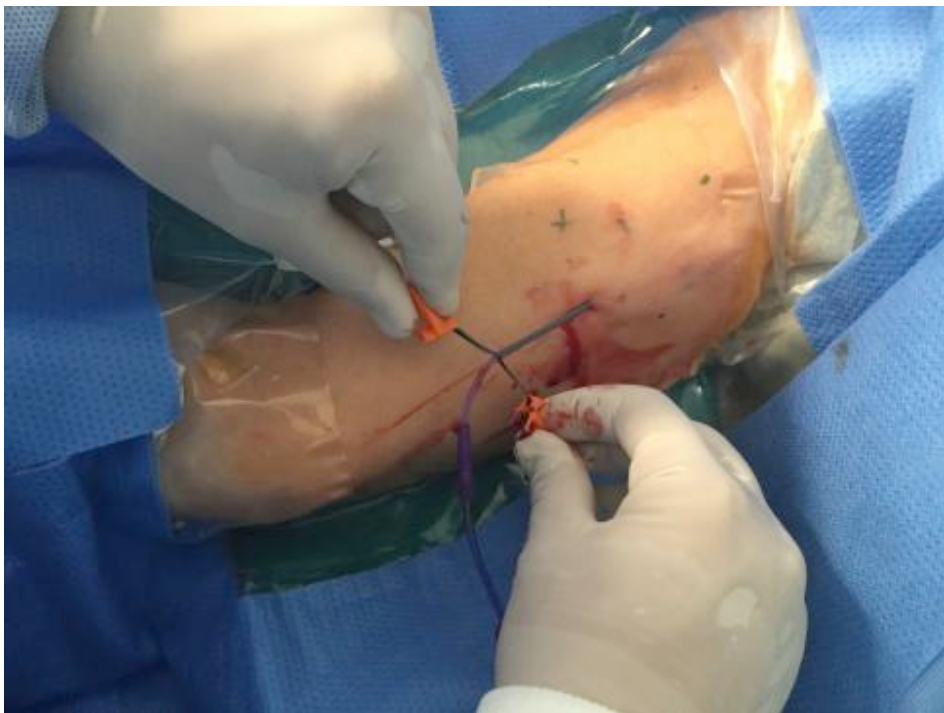
- Minimize complications related to venipuncture:
 - Failure, repeated punctures, nerve injury, arterial injury
- Minimize malpositions
- Minimize venous thrombosis
- Minimize dislocation
- Minimize infection

Insertion of a non-tunneled PICC









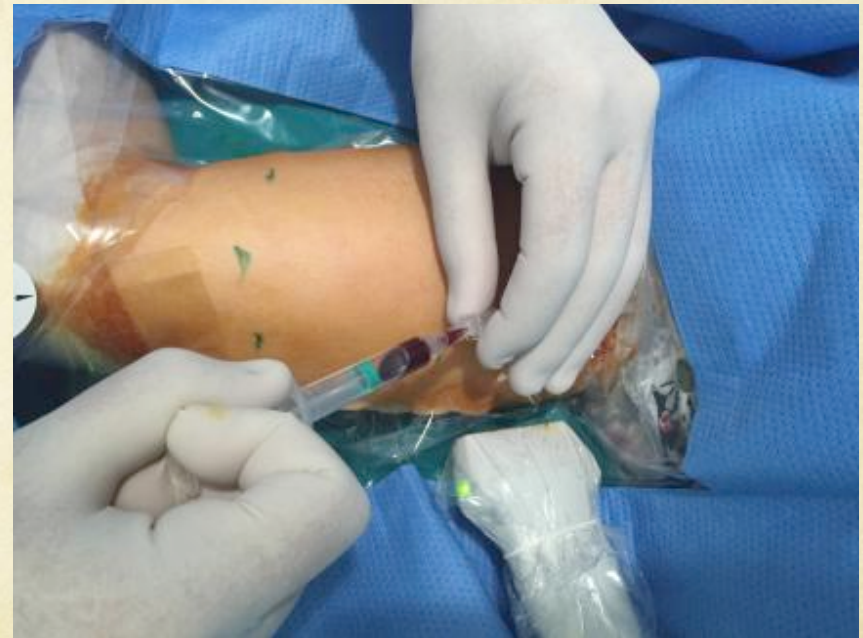
Expanding the indications of PICCs...

When veins in the middle third of the upper arm are too small ($< 3 - 4$ mm)....

..... we can puncture a larger vein in the proximal third of the upper arm and TUNNEL the catheter so to have an exit site in the middle third !

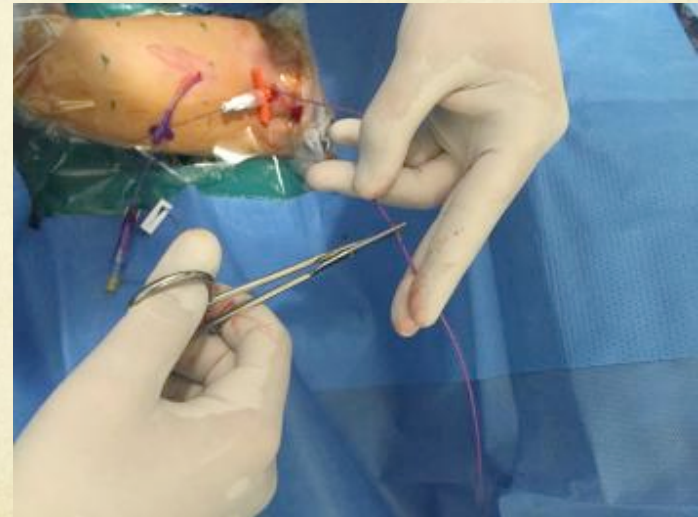
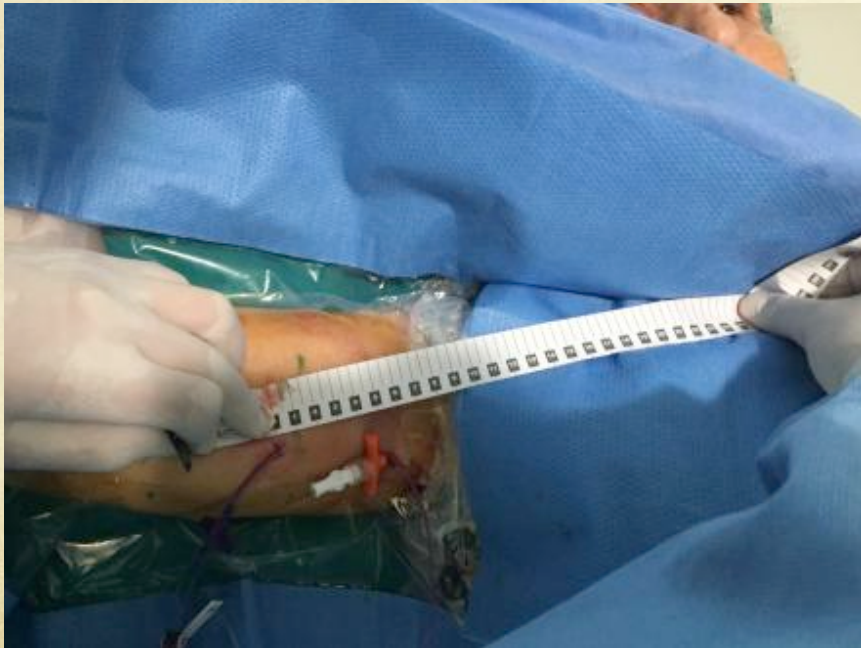
Insertion of a tunneled PICC

