

Gemelli



Fondazione Policlinico Universitario Agostino Gemelli IRCCS
Università Cattolica del Sacro Cuore



GAVeCeLT ROMA 2023



Nuove applicazioni dei midline: midline per aferesi e per prelievi ripetuti

Bruno Marche

Fondazione Policlinico Universitario A. Gemelli IRCCS, Roma

Procedure di aferesi

- Staminoafèresi
- Leucafèresi
- Fotoafèresi
- plasma/eritro-exchange
- Plasmatrattamento
- LDL aferesi
- ecc.

Procedure di aferesi

- Centrifugazione differenziale o filtrazione tramite membrane
- Due vie venose di calibro adeguato (prelievo e reinfusione)
 - Per la fotoaferesi anche una sola via (se presenti separatori cellulari specifici)
- Flussi alti e costanti
 - Di solito 30-50 ml/min, in alcuni casi fino a 150 ml/min
 - Secondo età/peso del paziente
 - Secondo tipologia di procedura



Quali accessi vascolari?

- **Procedure singole o comunque “acute”**
- **Procedure ripetute, ovvero croniche frequenti o infrequenti**
- **Catetere venoso periferico o centrale?**

Candidati ad aferesi

- **Pazienti** talvolta fragili, per i quali CICC o FICC di grosso calibro possono non essere strettamente indicati (es. piastrinopenia, neutropenia, cute patologica, aferesi cronica particolarmente infrequente...)
 - Spesso DIVA (60% secondo BCSH 2006)
- **Donatori sani di cellule staminali emopoietiche (CSE)** a cui, se definiti DIVA, **non si può posizionare un CVC***

* Raccomandazioni SIMTI-GITMO 2011

Letteratura scientifica di riferimento

- Poche review
- Qualche documento evidence-based (consensus e linea guida)
- Molte '*experts opinions*'

Scelta dell'accesso venoso per aferesi

Kalantari 2012

The Choice of Vascular Access for Therapeutic Apheresis

Kambiz Kalantari*

Division of Nephrology, University of Virginia Health System, Charlottesville, Virginia

Therapeutic apheresis (TA) is performed using either centrifugation-based or filter-based systems. The blood flow rate (BFR) used for TA using centrifugation-based systems is less than 100 mL/min. Because of the low BFR requirement, even peripheral veins can be considered as an option for TA, especially for less frequent treatments and those performed for short periods. Other options for vascular access (VA) include central venous catheters (temporary or tunneled), totally implantable ports, and arteriovenous fistulae (AVF) or grafts (AVG). None

Golestaneh 2013

Journal of Clinical Apheresis 28:64-72 (2013)

Commentary

Vascular Access in Therapeutic Apheresis: Update 2013

Ledan Golestaneh and Michele H. Mokrzycki*

Division of Nephrology, Department of Medicine, Albert Einstein College of Medicine, Bronx, New York

TRANSFUSION Volume 58, February 2018

Cellular collection by apheresis

Padmanabhan 2018

TABLE II. Option of Vascular Access for TA

Access Type	Use
Peripheral Vein	Short-term, less frequent treatments, less frequent shorter treatments, less frequent
Nontunneled CVC	Short-term treatments, filter-based and centrifugation-based
Tunneled CVC	Long-term (weeks to months) treatments, filter-based and centrifugation-based
Totally implantable ports	Long-term (weeks to months) treatments, filter-based and centrifugation-based systems
AVF	Long-term (years) treatments

Vascular access type	Indications for use
Peripheral Veins	Centrifugal based TA Acute or intermittent TA
Non-tunneled central venous catheters	Short term use (<2 weeks) Acute or intermittent TA Centrifugal or filter-based TA
Tunneled central venous catheters	Short or long term use Centrifugal or filter-based TA
Arteriovenous Fistula (AVF)	Chronic TA (>3 months) Centrifugal or filter-based TA

Access type	Setting
Peripheral veins	Adequate veins; one or few procedure(s) anticipated
Non-tunneled CVCs	Veins not adequate; one or few procedure(s) anticipated
Tunneled CVCs	Veins not adequate; several procedures anticipated; potential long-term (weeks/months) use (e.g., for chemotherapy)
Port-CVCs	Veins not adequate; several procedures/weeks-months of access anticipated

Agocannule ecoguidate nel paziente DIVA?

