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X Congresso GAVeCeLT XI PICC Day



Firenze
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Palazzo dei Congressi



Peripheral Venous Access Today

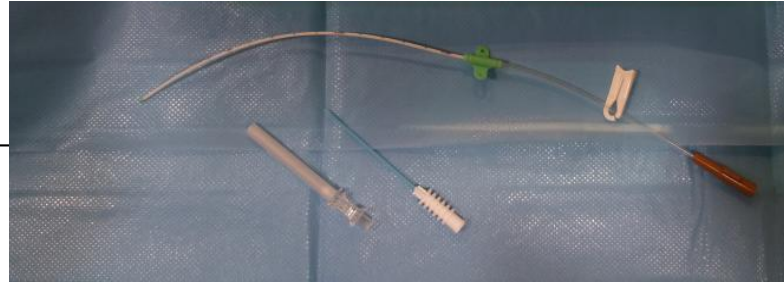
Mini-midline

Antonio La Greca
Emergency and Trauma Surgery
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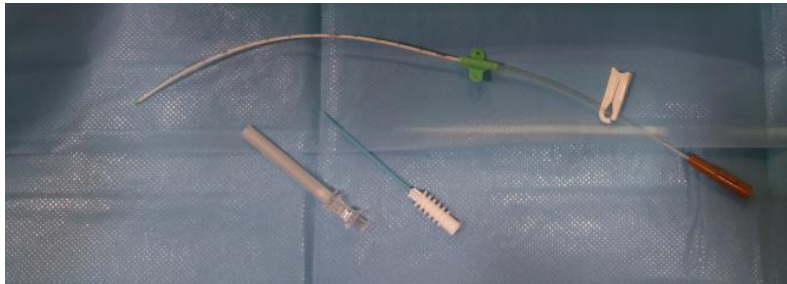


Mini-midline



- When
- How
- How to choose it
- How to insert it





Peripheral venous device

New guidelines state peripheral cannulas no longer be removed on a routine scheduled basis

A revolution in the field started due to extended use of PIV:

- A deeper attention into insertion technique (Ultrasound !!! Asepsis!!!)
- A deeper insight into in management (securement, dressing care, etc.)
- New devices better matching new needs: LONG CANNULAS / MINI-MIDLINE



Mini-Midline: Background for a Birth

Eur J Emerg Med. 2014 Feb;21(1):18-23. doi: 10.1097/MEJ.0b013e328363bebc.

Ultrasound-guided peripheral venous access: a systematic review of randomized-controlled trials.

Liu YT¹, Alsaawi A, Bjornsson HM.

⊕ Author information

2014

Abstract

OBJECTIVE: To systematically review the current literature on the effect of using ultrasound (US) intravenous (PIV) catheters in patients with difficult access.

MATERIALS AND METHODS: A systematic search was performed for the keywords ultrasonog systematic review was performed on randomized-controlled studies comparing the use of dynan technique. The primary outcome was the success rate of PIV placement and the secondary out successful PIV placement.

RESULTS: A total of 1778 titles were identified from the search and the review identified 50 pot comprehensively; six articles were included in the final review. The six studies enrolled a total of US group. Two of the studies reported a significantly higher success rate for US on the basis of pediatric studies found that time to successful cannulation was shorter and fewer attempts were to US compared with the traditional method. The six studies included were found to vary signific recording of procedure time, definition of success rate, and other important factors, making a m

CONCLUSION: On the basis of this review, routine use of US guidance for PIV placement is no

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ORIGINAL ARTICLE

2015

Ultrasound-guided peripheral venous access: a meta-analysis and systematic review

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Recent systematic reviews of the literature failed to prove significant advantage of US-PIV, mainly because of early complications and rapid catheter failure

Mini-Midline: Background for a Birth

US-PIVs have two problems

Since short teflon cannulas were not designed for US-guided insertion in deep veins (> 7mm of depth)....:

1. Ultrasound insertion of a needle/cannula system is not optimal (PIV were designed for the 'catheter over needle' technique)
2. Cannulas, being short and stiff, have a very short life:
 - easy dislocation
 - easy infiltration
 - easy thrombosis/phlebitis



Mini-Midline: Background for a Birth



HYPOTHESIS:

These disadvantages of US-guided PIVs may be overcome by using long peripheral cannulas – so called ‘mini midline’

A new Venous
Access Device

The ‘long peripheral cannula’
or
‘mini-Midline’

Mini-Midline: Background for a Birth

‘Long peripheral cannula’ or ‘mini-Midline’

- Longer cannula = less risk of dislocation
- Polyurethane = less risk of thrombosis than teflon
- Power injectability
- Seldinger technique (less trauma than ‘catheter over needle’)
- Designed also for ultrasound guided insertion



Mini-Midline: Background for a Birth



Advantages of long peripheral cannulas

- Can be inserted also in 'veinless' patients (US)
- Direct Seldinger technique = increased success rate
- Cost: higher than PIV but lower than standard Midline
- Insertion is simpler and more rapid if compared to standard Midline = more appropriate for emergency
- Longer duration if compared to PIV
- Less complications if compared to PIV



Mini-midline: what are we talking about

Four types of peripheral VADs:

Stainless steel needles

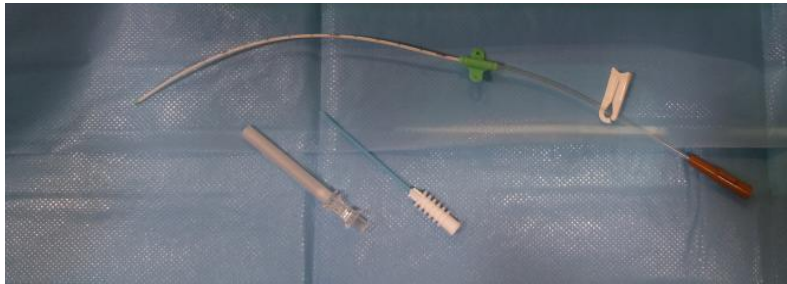
Appropriate only for bolus infusion

Short cannulas (3-6 cm)

Long peripheral cannulas or MiniMidline (6-15 cm)

Midline catheters (> 15 cm)





MidLine vs Mini-midline

MidLine: what are we talking about?

Any VAD longer than 6 cm ?

- Long peripheral cannulas ('new midline' ...)
- Standard 20 cm catheter ('old midline'...)