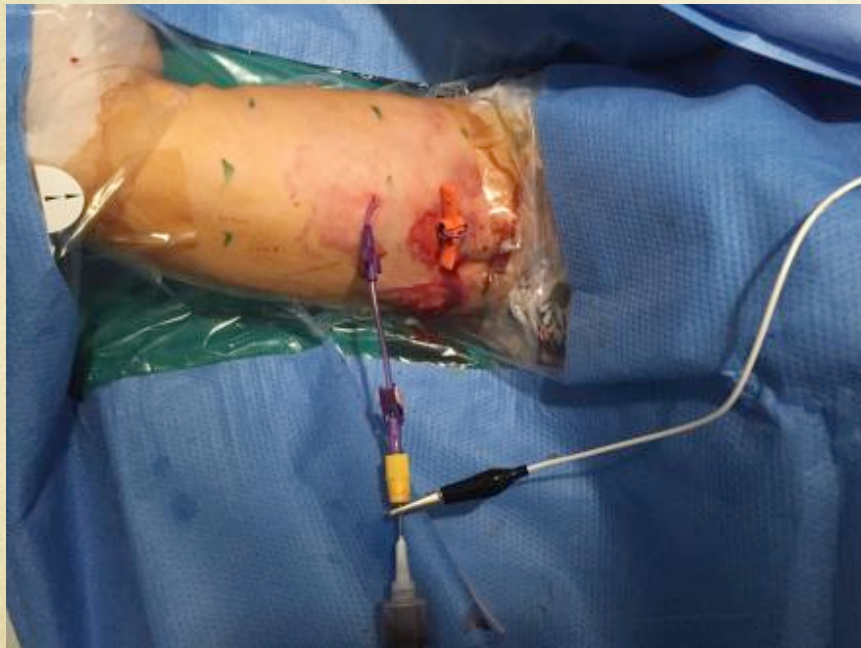
















When should we place a CICC ?

- Patients with AV-fistula (or CRF stage 3b – 5)
- Patients with bilateral local contraindications to PICC insertion (axillary node dissection, deep veins < 3mm, skin or bone abnormalities, deep venous thrombosis, etc.)
- Emergency central line needed in ER or in ICU or in OR
- Patients needing a central line with > 3 lumens

When should we place a FICC ?

- Emergency central line in ER (shock, trauma, etc.)
 - Non-tunneled FICC
- Superior vena cava obstruction
 - Tunneled FICC

When PICC are not indicated...

1. US-guided insertion of CICC in the axillary vein (infraclavicular exit site)
2. US-guided insertion of CICC in the brachio-cephalic, subclavian or internal jugular veins (supraclavicular exit site)
3. US guided insertion of FICC in the femoral vein (exit site at the groin is avoided by tunneling)

US-guided insertion of CICC
in the axillary vein
(infraclavicular exit site)





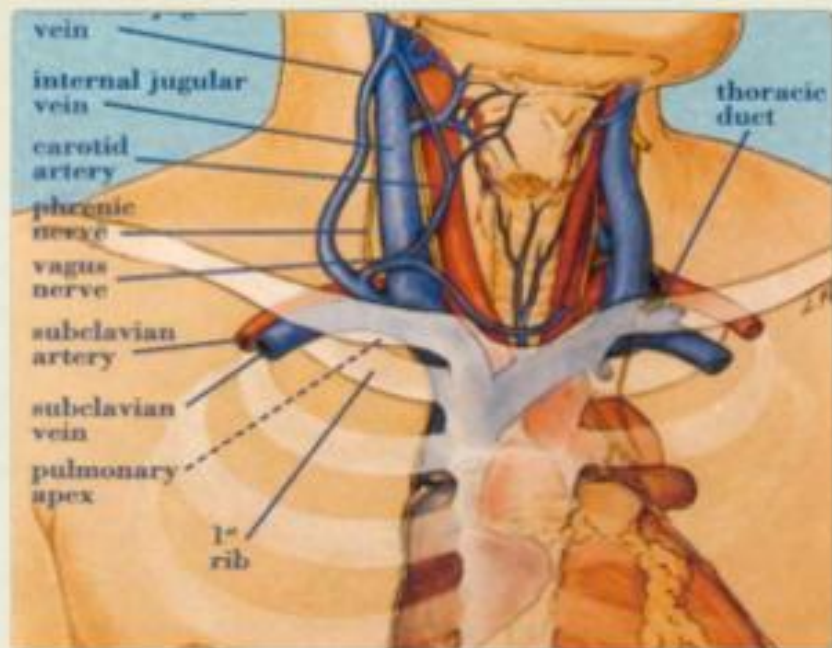








US-guided insertion of CICC in
the brachio-cephalic, subclavian
or internal jugular veins
(supraclavicular exit site)



