IV Convegno Nazionale GAVePed

TROMBOSI VENOSA E GUAINA FIBROBLASTICA

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AOU CAREGGI

FIRENZE

DEFINIZIONE: MOLTA CONFUSIONE

Management of occlusion and thrombosis associated with long-term indwelling central venous catheters

Jacquelyn L Baskin, Ching-Hon Pui, Ulrike Reiss, Judith A Wilimas, Monika L Metzger, Raul C Ribeiro, Scott C Howard

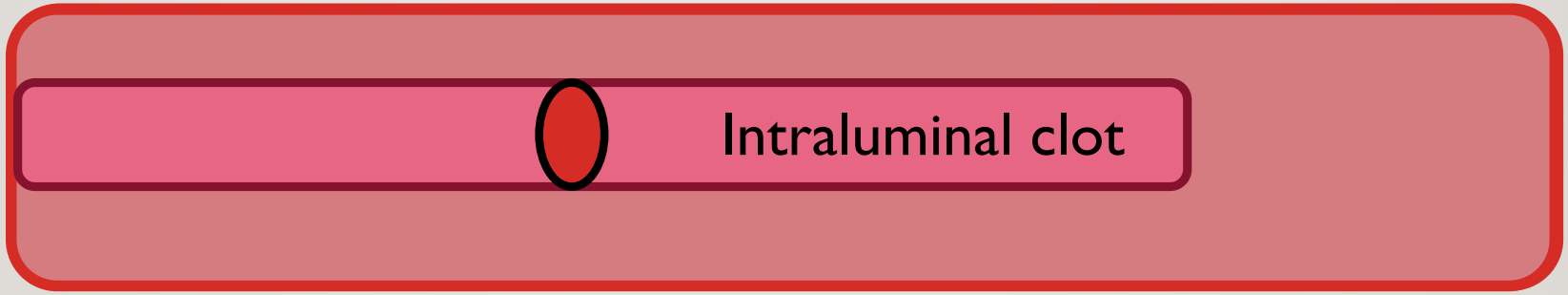
Long-term central venous catheters (CVCs) are important instruments in the care of patients with chronic illnesses, but catheter occlusions and catheter-related thromboses are common complications that can result from their use. In this Review, we summarise management of these complications. Mechanical CVC occlusions need cause-specific treatment, whereas thrombotic occlusions usually resolve with thrombolytic treatment, such as alteplase. Prophylaxis with thrombolytic flushes might prevent CVC infections and catheter-related thromboses, but confirmatory studies and cost-effectiveness analysis of this approach are needed. Risk factors for catheter-related thromboses include previous catheter infections, malposition of the catheter tip, and prothrombotic states. Catheter-related thromboses can lead to catheter infection, pulmonary embolism, and post-thrombotic syndrome. Catheter-related thromboses are usually diagnosed by Doppler ultrasonography or venography and treated with anticoagulation therapy for 6 weeks to a year, dependent on the extent of the thrombus, response to initial therapy, and whether thrombophilic factors persist. Prevention of catheter-related thromboses includes proper positioning of the CVC and prevention of infections; anticoagulation prophylaxis is not currently recommended.

Lancet 2009; 374: 159–69

Department of Oncology and International Outreach Program (J L Baskin MD, Prof C-H Pui MD, J A Wilimas MD, M L Metzger MD, R C Ribeiro M D, S C Howard M D), and Department of Hematology (U Reiss MD), St Jude Children's Research Hospital, Memphis, TN, USA; Department of Hematology and Oncology, Children's Hospital of Los Angeles, Los Angeles, CA, USA (J L Baskin); and