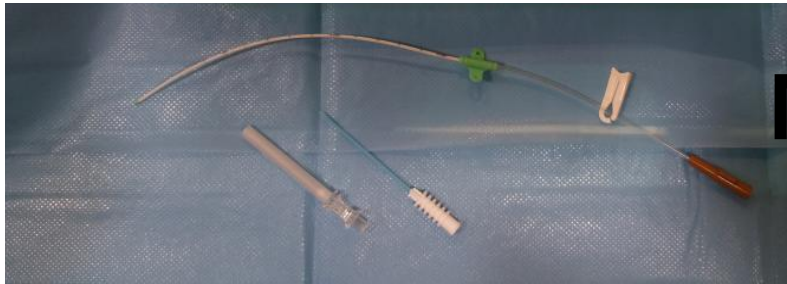
Or: is there a cut-off between a long peripheral cannula and an 'old midline'

8 cm?

10 cm?

15 cm ?



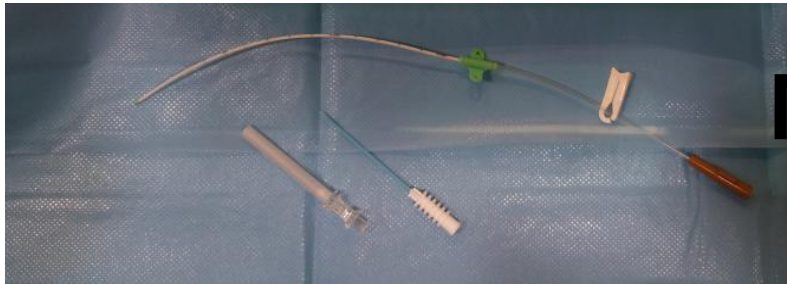


MidLine vs Mini-midline

An 'historical' consideration...

- Midline catheters were originally designed for 'blind' insertion at the antecubital fossa: their length (20-25 cm) was still consistent with the location of the tip in the brachial tract of the axillary vein
- When US guidance and micro-introducer technique were applied to Midline caths, the insertion site moved at the middle 1/3 of upper arm, so that the tip was now in the thoracic tract of the axillary vein (or in even in the subclavian vein), in a position which have been termed 'mid-clavicular')





MidLine vs Mini-midline

So...

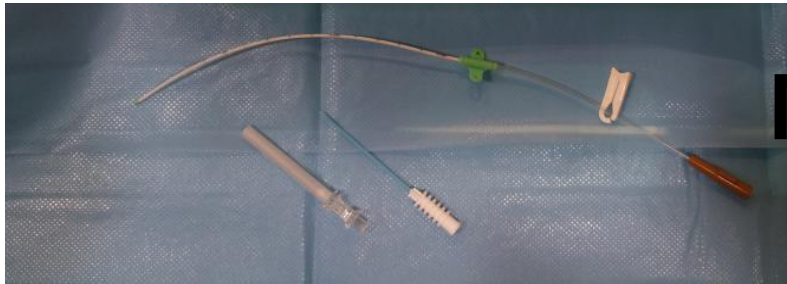
‘Long peripheral cannulas’ or ‘mini-Midline’

VS

‘traditional midline catheters’ or ‘midclavicular’

Just a question of length ???





MidLine vs Mini-midline



A clinical difference

Mini-midline = tip in the brachial tract of the axillary vein

Prone to malfunction (fibroblastic sleeve?)

Blood sampling may be difficult

In case of thrombosis, mild consequences

Midline = tip in the thoracic tract of the axillary vein or in the subclavian vein ('midclavicular')

Less prone to malfunction

Blood sampling is easier

In case of thrombosis, consequences may be more severe



Mini-midline

Available devices

- Specific VAD (The Wand, Flexicath, Power-Glide, etc.: some of them not yet)
- Multi-purpose VAD already on the market (LeaderFlex, LeaderCath, Vygon; Arrow) which can be used as long peripheral cannulas