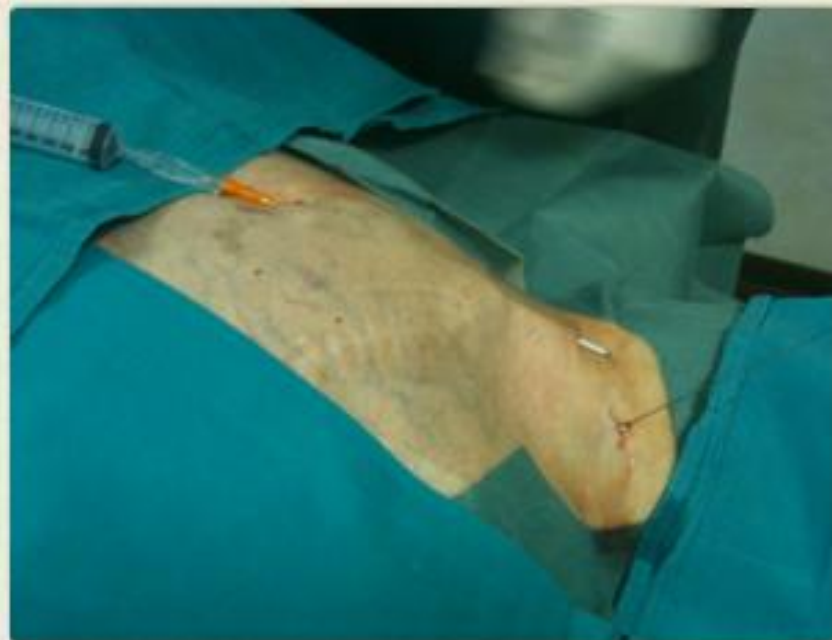




US guided insertion of FICC in the femoral vein (exit site at the groin is avoided by tunneling)









PICCs in adult hospitalized patients

- ideal central line for intra-hospital PN
- ideal central line in the perioperative period
- ideal central line for any short/medium term i.v. infusion (antibiotics, etc,)
- ideal central line for ICU patients !

CICC vs PICC in ICU

DEFINITE INDICATION TO PICCs:

- tracheostomy
- high risk infection should the emergency site should be at the neck or chest (local abnormalities)
- coagulation disorders
- prolonged ICU stay
- difficult access to the neck/chest area (helmets, halos, etc.)

CICC vs PICC in ICU

DEFINITE INDICATION TO CICC_s

- central line in emergency/urgency
- need for > 3 lumens
- systemic or local contraindications to PICCs
- need for blood exchange procedures

In hospitalized patients

Power-injectable,
polyurethane PICCs are the
first option for central
venous access in most
hospitalized patients

Central VAD for intra-hospital use



Elective CVC

Emergency CVC

First option: PICC

Second option: CICC (axillary)

Third option: CICC (supraclavicular)
preferably tunneled

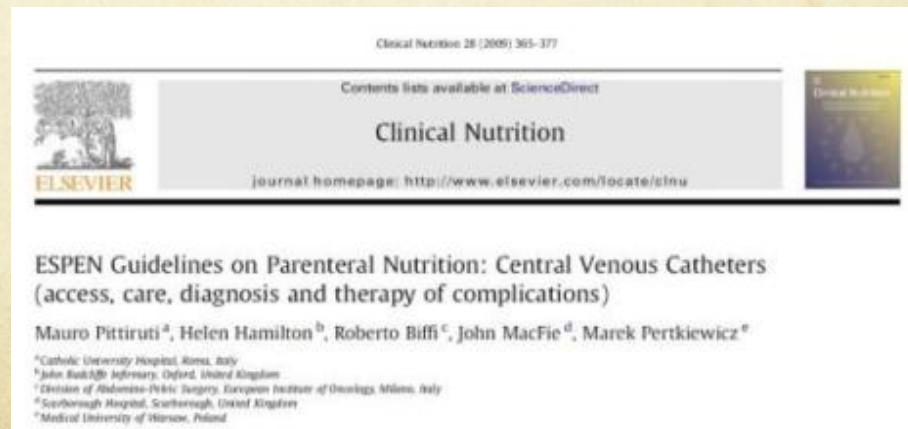
Fourth option (SVC obstruction):
tunneled FICC

FICC or CICC
(to be removed
within 48 hrs)

What about non-
hospitalized patients?

ESPEN guidelines 2009

- *'Home PN should not normally be given via short cannulas as these carry a high risk of dislocation and complications'*
- *'Non-tunneled central venous catheters are discouraged in home PN, because of high rates of infection, obstruction, dislocation, and venous thrombosis.'*



Vascular Access in Oncology Patients

Maurizio Gallieni, MD; Mauro Pittiruti, MD; Roberto Biffi, MD

‘Peripheral cannulas and short term CVCs should be used only for hospitalized patients’

‘The use of short-term CVCs for nonhospitalized patients should be discouraged, considering their high susceptibility to infection and the risk of obstruction of the device, dislocation, and catheter related venous thrombosis.’

AuSPEN guidelines for HPN, 2008

- Tunneled catheters (e.g., Hickman/Broviac with or without Groshong valve silicone catheters; Bard Access Systems, Salt Lake City, UT, USA): These offer acceptable rates of sepsis and thrombosis and ease of use. The visible length may be repaired if damaged (level III-2).
- Fully implanted catheters: (e.g., Port-a-cath): These CVCs are accessed through the skin by a needle and are favored by some patients for functional and cosmetic reasons, e.g., bathing and swimming, and could be considered for patients with a coexistent stoma. These are often also better suited for intermittent rather than daily use (level IV).
- Peripherally inserted CVCs: These are acceptable for short-term HPN (can provide access for up to 12–18 mo) [34]. Because the exit position effectively disables one hand, self-care may be difficult (level III-2).

In summary:

For extra-hospital use, medium term or long term VADs should be preferred



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epic3: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England

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IVAD8 Use a tunnelled or implanted central venous access device with a subcutaneous port for patients in whom long-term vascular access is required.

Class A

IVAD9 Use a peripherally inserted central catheter for patients in whom medium-term intermittent access is required.