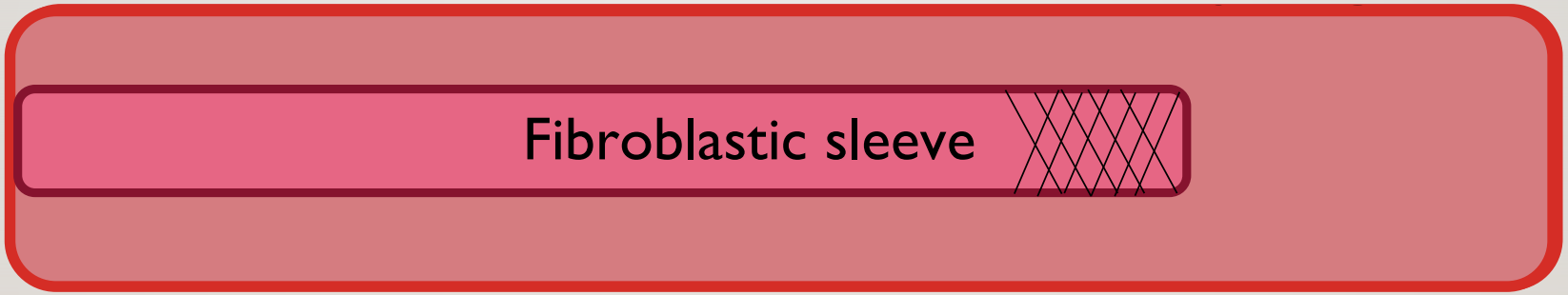
Baskin et al. Lancet. 2009 July 11; 374(9684): 159

DEFINIZIONE



Intraluminal clot is not CRT

DEFINIZIONE



Fibroblastic sleeve is not CRT

LA GUAINA FIBROBLASTICA : DEFINIZIONE

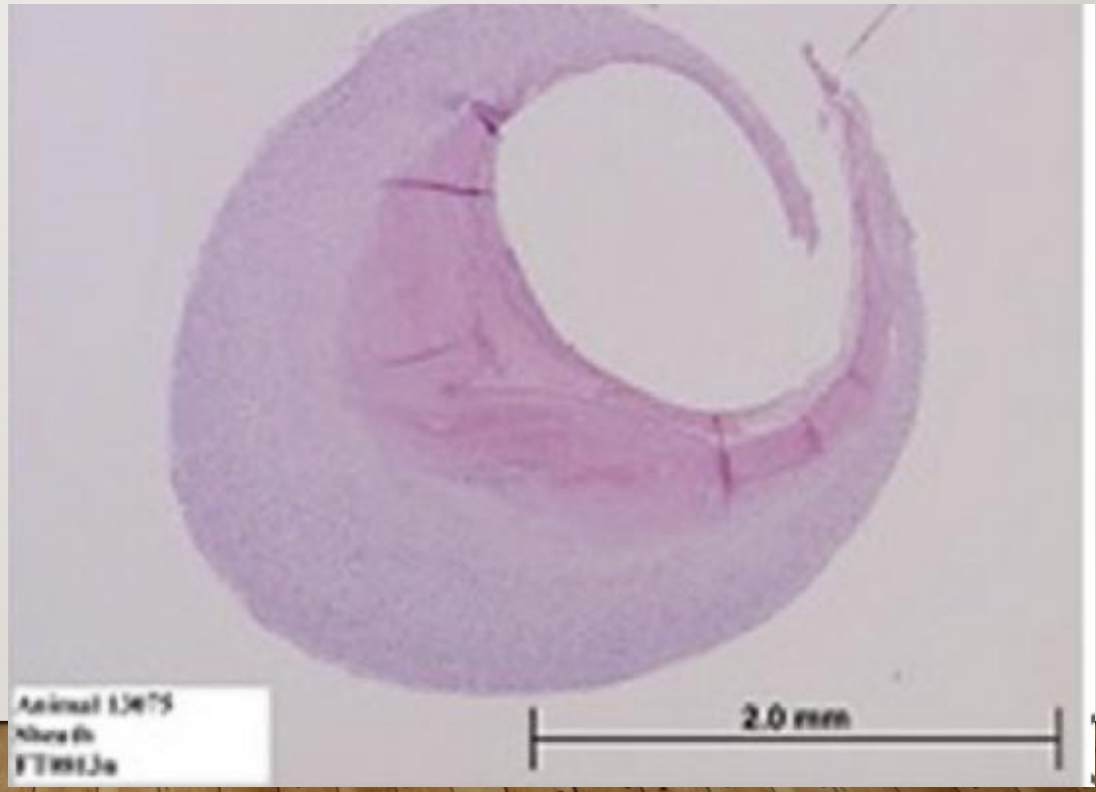
- Negli ultimi 50 anni molti diversi termini sono stati utilizzati:

  «fibrin sleeve», «fibrin sheath», «catheter sleeve», «catheter-related sheath» , «fibroblastic sleeve», trombosi pericatetere

- Se il termine «sleeve» o «sheath» può essere accettabile (guaina, manicotto, che circonda il catetere), certamente non lo è «fibrin»

LA GUAINA FIBROBLASTICA: ISTOLOGIA

- tessuto connettivo, costituito da **fibroblasti** e rivestito da endotelio;
- il principale componente non cellulare della guaina matura non è fibrina, ma **collagene**.



JVA The Journal of Vascular Access

Review

The fibroblastic sleeve, the neglected complication of venous access devices: A narrative review

The Journal of Vascular Access
1–13

DOI: 10.1177/1129729820951035
journals.sagepub.com/home/jva
SAGE

Giovanna Passaro, Mauro Pittiruti and Antonio La Greca

Abstract

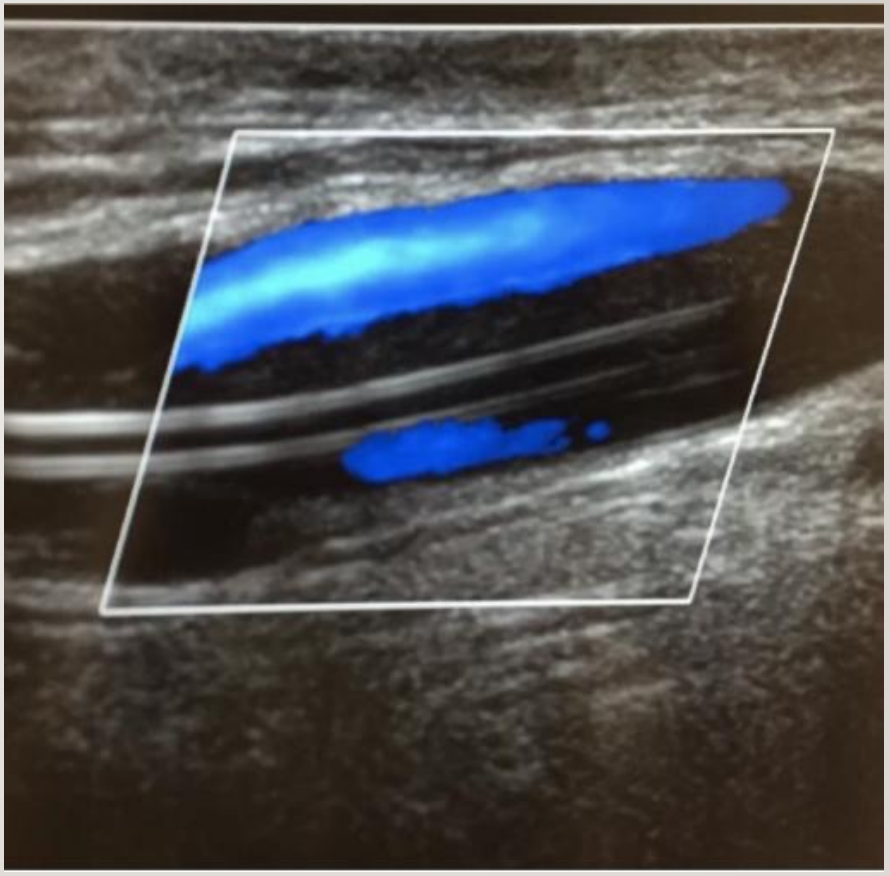
The presence of a vascular access device (or of any intravascular foreign body) inside the bloodstream is often associated with the formation of a connective tissue sleeve around the catheter (often named—erroneously—"fibrin sleeve"). Such sleeve is usually a physiological phenomenon with little or no clinical relevance, but its pathogenesis is still unclear, so that it is frequently confused with venous thrombosis; also, its relationship with other major catheter-related complications, such as venous thrombosis and bloodstream infection, is uncertain. This narrative review tries to convey in a systematic form the current knowledge about pathogenesis, incidence, clinical manifestations, diagnosis, and management of this phenomenon.