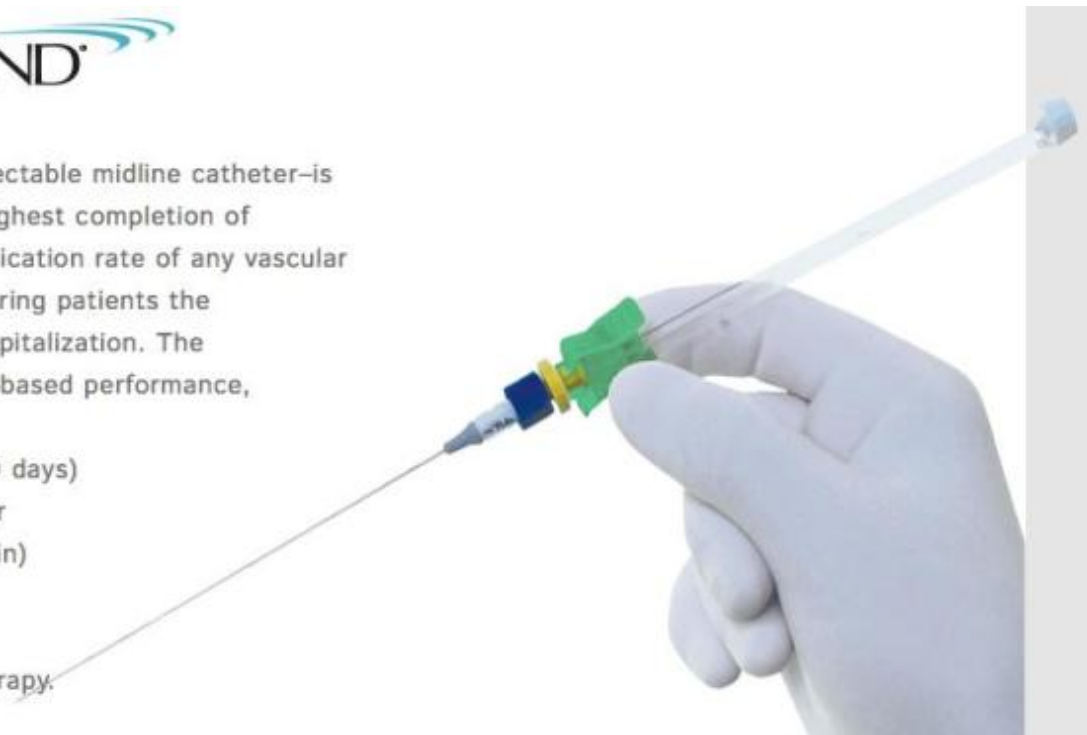
The Wand



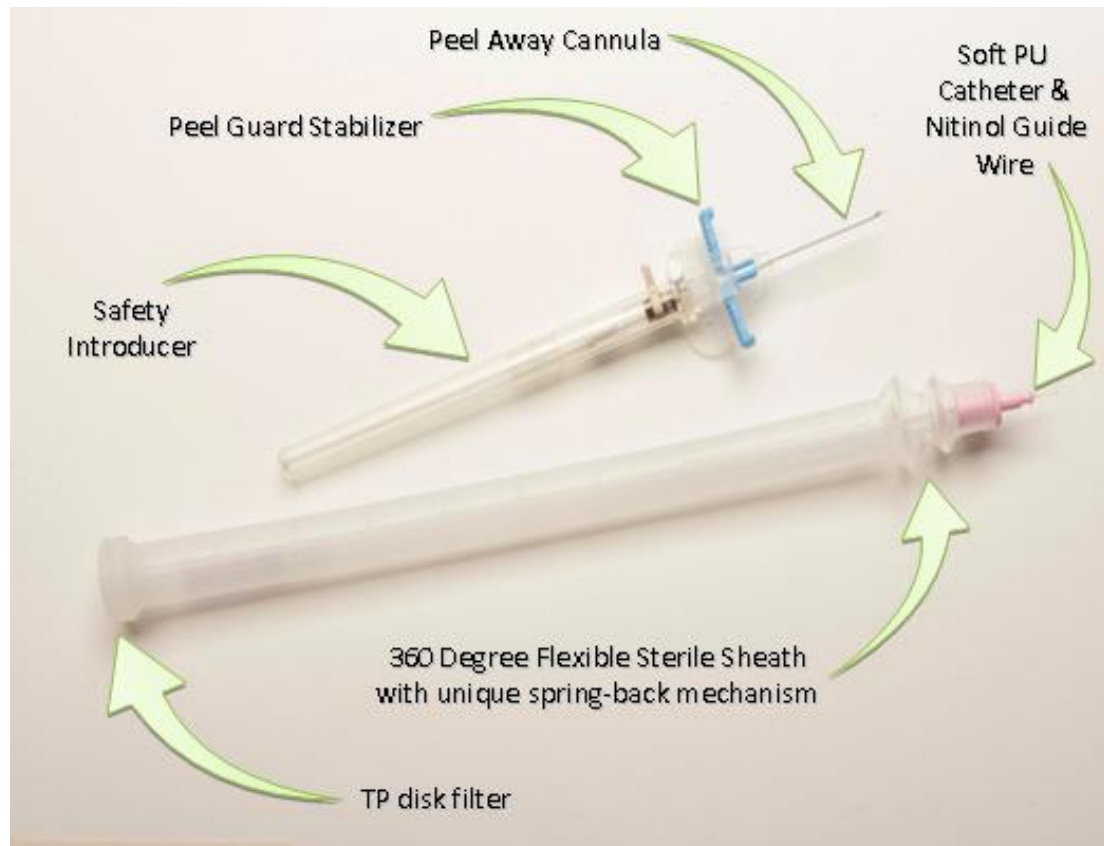
The POWERWAND®—power-injectable midline catheter—is clinically proven to have the highest completion of therapy and lowest total complication rate of any vascular access device yet studied, offering patients the opportunity for a one-stick hospitalization. The POWERWAND offers evidence-based performance, including:

- *Extended dwell time (up to 29 days)
- *Kink-resistant midline catheter
- *High flow rates (130-160 ml/min)
- *Blood drawability

The POWERWAND—the new, first option for intravenous therapy.



Flexicath



PowerGlide

POWERGLIDE™
Midline Catheter

- ▶ A simple solution for peripheral IV therapy
- ▶ A Power Injectable midline catheter
- ▶ Up to 29 days of access with a single catheter
- ▶ An integrated all-in-one placement device



LeaderFlex / LeaderCath

polyurethane (PUR) catheters (LeaderFlex)

- 10 cm 4Fr 18G PUR cath.,
- 54mm 19G needle + 30 cm guidewire

polyurethane (PUR) catheters (LeaderFlex)

- 8 cm 20G PUR cath.,
- 38mm 20G needle + 20 cm guidewire

polyethylene (PE) catheters (LeaderCath)

- 8 cm 20G PE cath.,
- 38mm 20G needle + 20 cm guidewire

PUR



PE



The use of 8-cm 22G Seldinger catheters for intravenous access in children with cystic fibrosis

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ABSTRACT

Purpose: Long intravenous catheters are an effective and economical choice of vascular access for intravenous antibiotic therapy in children with cystic fibrosis (CF). This prospective audit assesses the use of Vygon Leaderflex 22G × 8 cm catheters in an Australian tertiary centre. Key outcomes included catheter lifespan, ability to complete antibiotic therapy and complication rates.

Methods: All paediatric patients admitted with infective exacerbations of CF lung disease for 18 months between 2012 and 2013 were prospectively included. Data were analysed using *t*-tests and Fisher exact test.

Results: A total of 40 successful catheter insertions for 20 patients during 32 admissions were identified. The mean duration of the catheters was 10.08 days (median 9.5, SD=5.0). Of the 32 admissions, antibiotic therapy was completed with long catheters in 78% of cases (n=25) and with a single catheter in 48% (n=19). Rates of local complications were high, but there were no serious adverse outcomes.

Conclusion: Although limited by a small sample size, the results from this study are promising and suggest that 8 cm long catheters are a safe, effective and economical alternative to peripherally inserted central catheters (PICCs) in treating pulmonary exacerbations in children with CF.

Key words: 8-cm long intravenous catheter, Cystic fibrosis, Intravenous access, Infective exacerbation, Paediatric



Original Contribution

Standard-length catheters vs long catheters in ultrasound-guided peripheral vein cannulation

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Received 21 March 2011; revised 19 April 2011; accepted 20 April 2011

Abstract

Purpose: Ultrasound (US) is a useful tool for peripheral vein cannulation in patients with difficult venous access. However, few data about the survival of US-guided peripheral catheters in acute care setting exist. Some studies showed that the survival rate of standard-length catheters (SC) is poor especially in obese patients. The use of longer than normal catheters could provide a solution to low survival rate. The aim of the present study was to compare US-guided peripheral SCs vs US-guided peripheral long catheters inserted with Seldinger technique (LC) in acute hospitalized patients with difficult venous access.

Methods: This was a prospective, randomized controlled trial. A total of 100 consecutively admitted subjects in an urban High Dependency Unit were randomized to obtain US-guided intravenous access using either SC or LC after 3 failed blind attempts. Primary outcome was catheter failure rate.

Results: Success rate was 86% in the SC groups and 84% in the LC group ($P = .77$). Time requested to positioning venous access resulted to be shorter for SC as opposed to LC (9.5 vs 16.8 minutes, respectively; $P = .001$). Catheter failure was observed in 45% of patients in the SC group and in 14% of patients in the LC group (relative risk, 3.2; $P < .001$).