New recommendation *Class D/GPP*

PICC in non-hospitalized patients

- ideal central line for short term extra-hospital PN
- ideal central line for palliative care
- ideal central line for advanced-stage cancer patients at home or in hospice



Medium term VAD for extrahospital use

- First Option:
 - PICC (tunneled or non-tunneled)
- In case of contraindications to PICC:
 - Tunneled CICC
 - Tunneled FICC



Long term VAD for extrahospital use

Infrequent use (< 1 per week)

- Chest Port
- PICC-port

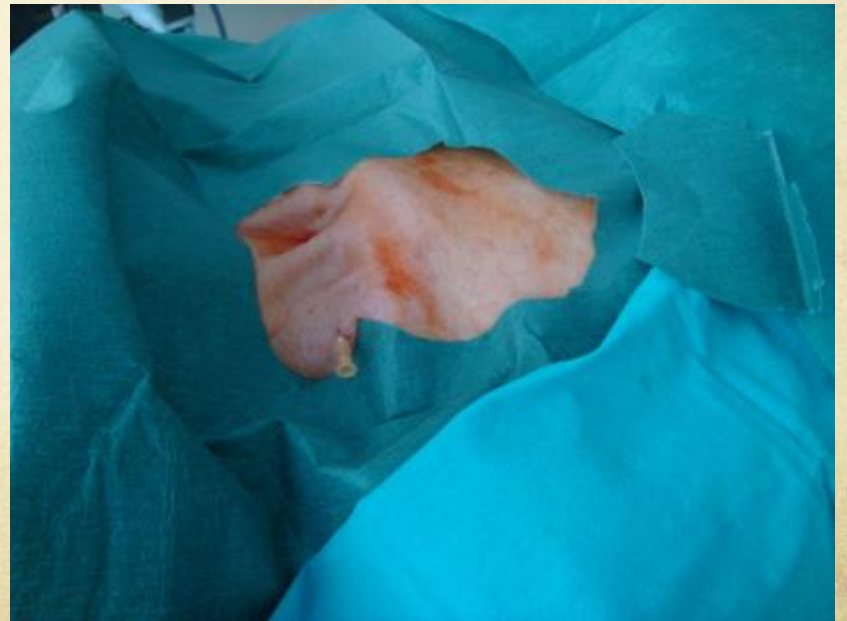
Frequent use (> 1 per week)

- Tunneled cuffed catheters
 - At the arm – cuffed PICCs
 - At the chest – cuffed CICC
 - At the groin – cuffed FICC
- PICCs (in selected cases)