PRINCIPALI DIFFERENZE TRA CRT E FS

	CRT	FS
Etiopathogenesis	Endothelial damage	Foreign body reaction
Molecular trigger	Tissue thromboplastin	Fibronectin
Type of tissue	Thrombus	Connective tissue
Location	At the site of vein wall damage	Around the catheter
Evolution	Fibrosis/reabsorption	Reabsorption (?)
US imaging	Mass obstructing the vein Anechoic, and then hypo-echoic Mainly attached to the vein wall	Sleeve all around the catheter Hypo- or hyper-echoic Mainly attached to the catheter
Clinical manifestation	Signs and symptoms of venous obstruction + risk of catheter malfunction	Catheter malfunction
Risk of pulmonary embolism	Yes	No
Need for VAD removal	Rare (not responsive to therapy)	Rare (irreversible catheter malfunctio
Preventable with anticoagulants	Yes (not consistently)	No
Sensitive to thrombolysis	Yes (in the initial phase)	No
Pharmacological management	LMW heparin	None

Passaro JVA 2020

FS con aree ipo- e iper-ecogene, che circondano completamente il catetere.



FS ipo-ecogena, con flusso sanguigno tra FS e parete della vena.

LA GUAINA FIBROBLASTICA: PATOGENESI

1. Tipo di **reazione da "corpo estraneo"** (catetere) del tessuto sanguigno: non è sostanzialmente prevenibile
2. Nella maggior parte dei cateteri che rimangono in situ **per più di 7** giorni
3. FS si sviluppa **molto rapidamente**, anche 24 ore dopo l'inserimento del VAD e viene completata entro 2 settimane

Original research article

JVA The Journal of Vascular Access

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Incidence of fibroblastic sleeve and of catheter-related venous thrombosis in peripherally inserted central catheters: A prospective study on oncological and hematological patients

Carmela Trezza[1], Catello Califano[2], Vincenzo Iovino[3], Carmela D'Ambrosio[1], Giuseppe Grimaldi[4] and Mauro Pittiruti[5]

Abstract

Background: Insertion of peripherally inserted central catheters in oncological patients is potentially associated with catheter-related thrombosis and fibroblastic sleeve; the actual incidence and interactions between these two non-infective complications have never been investigated in a prospective clinical study on peripherally inserted central catheters.

Methods: In a cohort of oncological/hematological patients with peripherally inserted central catheter, we evaluated the occurrence of catheter-related thrombosis and/or fibroblastic sleeve, examining all patients by ultrasound scan at days 7, 14, 21, and 28 after insertion. We correlated our findings with the type of disease.