2015

Journal of Clinical Apheresis 00:00–00 (2015)

Ultrasound-Guided Peripheral Deep Vein Cannulation to Perform Automated Red Cell Exchange—A Pilot Study in a Single Centre

Daniel Putensen,^{*} Linda Pilcher, Dawn Collier, and Karen McInerney

Apheresis Department, Macmillan Cancer Centre, University College London Hospitals, London

Background: Securing adequate vascular access is essential for a successful apheresis procedure. In most,

Received: 16 May 2016 | Revised: 1 July 2016 | Accepted: 19 July 2016

DOI: 10.1002/jca.21493

2016

RESEARCH ARTICLE

WILEY

Journal of
Clinical Apheresis

Ultrasound-guided peripheral venous access for therapeutic apheresis procedures reduces need for central venous catheters

Eric Salazar | Salvador Garcia | Robin Miguel | Francisco J. Segura |

Tina S. Ipe | Christopher Leveque

Department of Pathology and
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Methodist Hospital, Houston, Texas

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Abstract

Therapeutic and donor apheresis requires adequate vascular access to achieve inlet flow rates of ~50–100 mL/min. While central dialysis-type venous catheters can usually provide such access, their use includes several associated risks. Some of these risks can be avoided or diminished if adequate peripheral venous access can be established. Some patients have adequate peripheral veins for apheresis that cannot be readily identified visually or by palpation. We hypothesized that ultrasound-guided peripheral venous access would benefit such patients and would lead to placement of fewer central venous catheters. The technique of ultrasound-guided peripheral access for apheresis has been in use at Houston Methodist Hospital since 2012. We performed a prospective review of patients undergoing inpatient and outpatient apheresis at Houston Methodist Hospital from July 1, 2015 to September 30, 2015, to assess its benefit. During this time, we performed 831 procedures on 186 patients, including

2015

Journal of Clinical Apheresis 30:380–381 (2015)

Letter to the Editor

Deep Vein Puncture Under Ultrasonographic Guidance—An Alternative Approach for Vascular Access of Apheresis Therapies

Norio Hanafusa,^{1,2*} Toshihiro Torato,¹ Daisuke Katagiri,¹ Tomoko Usui,¹ Akihiko Matsumoto,¹ Eisei Noiri,¹ and Masaomi Nangauku¹

Received: 19 September 2016 | Revised: 21 December 2016 | Accepted: 23 February 2017

DOI: 10.1002/jca.21533

2017

RESEARCH ARTICLE

WILEY

Journal of
Clinical Apheresis

A successful model to learn and implement ultrasound-guided venous catheterization in apheresis

Nigopan Gopalasingam¹ | Anna-Marie Eller Thomsen² | Lars Folkersen¹ |

Peter Juhl-Olsen¹ | Erik Sloth^{1,3,4}

¹Department of Anaesthesia and Intensive
Care, Aarhus University Hospital, Aarhus
N 8200, Denmark

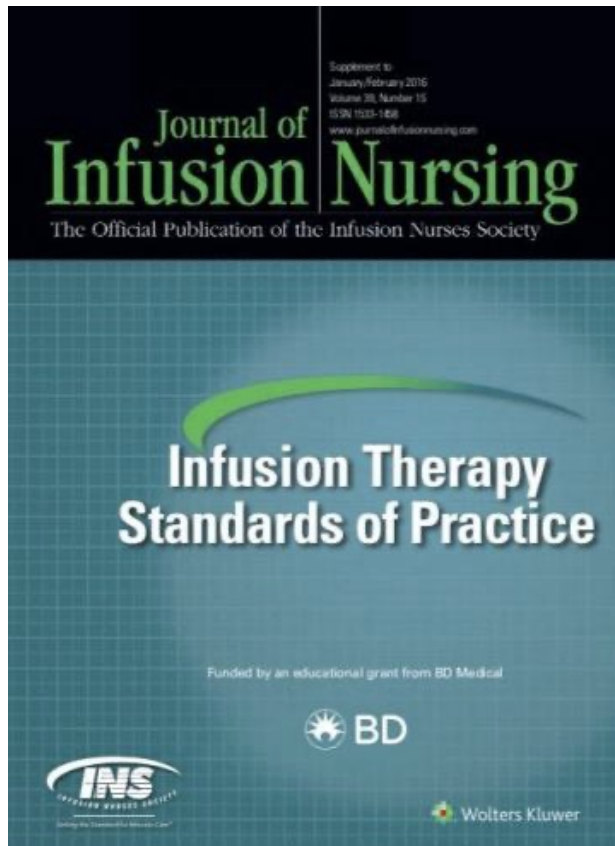
²Department of Clinical Immunology,
Aarhus University Hospital, 8200 Aarhus
N, Denmark