Insertion of a chest port



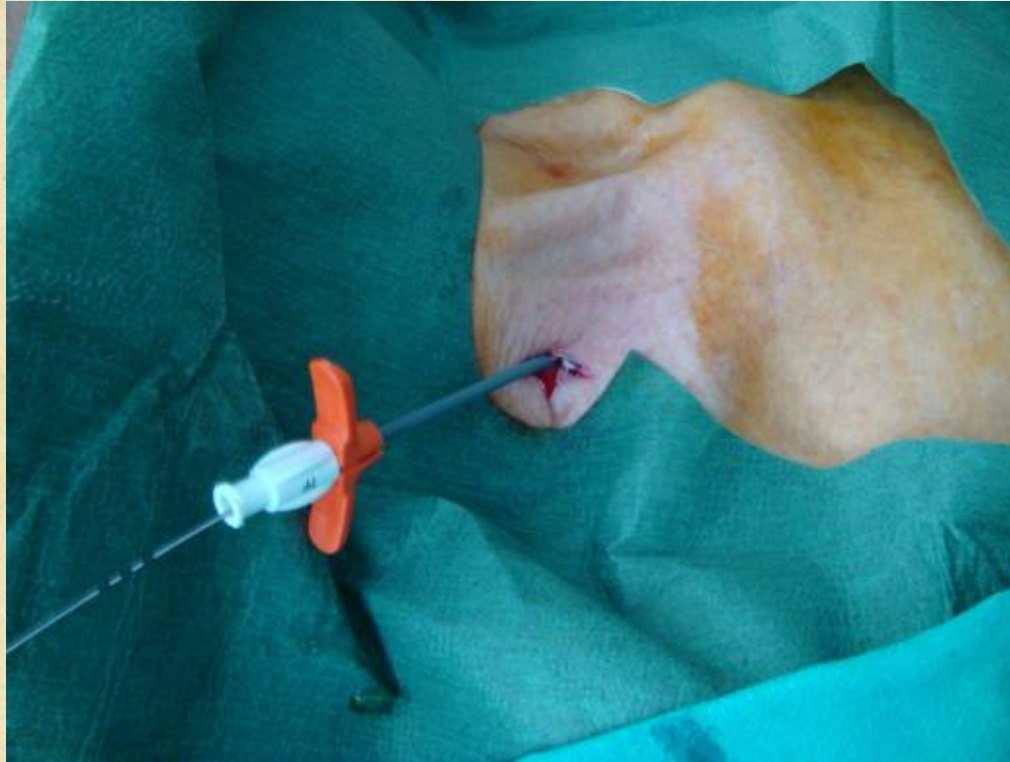


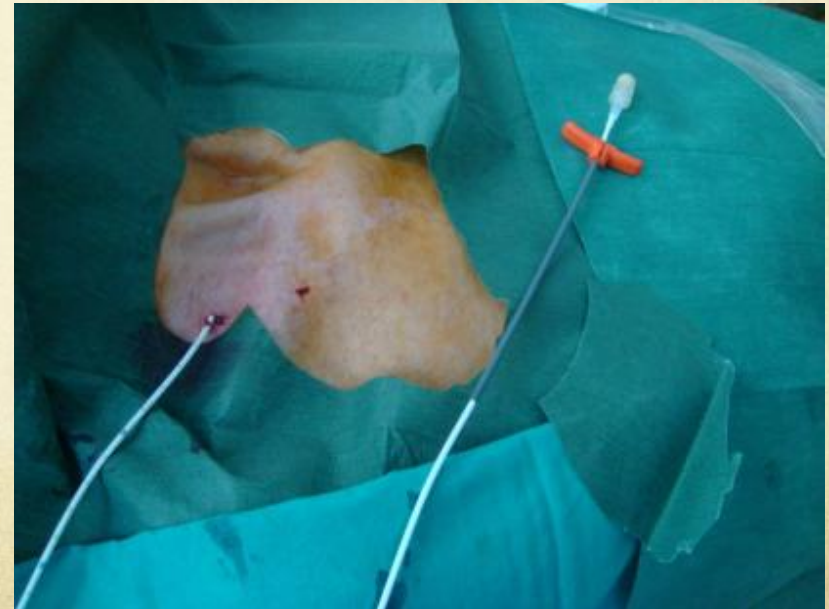






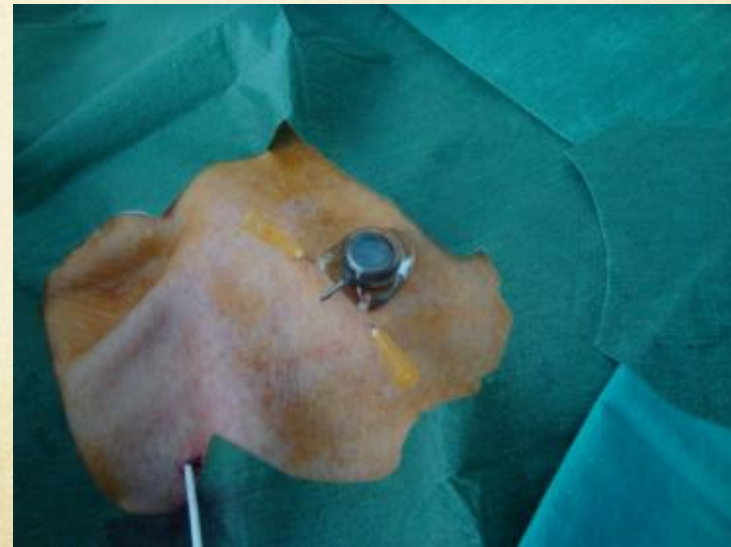
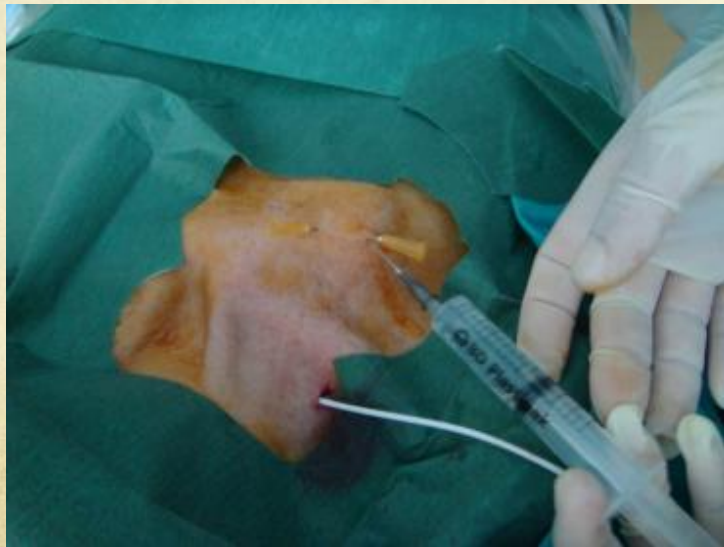
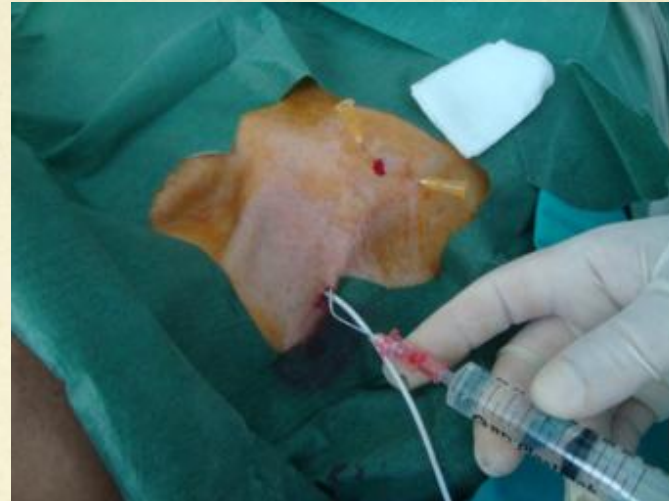