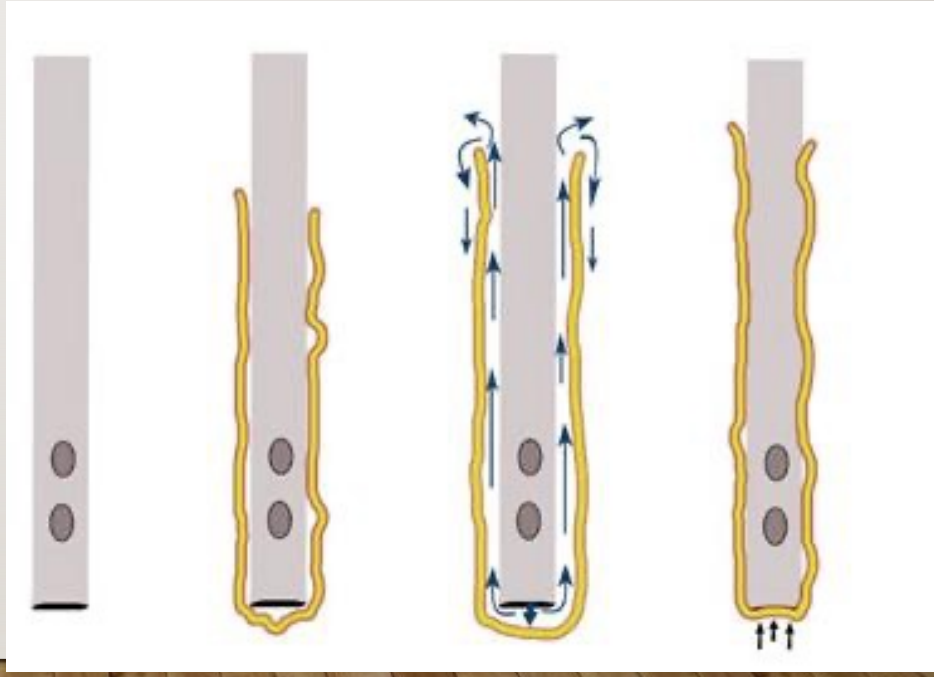
Results: We enrolled 254 patients with power injectable polyurethane 4Fr peripherally inserted central catheters. Ultrasound scan of the veins of the arm showed fibroblastic sleeve in 76 patients (29.9%); the fibroblastic sleeve was first detected on day 7 in 45 cases (17.7%), on day 14 in 26 cases (10.2%), on day 21 in 3 cases (1.2%), and on day 28 in 2 cases (0.79%). There was no correlation between the type of disease and the development of fibroblastic sleeve. The incidence of asymptomatic catheter-related thrombosis was 5.12%: all catheter-related thromboses were detected before day 14. There was only one case of symptomatic catheter-related thrombosis (0.39%) in a leukemia patient. Fibroblastic sleeve and catheter-related thrombosis were associated only in two cases (0.78%).

Conclusion: Fibroblastic sleeve is a frequent (29.9%) but asymptomatic finding in oncological and hematological patients with peripherally inserted central catheter, and—in the vast majority of cases—it occurs within 2 weeks after insertion. If compared to fibroblastic sleeve, asymptomatic catheter-related thrombosis is less frequent (5.51%); symptomatic catheter-related thrombosis is rare (<1%).

- 254 oncological/hematological pts
- PICC 4 FR
- FBS=29.9%
- 17.7% on day 7

LA GUAINA FIBROBLASTICA: IMPORTANZA CLINICA

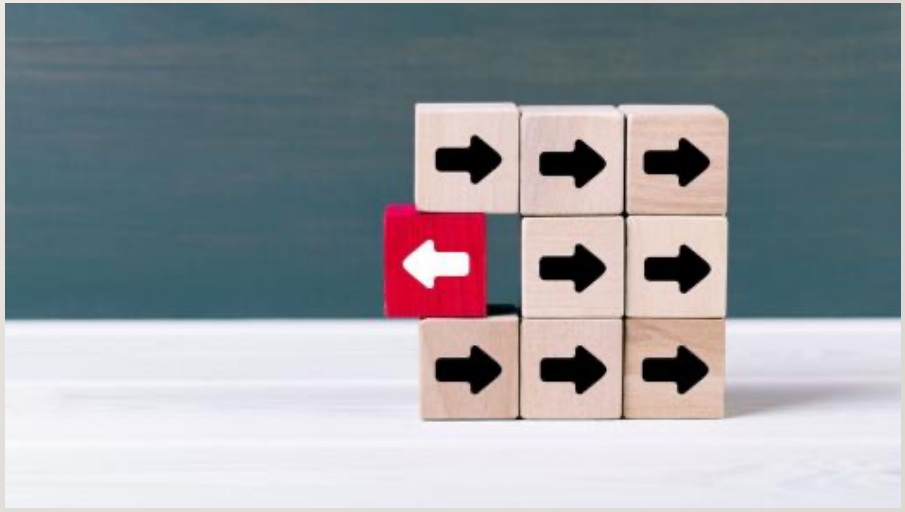
- Incidenza **10-56%** (100% per alcuni aa)
- Solitamente è un fenomeno fisiopatologico **innocuo**
- Clinicamente rilevante come potenziale motivo di **malfunzionamento del VAD** (PWO, stravaso)
- Associazione con infezione o trombosi venosa?
- **Distinzione da CRT**: FS non richiede alcun trattamento anticoagulante