³Department of Clinical Medicine, Aarhus
University, 8200 Aarhus N, Denmark

Background: Apheresis treatments can be performed with peripheral venous catheters (PVC), although central venous catheters (CVC) are inserted when PVCs fail or patient with history of difficult vascular access prior to the apheresis. Ultrasound guidance for PVC has shown promising results in other settings.

Purpose: To investigate if ultrasound guidance for PVC could be implemented among apheresis nurses. Second, how implementation of ultrasound guidance affected the number of CVCs used for apheresis per patient.

2016



2021

Infusion Therapy Standards of Practice

Lisa A. Gorski, MS, RN, HHCNS-BC, CRNI®, FAAN
Lynn Hadaway, MEd, RN, NPD-BC, CRNI®
Mary E. Hagle, PhD, RN-BC, FAAN
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8TH EDITION

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PIVCs

1. Insert 2 PIVCs for the apheresis procedure, 1 for access or withdrawal of blood for apheresis and 1 for return of the patient's cells and replacement fluid.
 - a. Use a large-gauge PIVC (eg, 16- to 18-gauge) in the antecubital vein or other large veins, such as the basilic or cephalic veins, in the forearm for access, and in smaller veins for the return.^{1,5} (IV)

CVADs

2. Consider the benefits of dialysis-capable CVADs that include reliable blood flow and reduced resistance to withstand high negative pressures required to draw blood into the apheresis device; use a CVAD with a catheter size of at least 11.5 French (Fr) for adults.^{1,2} (IV)

Ports

3. Consider an implanted vascular access port for patients requiring long-term treatment; improvement in port design allowing for high flow rates has led to increasing port use in both adults and children.^{1,2,9} (V)

2021



2021

PICCs

- b. PICCs are not appropriate for apheresis procedures due to small catheter gauge and higher failure rates.¹ (IV)

AVFs/AVGs

- 4. Avoid AVFs and AVGs for long-term apheresis; the failure rate associated with AVFs is high.^{1,10} (V)

Quale ruolo per i midline?

2020

Midline 5Fr per il prelievo nelle staminoafèresi di 3 donatori sani e di 3 pazienti ematologici DIVA



Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Transfusion and Apheresis Science

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



Midline catheter as effective device in healthy allogeneic donors and patients without an adequate peripheral venous access for HPC collection by apheresis: Preliminary experience at IEO

Alessandro Caime^a, Alessio Piredda^b, Bruno Lucchetti^a, Antonio Magarò^a, Claudia Zencovich^b, Margherita Clerici^a, Daniele Laszlo^{a,*}

^a Stem Cell Mobilization and Collection Unit, Italy

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Una soluzione per i donatori sani di CSE definiti DIVA

Apheresis PBSC collections performed using midline at IEO.

	Midline right	Midline left	Midline length	Flow rate	Processed blood(ml)	Time duration min	No. of procedures	Collection cell/Kg
#1	#	X	10cm	35 ml/min	10275	319	1	9.7×10^6
#2		#	12cm	35 ml/min	7621	238	1	4.3×10^6
#3	#	X	9cm	35 ml/min	6178	193	1	7.1×10^6
#4	#		12cm	35 ml/min	7361/6362	247 / 214	2	5.0×10^6
#5	#		10cm	35 ml/min	10393	294	1	5.1×10^6
#6	X		12cm	28 ml/min	7764 /7634	243 / 239	2	4.6×10^6

Patients characteristics.

	Diagnosis
#1	Donor aplo
#2	Donor aplo
#3	Donor aplo
#4	HDG
#5	LNH
#6	HDG

Caime 2020



Una soluzione per i donatori sani di CSE definiti DIVA

Apheresis PBSC collections performed using midline at IEO.