Conclusions: Both SC and LC US-guided cannulations have a high success rate in patients with difficult venous access. Notwithstanding a higher time to cannulation, LC US-guided procedure is associated with a lower risk of catheter failure compared with SC US-guided procedure.

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Ultrasound-guided deep-arm veins insertion of long peripheral catheters in patients with difficult venous access after cardiac surgery



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Complications

ABSTRACT

Objectives: To analyze success rate, dwell-time, and complications of long peripheral venous catheters (L-PVCs) inserted under ultrasound guidance.

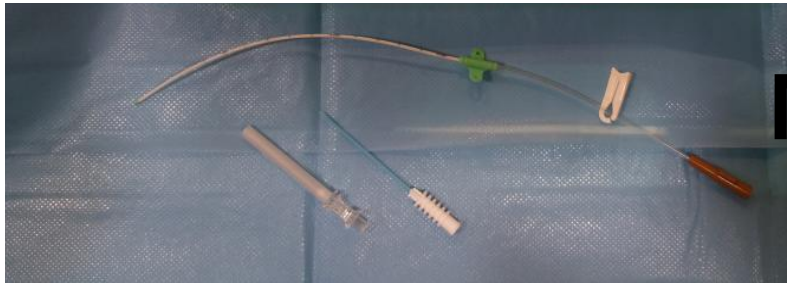
Background: In difficult venous access (DVA) patients, L-PVC can represent an alternative to central or midline catheters.

Methods: Prospective observational study. L-PVCs were positioned in DVA patients. The outcome of the cannulation procedure and the times and reasons for catheters removal were analyzed.

Results: A 100% placement success rate was documented. The catheter dwell-time was 14.7 ± 11.1 days. Most catheters were removed at end-use in the absence of complications. The rate of catheters appropriately or inappropriately removed before completing the intravenous therapies was 27.7/1000 catheter-days. Two thrombophlebitis (1.91/1000 catheter-days) and 1 catheter-related bloodstream infection (0.96/1000 catheter-days) occurred.

Conclusions: L-PVC could be a viable solution in DVA patients, as it may reduce the need for multiple vein punctures, patients' discomfort, and nursing workload. A better adherence to catheter management recommendations should further reduce complications.

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MidLine vs Mini-midline

Midline = low rate of complications

- Prospective study (Pittiruti 2009)
 - 94 midline caths in hospitalized patients
 - Mean duration of the VAD: 27 days
 - Mechanical complications (dislocation, occlusion) **3.5/1000 days**
 - Thrombosis/phlebitis **1.1/1000 days**



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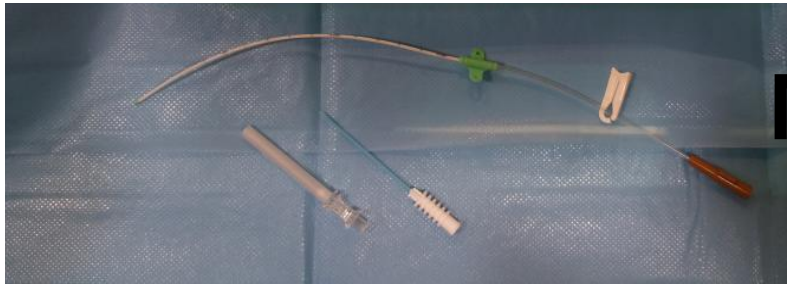
Wichtig Editore, 2009

Original Article

Parenteral nutrition through ultrasound-placed PICCs and midline catheters is associated with a low rate of complications: an observational study

M. PITTIRUTI¹, G. SCOPPETTUOLO², A. EMOLF, L. DOLCETTI³, I. MIGLIORINI¹, A. LAGRECA¹, M. MALERBA¹

¹Department of Surgery, ²Department of Infectious Diseases, ³Department of Oncology, Catholic University Hospital, Rome - Italy



MidLine vs Mini-midline

Mini-midline:
actual rate of complications still
unknown





Mini-midline

OCCLUSION/MALFUNCTION

- Fibroblastic sleeve vs extensive thrombosis
- More likely to occur if the tip is placed in the brachial tract of the axillary vein (Mini-Midline)
- More likely to occur if using catheter with closed end and distal valve





Mini-midline



DISLODGEEMENT (tip / external tract)

- May be due to inadequate securement of the catheter to the skin or to inappropriate policy of care of the exit site
- More likely to occur if the catheter is secured with stitches
- Less likely to occur (or impossible?) adopting subcutaneously anchored sutureless device
- More likely to occur with silicon catheter
- No difference Midline vs. Mini-Midline (?)
 - Maybe higher with mini-midline if catheter lenght not matched with vessel depth)



Mini-midline



VENOUS THROMBOSIS

Typically due to inappropriate use of the peripheral VAD with infusion/drugs which would require a central VAD

No difference Midline vs. Mini-Midline

Though: clinical consequences of venous thrombosis may be more severe if the tipo of the catheter is in the subclavian vein or in the thoracic tract of the axillary vein (old fashioned Midline: 'midclavicular')



Mini-midline

INFECTION

- Uncommon
- No difference Midline vs. Mini-Midline

Risk of CRBSI:

- Short cannulas : 0.5/1000 cath days
- Midline : 0.2 /1000 cath days
- Mini-Midline: ?

Maki 2006





Mini-midline

Material makes the difference

SILICON (Midline)

- higher rate of rupture/dislodgement
- no advantage in terms of risk of thrombosis or infection
- not appropriate for pressure injection
- no advantage in terms of duration or biocompatibility

POLYURETHANES (Mini-Midline and Midline)

- less fragile
- some are power injectable





Mini-midline

	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





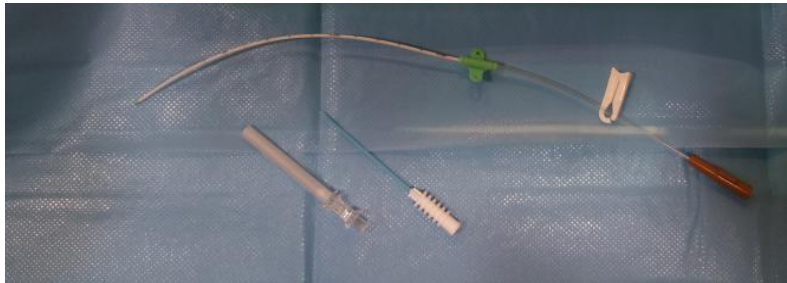
Mini-midline

A possible SPECIFIC indication for long peripheral cannulas ('mini-Midline')...