Trombosi catetere-correlate (CRT): definizione

Mural (non occlusive) and occlusive thrombosis are CRT

FATTORI DI RISCHIO



Editorial

JVA The Journal of Vascular Access

Reconsidering the GAVeCeLT Consensus on catheter-related thrombosis, 13 years later

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1–8

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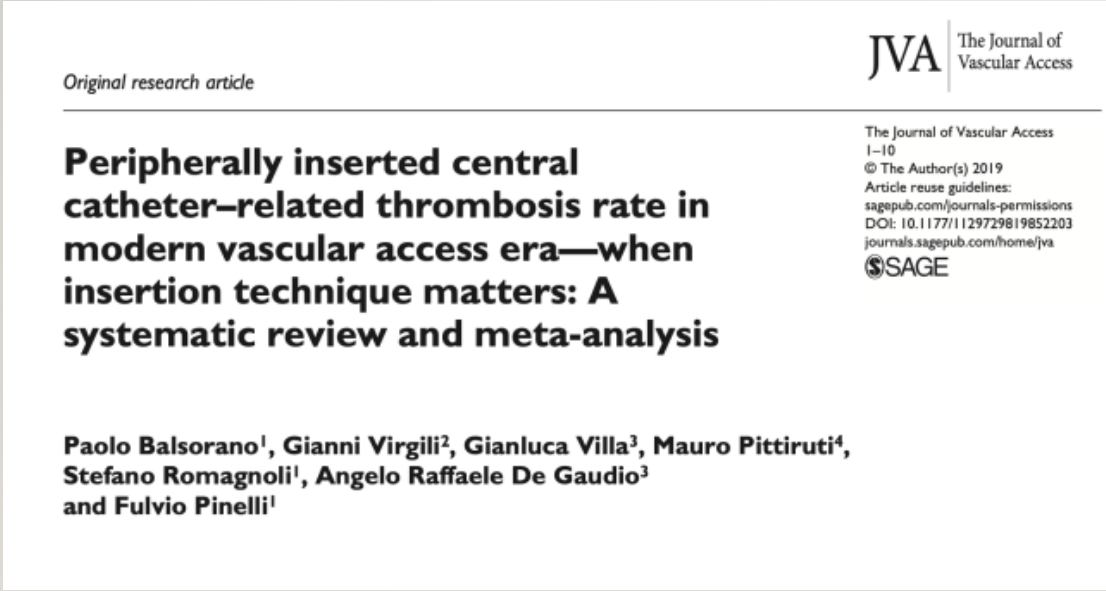
Fulvio Pinelli[1], Paolo Balsorano[1], Benedetta Mura[2] and Mauro Pittiruti[3]

- Choice of the device (Type; Material; Size)
- Technique of insertion
  - Catheter/vein ratio
  - Magnitude of the trauma to the vein wall
  - Position of the tip

CORRETTA TECNICA DI IMPIANTO = BASSO RISCHIO DI CRT

2019



Original research article

JVA The Journal of Vascular Access

Peripherally inserted central catheter–related thrombosis rate in modern vascular access era—when insertion technique matters: A systematic review and meta-analysis

Paolo Balsorano[1], Gianni Virgili[2], Gianluca Villa[3], Mauro Pittiruti[4], Stefano Romagnoli[1], Angelo Raffaele De Gaudio[3] and Fulvio Pinelli[1]