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Patients characteristics.

	Diagnosis
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#2	Donor aplo
#3	Donor aplo
#4	HDG
#5	LNH
#6	HDG

Caime 2020



2021

JVA | The Journal of
Vascular Access

Original research article

Midline catheters for extracorporeal photopheresis in hematological patients

**Bruno Marche^{1*}, Sonia D'Arrigo^{2*} , Maria Giuseppina Annetta²,
Andrea Musarò³, Alessandro Emoli⁴, Simona Sica¹,
Nicola Piccirillo⁵, Rossana Putzulu⁵, Maria De Paolis⁵,
Marco Bernoldi⁵ and Mauro Pittiruti⁶ **

The Journal of Vascular Access
1–7

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DOI: 10.1177/11297298211041450

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 **SAGE**

6 pazienti DIVA con Graft Versus Host Disease (GVHD)
cronica:

69 procedure di fotoaferersi con midline 4-5Fr

- Minima permanenza (2-3 giorni) e posizionamenti ripetuti
- Cateteri di massimo 20cm di lunghezza e con calibro adeguato (meglio se 5Fr per il prelievo)**
- Tip location ecoguidata in vena ascellare**



Marche 2021

RaPeVA + ZIM





Massime precauzioni di barriera

Eventuale pseudo-tunnellizzazione asse corto out-of-plane



JVA
ISSN 1129-7298

J Vasc Access 2017; 18 (3): 269-272
DOI: 10.5301/jva.5000647

TECHNIQUES IN VASCULAR ACCESS

Elli 2017

“Extended subcutaneous route” technique: a quick subcutaneous tunnelling technique for PICC insertion

Stefano Elli, Chiara Abbruzzese, Luigi Cannizzo, Simona Vimercati, Stefania Vanini, Alberto Lucchini

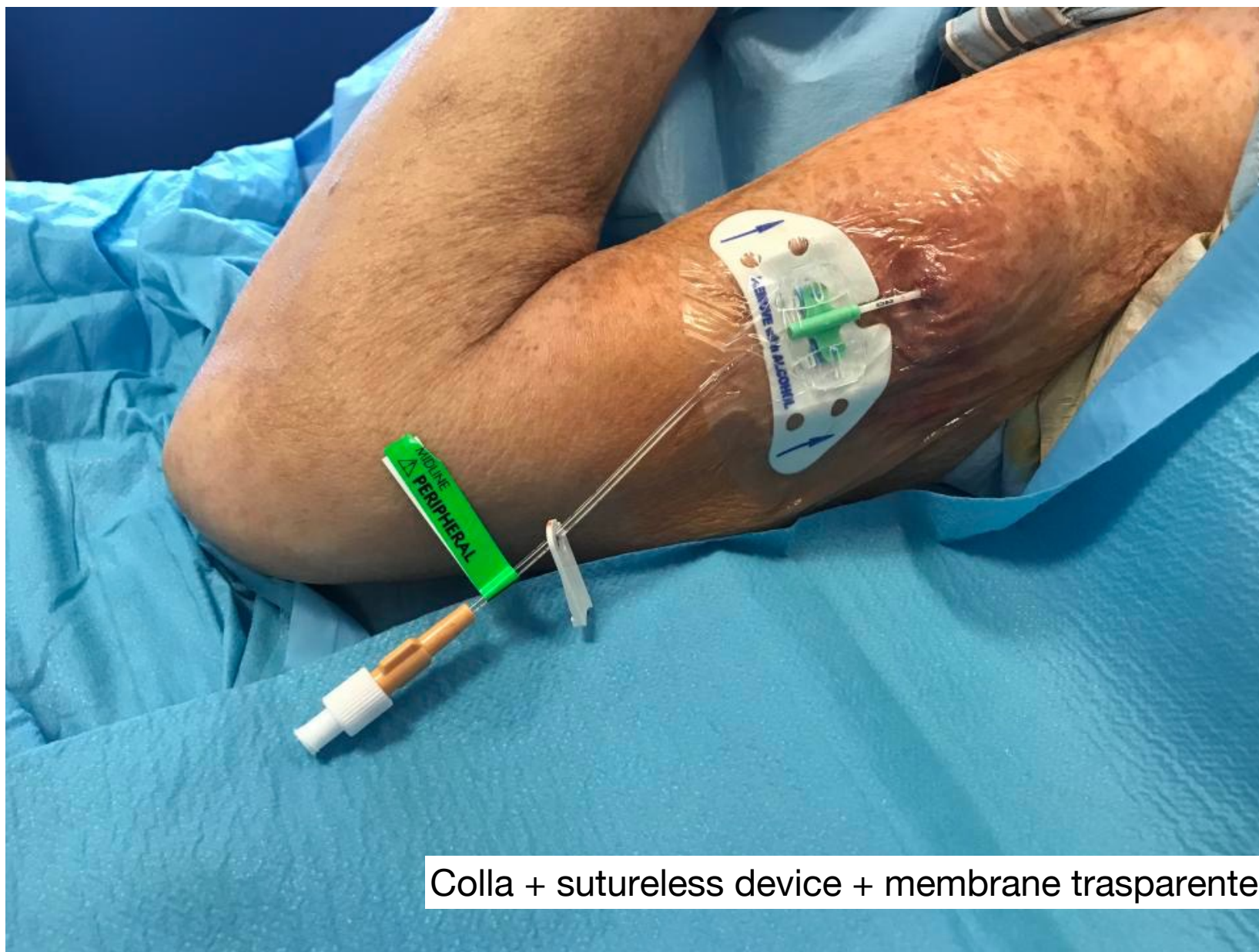
Tip location in vena ascellare sottoclavicolare