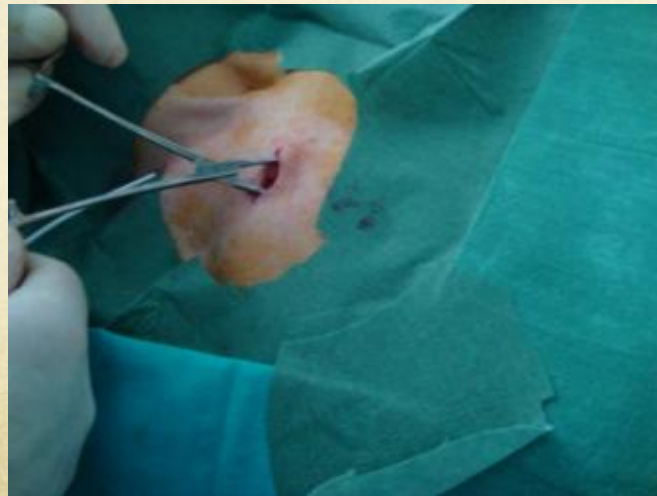


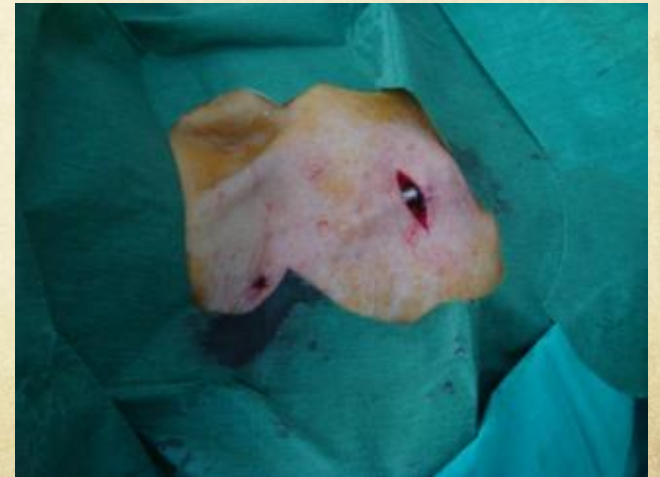


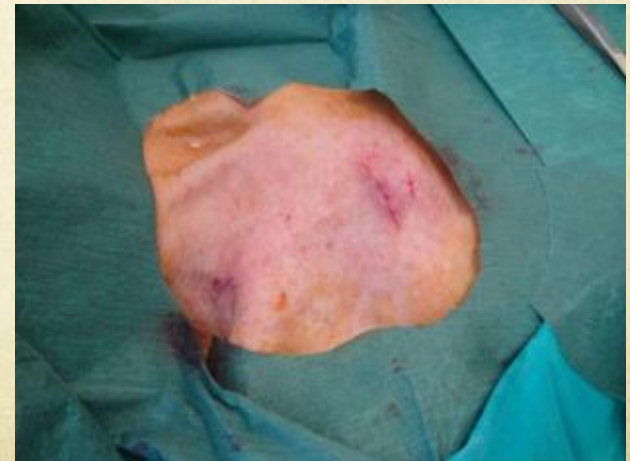














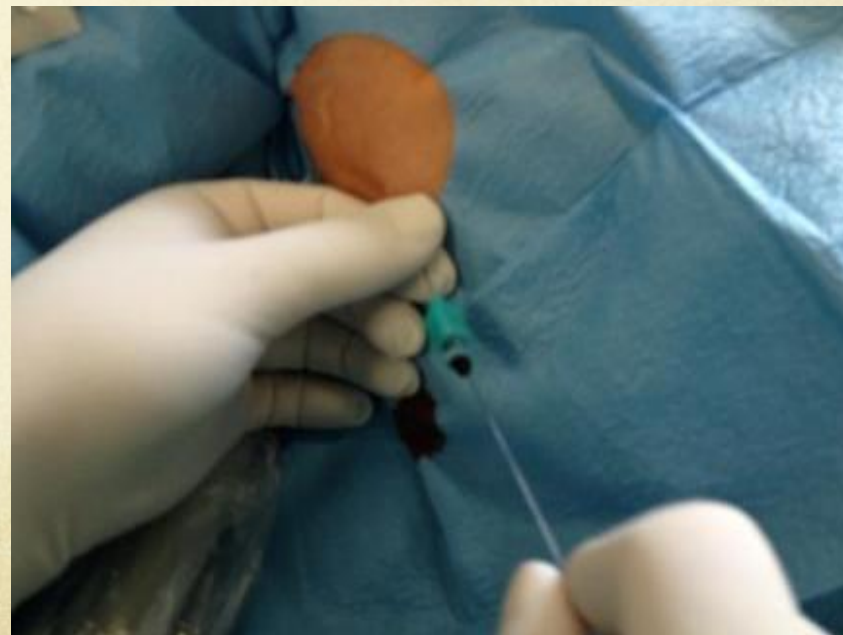
Insertion of a PICC port

Indications to a PICC port

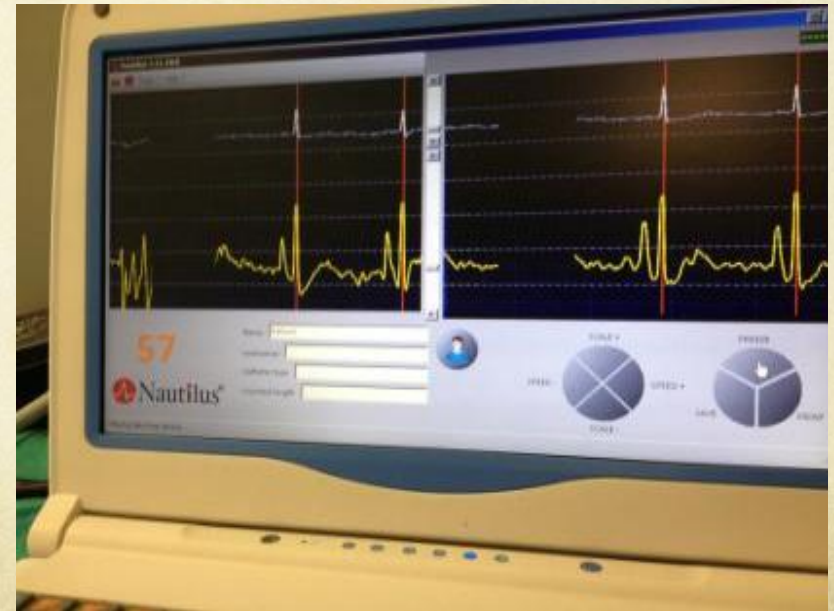
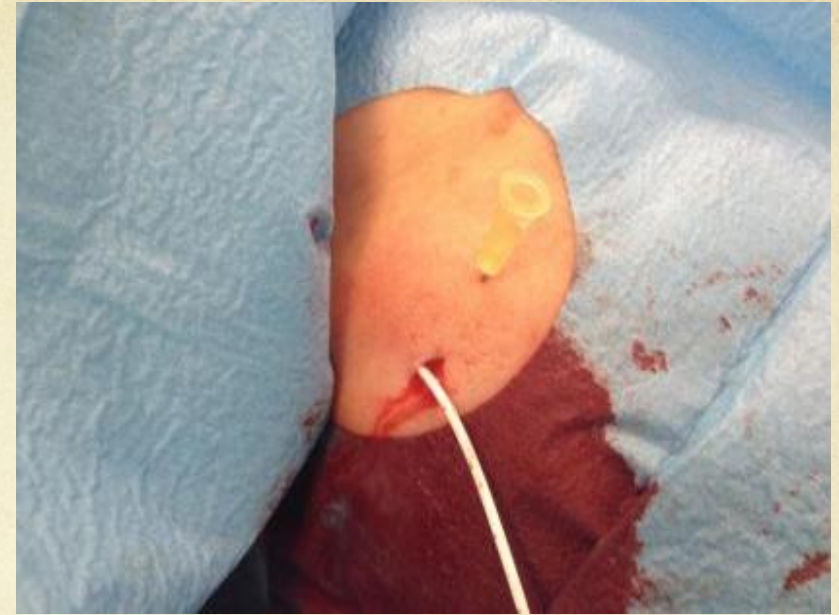
- Same indications as a chest port (i.e.: prolonged, episodic use of the central line, less than once a week), but:
 - Planned irradiation of the chest area
 - Planned reconstruction using pectoralis flap
 - Large, bilateral breast prosthesis
 - Supine position risky or impossible (respiratory insuff.)
 - Radiodermatitis or other local alterations of the skin
 - Complicated tracheostomy
 - Morbid obesity
 - Preference of the patient (cosmetic/psychological reasons)