- Can be inserted by US in 'veinless' patients
- Nurse-driven insertion
- Simple insertion (direct Seldinger)
- Rapid insertion
- Good flow (18G – 20G)
- Power injectability
- Long duration (1-2 weeks)
- Cost: lower than standard Midline

... peripheral VAD in emergency !





Mini-midline in ED

- Power injectable, polyurethane 'Mini-Midline' 18G or 20 G, 8 - 10 cm long (LeaderFlex, Vygon))
- All inserted by US guidance and direct Seldinger technique
- Mostly inserted by nurses
- Often in the emergency room, in acutely ill patients needing infusions and CT scan
- Sometimes, in non-emergency cases (hospitalized patient candidate to a peripheral VAD for 1 or two weeks)

Scoppettuolo et al. *International Journal of Emergency Medicine* (2016) 9:3
DOI 10.1186/s12245-016-0100-0

 International Journal of Emergency Medicine
a SpringerOpen Journal

ORIGINAL RESEARCH

Open Access



Ultrasound-guided "short" midline catheters for difficult venous access in the emergency department: a retrospective analysis

Giancarlo Scoppettuolo^{1*}, Mauro Pittiruti², Sara Pitoni³, Laura Dolcetti¹, Alessandro Emoli⁴, Alessandro Mitidieri⁵, Ivano Migliorini² and Maria Giuseppina Annetta³



Technique of ultrasound guided peripheral venous access in the emergency room

Maria Giuseppina ANNETTA and
Giancarlo SCOPPETTUOLO

Catholic University, Rome, Italy





Mini-midline

Different types of long cannulas can be used:

polyurethane (PUR) catheters

- 10 cm 4Fr 18G PUR cath.,
- 54 mm 19G needle + 30 cm guidewire

polyurethane (PUR) catheters

- 8 cm 20G PUR cath.,
- 38mm 20G needle + 20 cm guidewire

polyethylene (PE) catheters

- 8 cm 20G PE cath.,
- 38mm 20G needle + 20 cm guidewire



PUR



PE





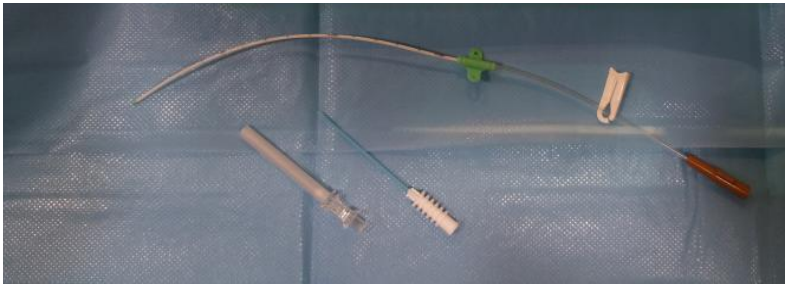
Mini-midline

Polyethylene ?

- Easier to insert (more rigid)
- Higher risk of thrombosis
- Appropriate only for a shorter duration