Scansione trasversale di
vena e catetere



Scansione longitudinale
di vena e catetere

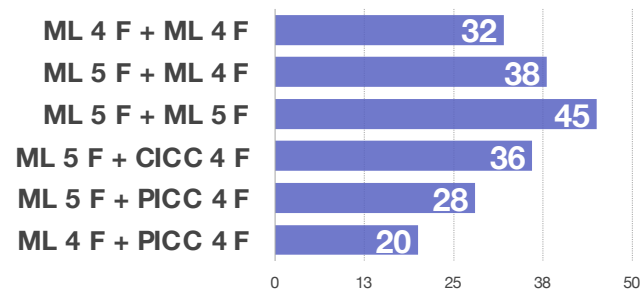




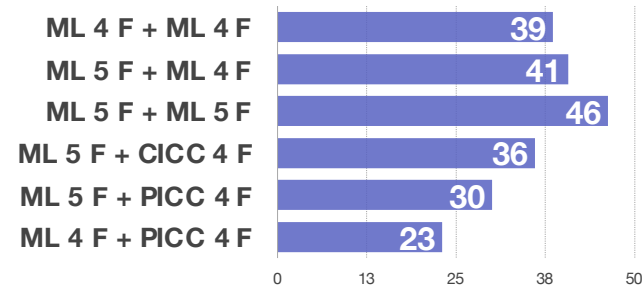
Colla + sutureless device + membrane trasparente

Midline 5Fr: una soluzione per la fotoaferesi cronica, specialmente se infrequente

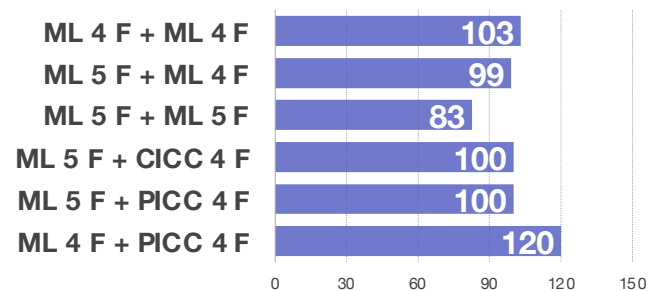
Average blood withdrawal
(ml/min)



Average blood return
(ml/min)



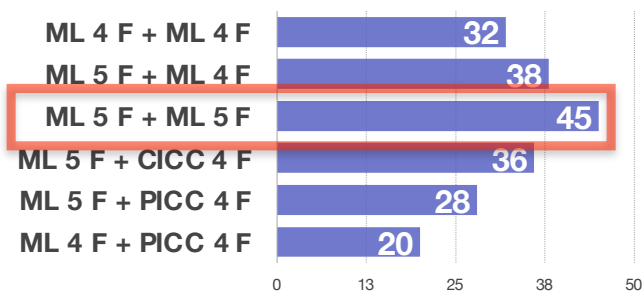
Average ECP time (min)