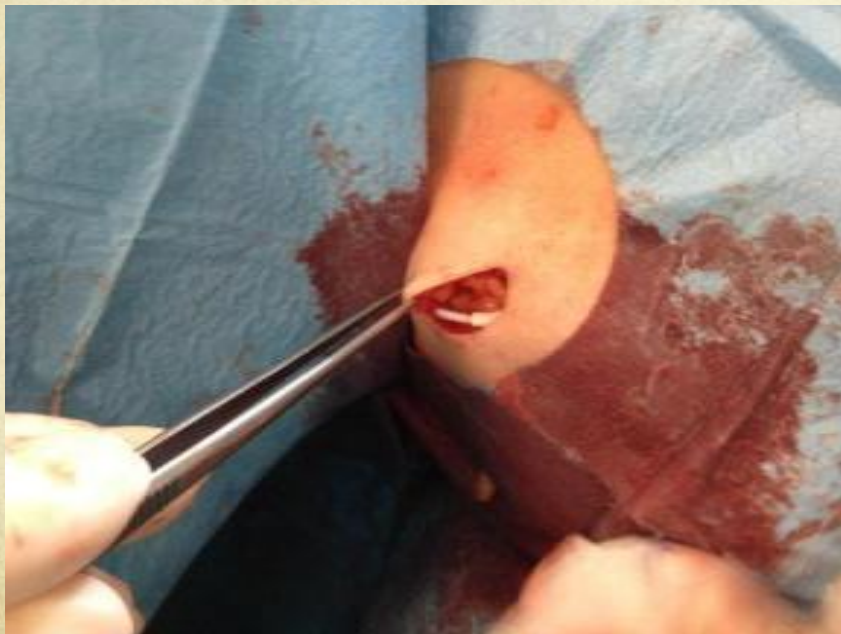
Contraindications to a PICC port

- Same contraindications as standard PICCs:
 - Small veins, venous thrombosis, AV fistula, arm paresis, major skin or orthopedic problems of the arm, axillary node dissection, etc.
- Home chemotherapy for > 12 hours (risk of needle dislodgement while sleeping)
- Agitated or confused patients