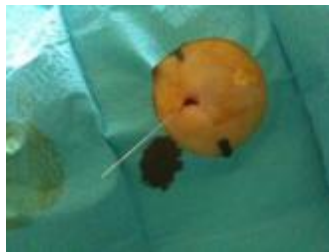


Mini-midline



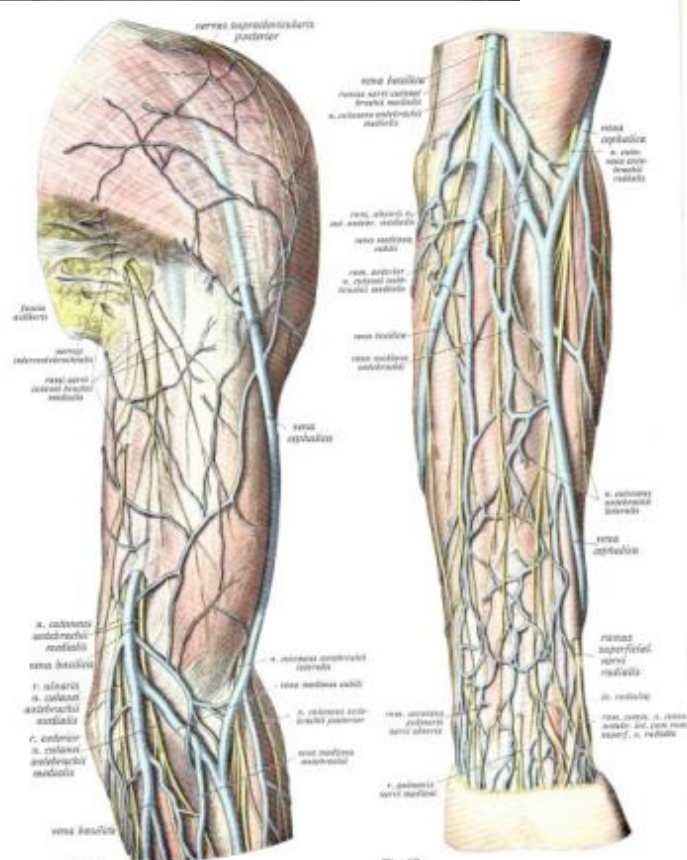
Insertion

- 1) Ultrasound guidance
- 2) Simple ('direct') Seldinger technique





Mini-midline



Different veins of forearm and arm can be cannulated



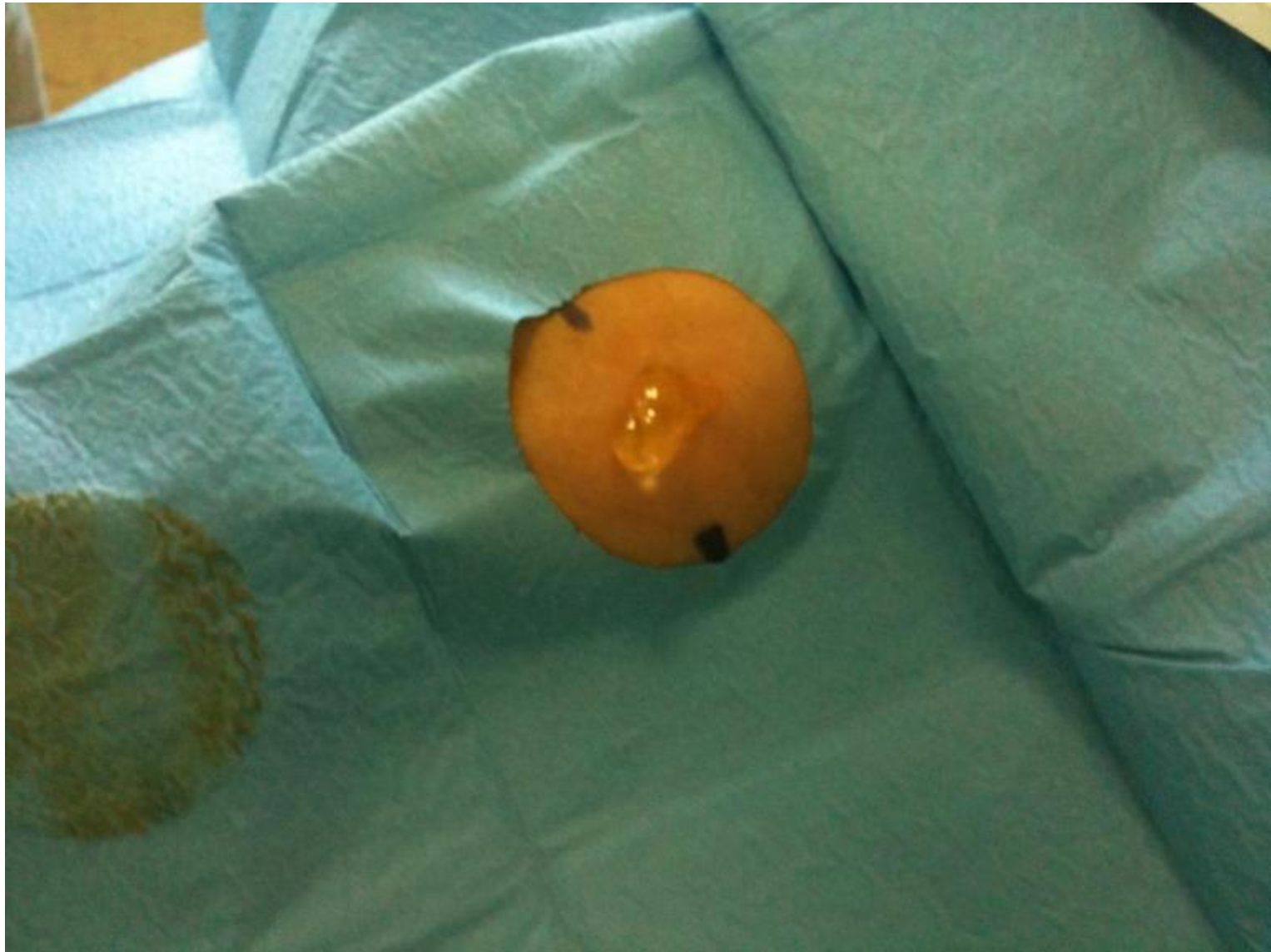


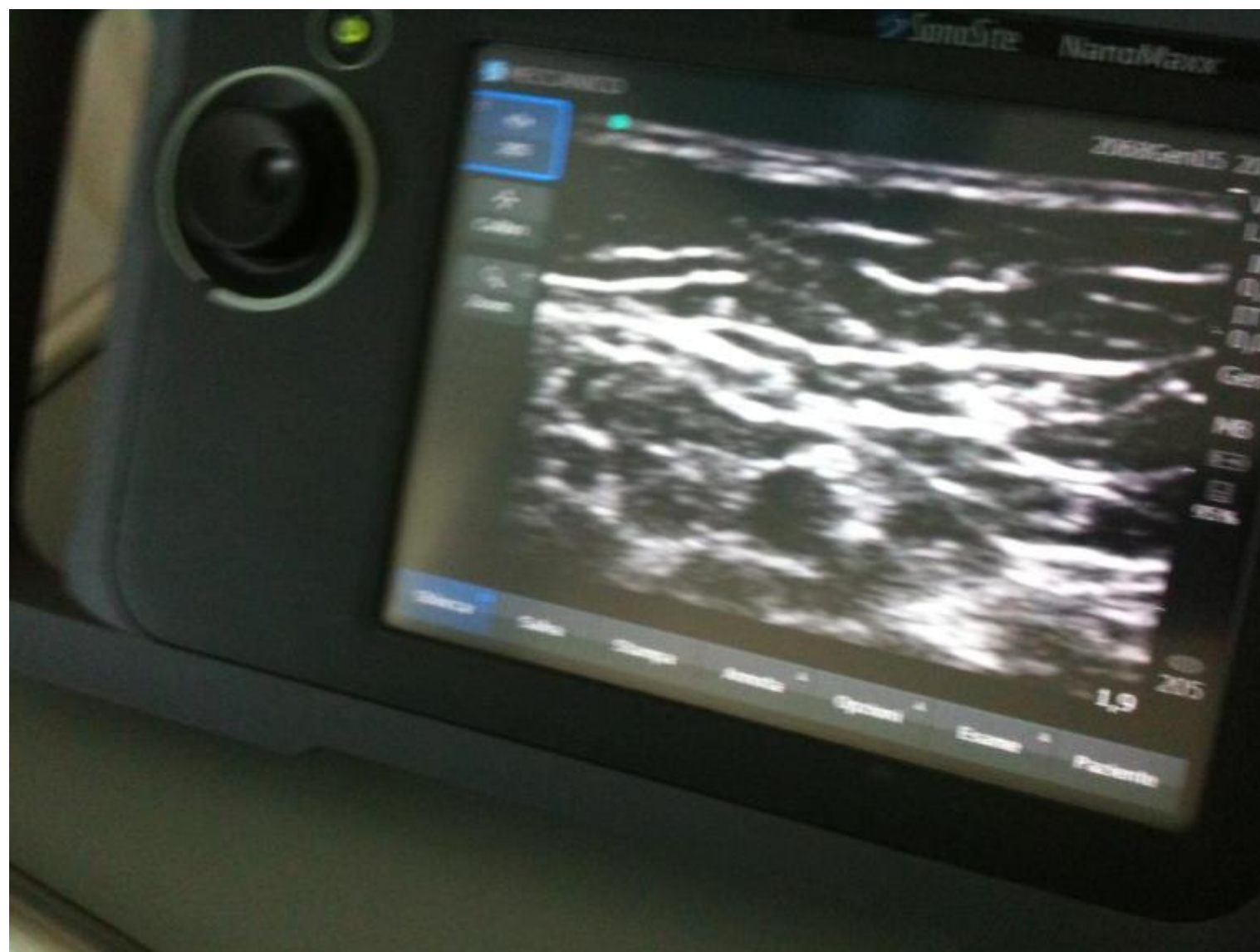
Mini-midline

Our experience

- In the emergency room, in patients candidate to PIV insertion but with no visible/palpable veins of the arm, we preferably use 18G polyurethane catheters, 10 cm long, inserted by direct Seldinger technique and by real time ultrasound guidance.
- Most of the insertion are performed by nurses, in emergency conditions, exclusively in patients candidate to a peripheral line