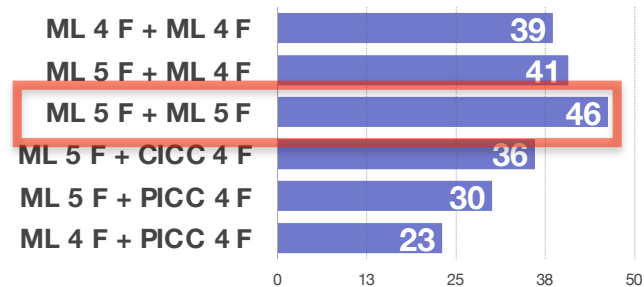
Marche et al. 2021

Midline 5Fr: una soluzione per la fotoaferesi cronica, specialmente se infrequente

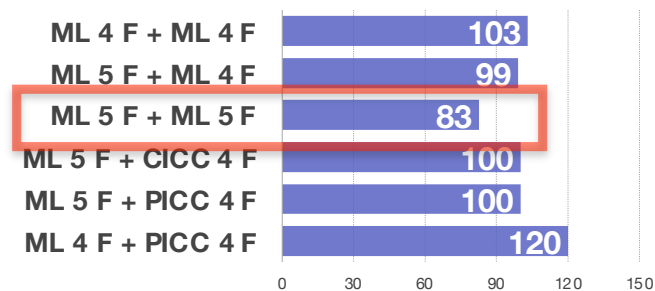
Average blood withdrawal
(ml/min)



Average blood return
(ml/min)



Average ECP time (min)



Marche et al. 2021

Origini della tip location nei midline

2020

Techniques in vascular access

JVA | The Journal of
Vascular Access

Ultrasound-guided tip location of midline catheters

**Stefano Elli¹ , Mauro Pittiruti², Valentina Pigozzo¹,
Luigi Cannizzo¹, Luciano Giannini¹, Andrea Siligato¹,
Egle Rondelli¹, Giuseppe Foti¹ and Alberto Lucchini¹ **

The Journal of Vascular Access
1–5

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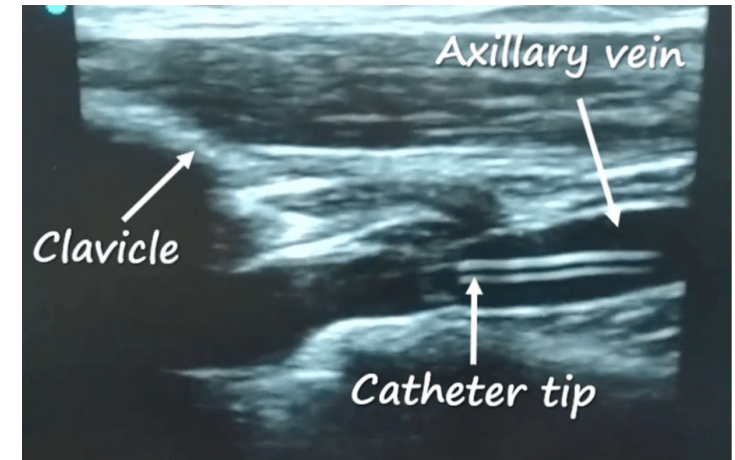
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DOI: 10.1177/1129729820907250

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 **SAGE**

Midline con tip location ecoguidata in vena ascellare per la riduzione del rischio di trombosi



	Midline 25 cm without USGTL Control group 1	Midline 20 cm without USGTL Control group 2	Midline 20 cm with USGTL Study group	p value
MCs (n)	412	111	458	
Age (mean $\pm$ SD)	67.2 $\pm$ 17.6	67.8 $\pm$ 16.9	67.6 $\pm$ 17.5	ns
Sex = M (%)	54.12	45.9	51.64	ns
Medical/surgical disease (%)	86.4/13.6	88.2/11.8	85.5/14.5	ns
CRT (n)	10	10	12	
CRT (%)	2.42	9	2.62	
CRT: group 1 vs study group	10		12	0.852
CRT: group 2 vs study group		10	12	0.002

MCs: Midline catheters; SD: standard deviation; CRT: catheter-related venous thrombosis.