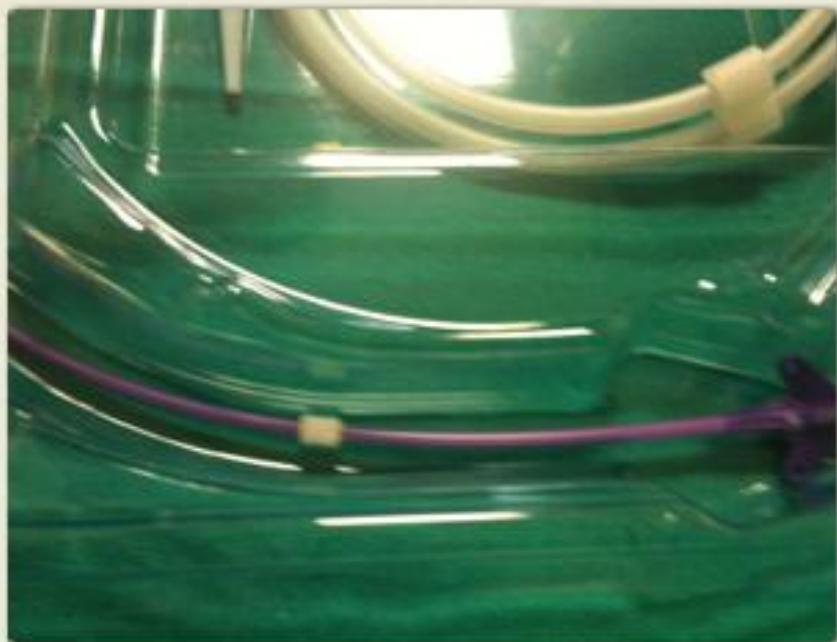


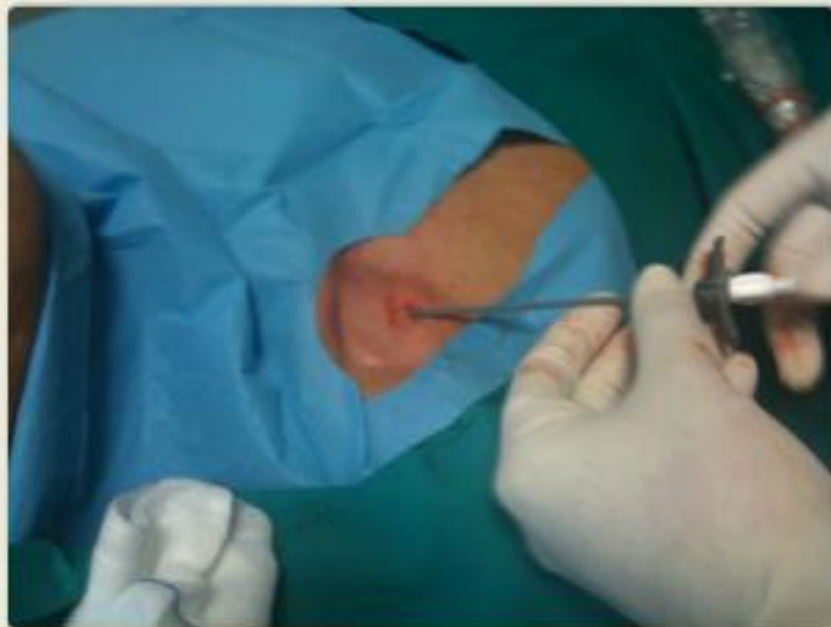






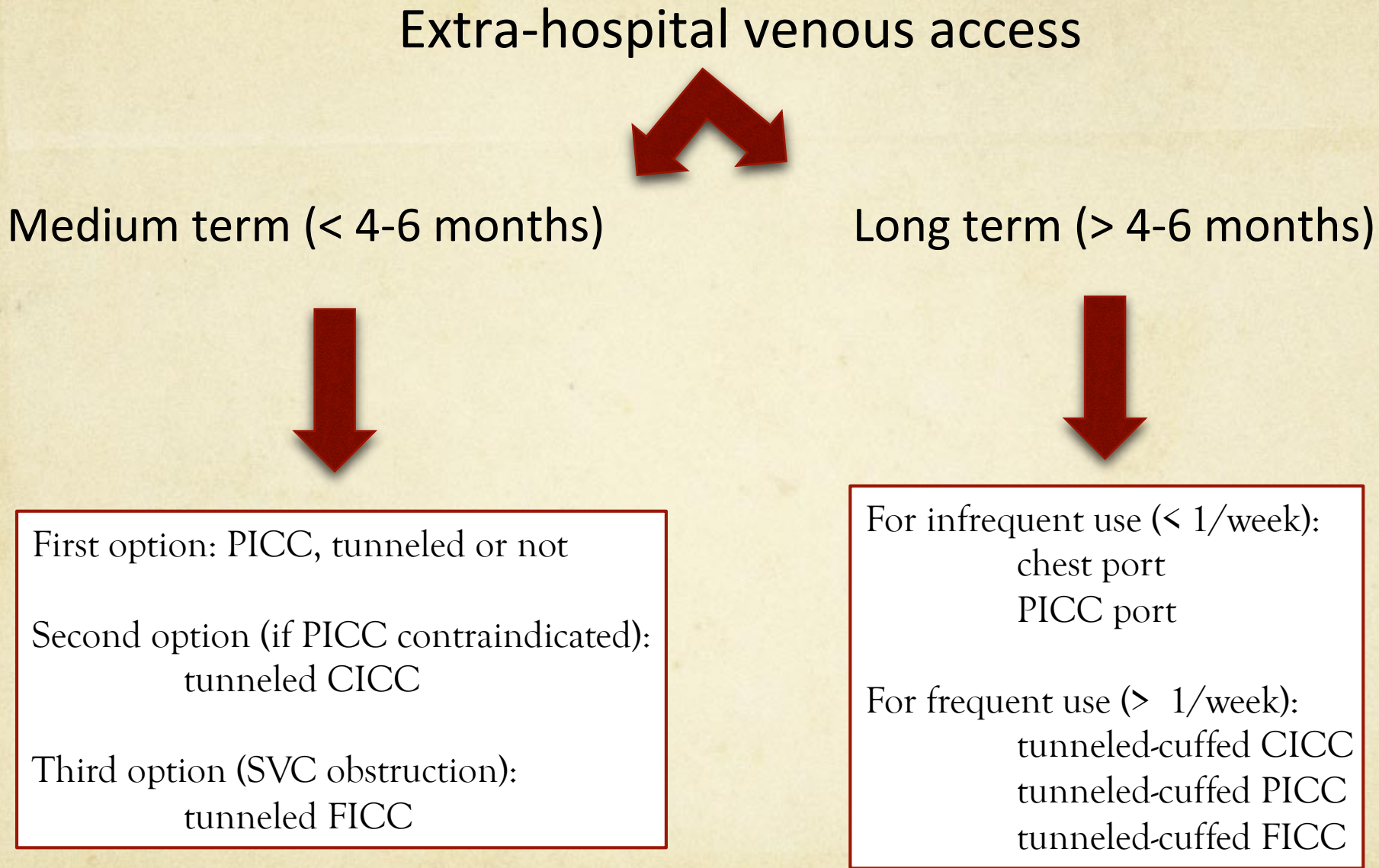
Insertion of a tunneled-cuffed CICC







Extra-hospital venous access



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graph TD; A[Extra-hospital venous access] --> B[Medium term (< 4-6 months)]; A --> C[Long term (> 4-6 months)]; B --> D["First option: PICC, tunneled or not<br/>Second option (if PICC contraindicated):<br/>tunneled CICC<br/>Third option (SVC obstruction):<br/>tunneled FICC"]; C --> E["For infrequent use (< 1/week):<br/>chest port<br/>PICC port<br/>For frequent use (> 1/week):<br/>tunneled-cuffed CICC<br/>tunneled-cuffed PICC<br/>tunneled-cuffed FICC"];
```

Medium term (< 4-6 months)

Long term (> 4-6 months)

First option: PICC, tunneled or not

Second option (if PICC contraindicated):
tunneled CICC

Third option (SVC obstruction):
tunneled FICC

For infrequent use (< 1/week):
chest port
PICC port

For frequent use (> 1/week):
tunneled-cuffed CICC
tunneled-cuffed PICC
tunneled-cuffed FICC

PICC in non-hospitalized patients

- Different options....
 - Standard PICC (medium term VAD)
 - Tunneled PICC (medium term VAD)
 - Tunneled/cuffed PICC (long term VAD)
 - PICC port (long term VAD)

In conclusion: PICCs = first-option central line also in non-hospitalized patients

- With few exceptions:
 - Patients needing long-term, non-frequent venous access (1/week or less frequent)
 - Central PORT or PICC-PORT is recommended
 - Patients needing a long term venous access for life-time home parenteral nutrition due to benign disease
 - Central tunneled/cuffed catheter is recommended (though, it might be a tunneled/cuffed PICC !)

Necessità accesso venoso nel paziente adulto per infusione, prelievi o monitoraggio emodinamico

Accesso venoso periferico

pH 5-9
farmaci con osmolarità <600
farmaci non vescicanti
farmaci non irritanti



Agocannula

vene superficiali del braccio disponibili
accesso periferico < 1 settimana
uso esclusivamente intraospedaliero

Cannula periferica lunga

vene superficiali del braccio non disponibili
accesso periferico > 1 settimana

Catetere Midline

accesso periferico > 3 settimane
accesso periferico ad uso extraospedaliero

Accesso venoso centrale

pH >9 o <5
farmaci con osmolarità >600
farmaci vescicanti
farmaci irritanti
nutrizione parenterale con osmolarità >800
necessità di prelievi ripetuti e frequenti
necessità di monitoraggio emodinamico

USO INTRA-OSPEDALIERO



Catetere ad inserzione periferica PICC

vene profonde del braccio disponibili
soltanto in elezione

Catetere ad inserzione centrale CICC

vene profonde del braccio non disponibili
inserzione in condizioni di urgenza
necessità di catetere 'medicato'
necessità di > 3 lumi

Catetere ad inserzione femorale

non tunnelizzato
in situazioni di emergenza
tunnelizzato
presenza di ostruzione vena cava superiore

USO EXTRA-OSPEDALIERO Day Hospital, Domicilio, Hospice



ACCESSI A MEDIO TERMINE (< 4 MESI)

PICC

- vene profonde del braccio disponibili

CICC tunnelizzato

- vene profonde del braccio non disponibili

ACCESSI A LUNGO TERMINE (> 4 MESI)

uso episodico: < 1/settimana:

Port

uso frequente: > 1/settimana:

Catetere Cuffiato Tunnelizzato CCT
ad inserzione periferica/centrale/femorale

GAVeCeLT
Gli Accessi Venosi Centrali a Lungo Termine

My venous access team...



GAVeCeLT
Gli Accessi Venosi Centrali a Lungo Termine



Thank you
for your attention

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