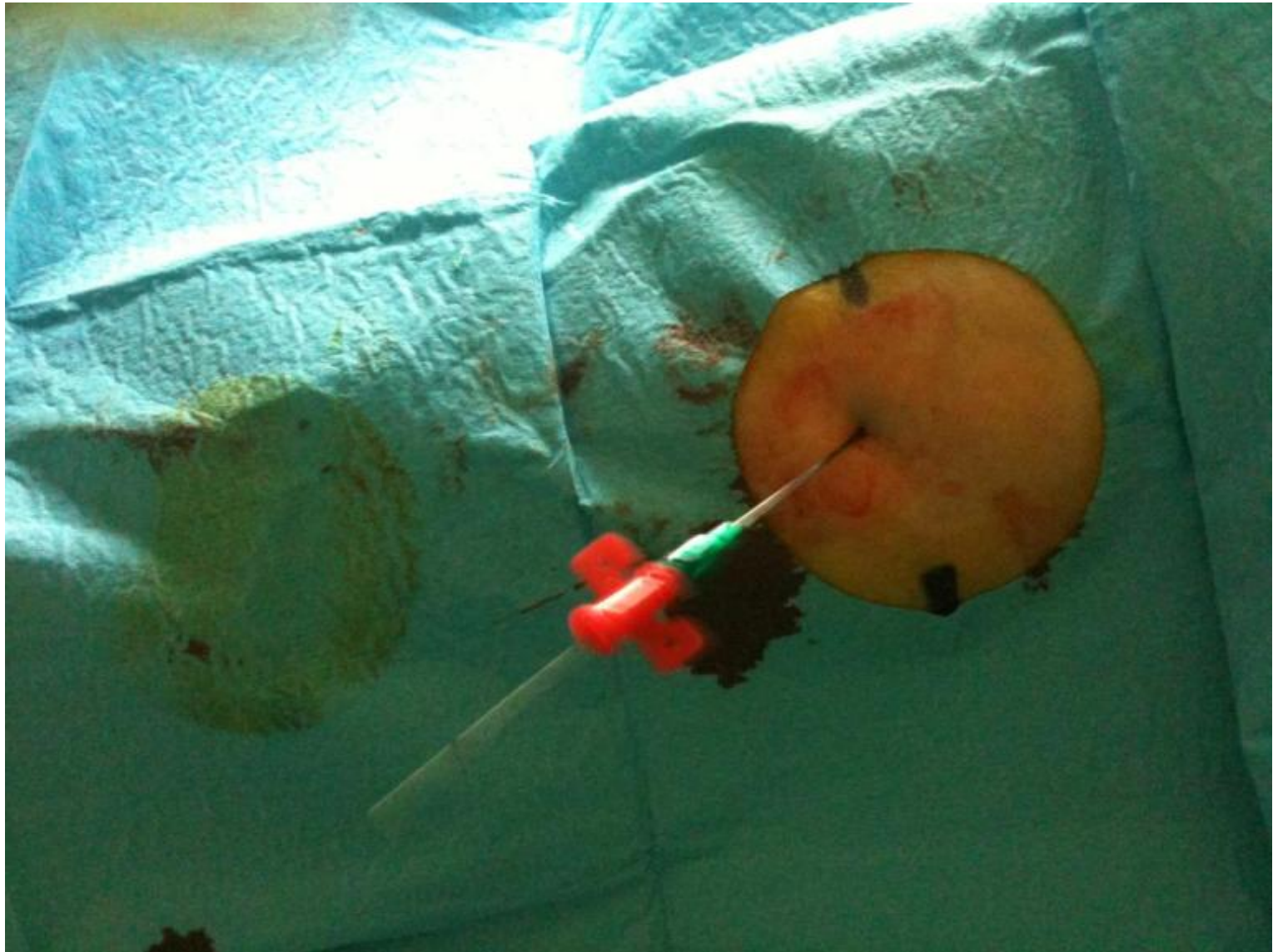


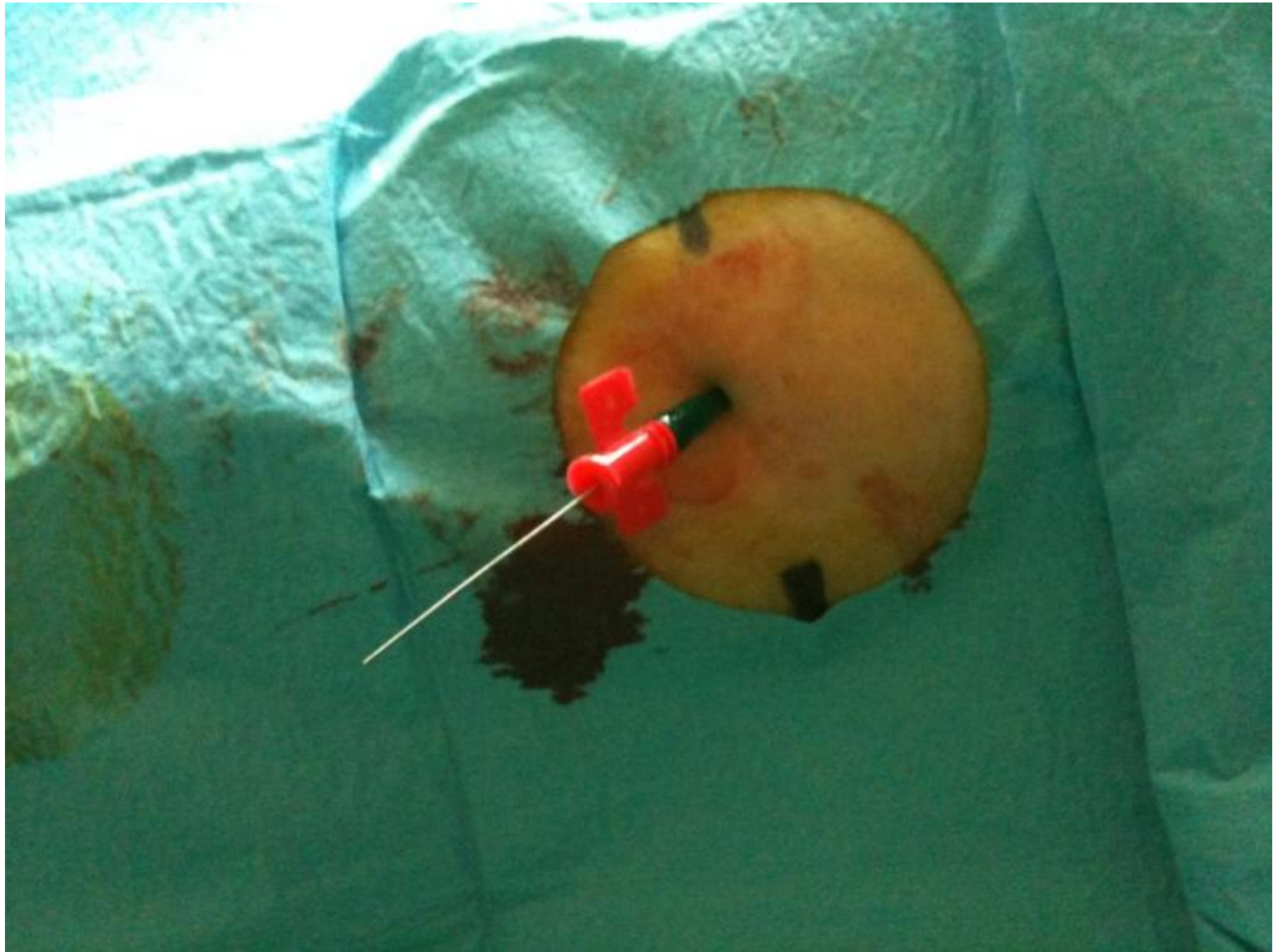








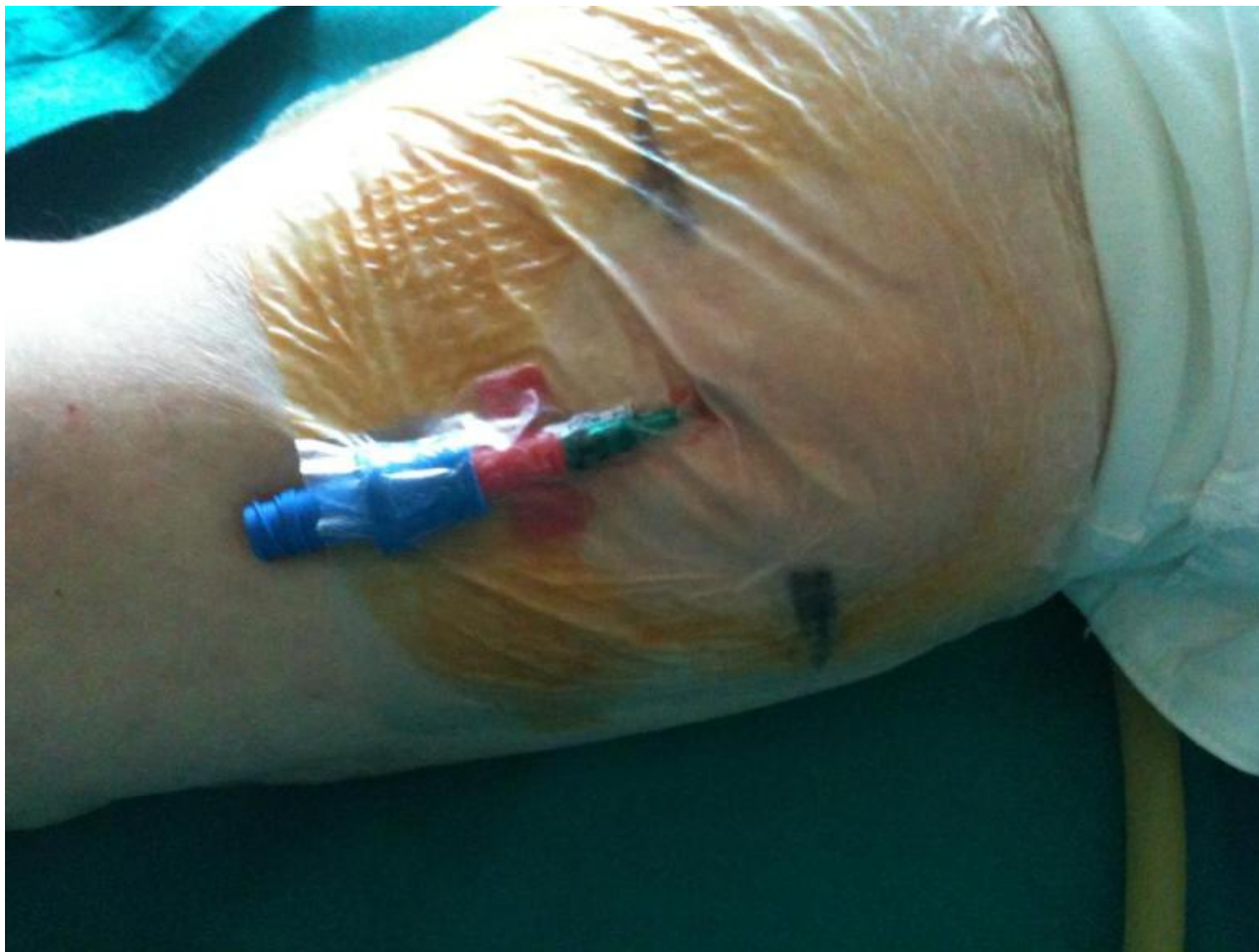














Mini-midline

(retrospective study: 122 cases)

- The success rate of insertion is 100%
- The median time for insertion was 7 minutes.
- Veins used for insertion were:
 - Basilic vein 44%
 - Brachial veins 21%
 - Cephalic vein 17%
 - Veins of the forearm 18%





Mini-midline

- Most lines (75%) lasted > one week and were used for different purposes, including contrast medium injection.
- After 1 week, most catheters were removed for end of use or replaced by a more appropriate type of VAD.
- In 25 % of patients, the catheter was removed before 1 week for end of use.
- No dislocations were observed
- No infections or thrombosis were reported





Mini-midline

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
D.i.V.A. +/- EMERGENZA

Catetere Midline

accesso periferico > 3 settimane
accesso periferico ad uso extraospedaliero

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Firenze
4-5-6 dicembre 2017
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Mini-midline

Conclusions (1)

Mini-Midline: inclusi in un algoritmo di scelta ragionata

Scelta del device in relazione alla profondità del vaso target

Poliuretano vs Polietilene

Seldinger diretto vs modificato

Massimi presidi di barriera ?

Materiali di buona qualità, possibilmente studiati per l'utilizzo specifico





Mini-midline

Conclusions (2)

Procedure aziendali e protocolli di U.O. chiari e aggiornati per gli accessi venosi periferici:

- Corretta indicazione
- Corretta tecnica di inserzione
- Corretto tecnica di mantenimento

CLEAR LABELLING !!!





GRAZIE !!!

Gemelli



GAVeCeLT 2017