Conclusion

As far as we know, this is the first clinical study reporting the possibility and the potential benefits of locating the position of the tip of midclavicular MCs using ultrasound.

During insertion of MCs, USGTL is safe, inexpensive, easy in the vast majority of patients and potentially useful in correlating the location of the tip with the incidence of malfunction and/or of CRT. Our study suggests that the

ideal position of the tip of an MC, in terms of reduction of the risk of CRT, might be inside the axillary vein, distal to the axillary-subclavian transition, or inside the subclavian vein, proximal to the transition area. It is not so important if a 20- or 25-cm long MC is used but is important to avoid the axillary-subclavian transition area during tip placement. USGTL should be routinely used for this purpose.



Midline per aferesi e per prelievi ripetuti, oggi

**DH Ematologia, Fondazione Policlinico
Universitario Agostino Gemelli, IRCCS, Roma**

Nel 2023, **55 midline** per aferesi e per prelievi ripetuti

**DH Ematologia, Fondazione Policlinico
Universitario Agostino Gemelli, IRCCS, Roma**

55 midline di cui:

20 midline 5Fr in 6 pazienti con GVHD sottoposti a
fotoaferesi cronica e prevalentemente infrequente

Midline 5Fr per fotoafaresi cronica infrequente (due sedute consecutive ogni mese o ogni due mesi)



Singolo midline 5Fr, off-label come CICC ,
per aferesi cronica infrequente (due sedute consecutive due mesi)



**DH Ematologia, Fondazione Policlinico
Universitario Agostino Gemelli, IRCCS, Roma**

- 0 complicanze meccaniche e infettive;
- **1 episodio di trombosi distale** in midline 5Fr in situ per 4 mesi di ECP cronica frequente (2 sedute consecutive ogni settimana per GVHD acuta)

Soluzione

Midline 5Fr, tunnellizzato + SAS,
off-label come CICC per
fotoaferesi cronica frequente
(con separatore cellulare a via
singola)



**DH Ematologia, Fondazione Policlinico
Universitario Agostino Gemelli, IRCCS, Roma**

55 midline di cui:

14 midline 5Fr in 8 donatori sani di CSE definiti DIVA

- 6 donatori con doppio midline
- 2 donatori con singolo midline (+ agocannula)
- 0 complicanze meccaniche, trombotiche o infettive
- Minima permanenza
- Accesso ambulatoriale

Doppio midline 5Fr in donatori sani di CSE definiti DIVA



Fondazione Policlinico Universitario A. Gemelli, IRCCS, Roma

55 midline di cui:

21 midline 4Fr per prelievi ripetuti (e infusioni non flebolesive) in pazienti DIVA

- 0 complicanze meccaniche e infettive;
- **1 episodio di trombosi**

Midline 4Fr per prelievi ripetuti e infusioni non flebolesive



Due auspici finali

Che sempre più centri possano prendere in considerazione l'utilizzo dei midline 5Fr:

Per le aferesi singole, episodiche e croniche (soprattutto se infrequenti)

	Azienda Ospedaliera Universitaria Integrata Verona IMPIANTO DI DOPPIO MIDLINE PER LA RACCOLTA DI CELLULE STAMINALI IN DONATORI SANI C. Esposito, S. Polato, M. Corso, E. Bonora, V. Schweiger, E. Polati Servizio Accessi Vascolari U.O.C di Terapia del Dolore Policlinico Universitario G.B. Rossi, AOUI Verona	
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Poster XVI PICC Day

Che sempre più diffusamente venga eseguita la tip location ecografica per tutti i midline:

Per la riduzione del rischio di trombosi e per il miglioramento della performance in aspirazione

GAVeCeLT

Roma 11-12 Dicembre 2023

MIDLINE E TIP LOCATION “EASY AND RIGHT”?

XVI PICC Day

S. De Letteriis¹, N. De Giosa¹, M. Teofilo¹, S. Vilardi¹, P. Pardini², M. Scarano¹

1. U.O. di Anestesia e Rianimazione II - A.O.U. Policlinico Bari

2. U.O. Medicina Interna Universitaria G. Baccelli - A.O.U. Policlinico Bari

Poster XVI PICC Day



Grazie per l'attenzione

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