The Journal of Vascular Access
1–10

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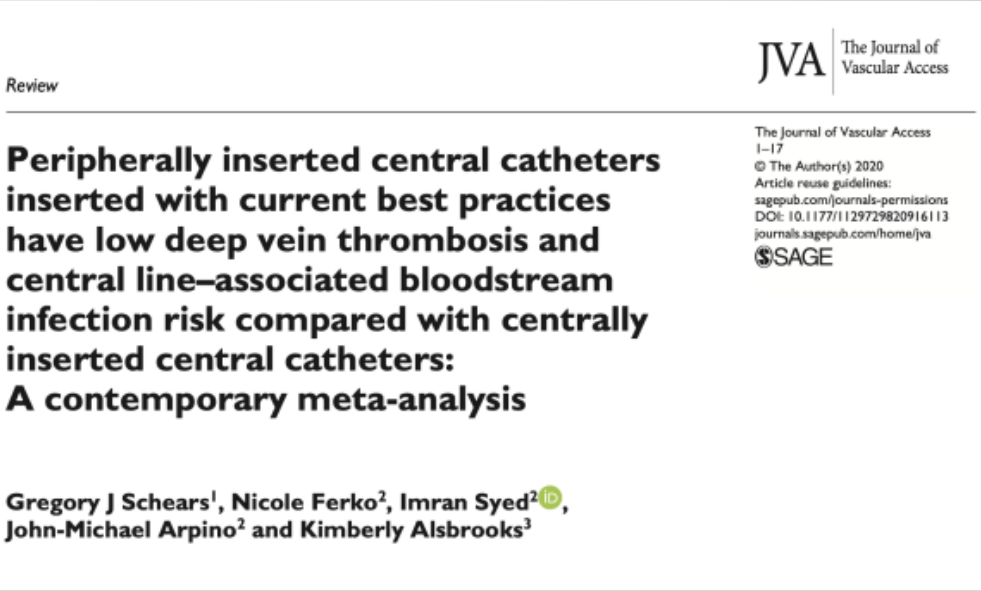
PICC CRT 2.2%

2020



Review

JVA The Journal of Vascular Access

Peripherally inserted central catheters inserted with current best practices have low deep vein thrombosis and central line–associated bloodstream infection risk compared with centrally inserted central catheters: A contemporary meta-analysis

Gregory J Schears[1], Nicole Ferko[2], Imran Syed[2], John-Michael Arpino[2] and Kimberly Alsbrooks[3]

The Journal of Vascular Access
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PICC vs CICC 2.3% vs 3.9%

THE BEST PREVENTION: A PROPER TECHNIQUE OF VAD INSERTION

1. Appropriate choice of the vein
2. Minimize the vein trauma
3. Assess a proper position of the tip
4. Stabilize the catheter

i.e: USE an INSERTION BUNDLE FOR CRT PREVENTION (ex. **GAVeCeLT bundle**)

1. APPROPRIATE CHOICE OF THE VEIN

- Choose the easier and safest vein to be punctured
- Avoid to puncture already thrombosed vein
- Choose an appropriate exit site
- Consider Catheter - vein ratio
- For PICCs: avoid broken or paralyzed limbs

PER I PICC: EVITARE BRACCIA FRATTURATE…

Catheter to vein ratio: maybe the most important factor

CHEST

Original Research

CRITICAL CARE

The Effect of Catheter to Vein Ratio on Blood Flow Rates in a Simulated Model of Peripherally Inserted Central Venous Catheters

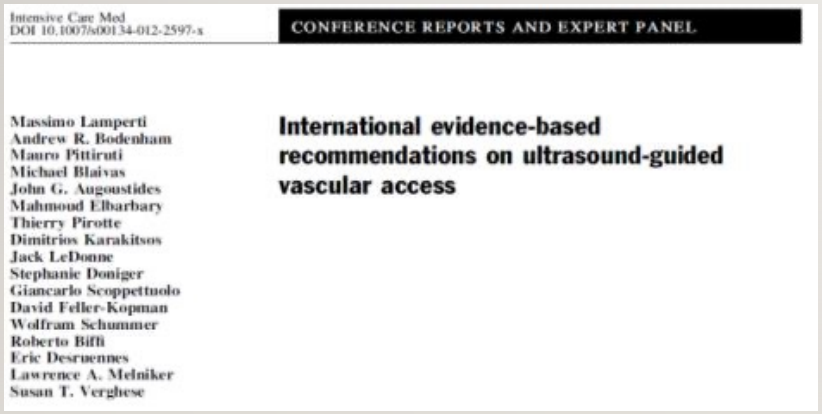
Thomas P. Nifong, MD; and Timothy J. McDevitt, PhD

DIMENSIONI

- Studi hanno confermato che il rapporto catetere/vena può essere più rilevante del diametro del catetere di per sé.
- Non è stato ancora definito un rapporto catetere/vena ideale.
- Sulla base dello studio in vitro di Nifong et al., molte istituzioni hanno adottato la regola del 33%.
- Allo stesso modo, la consensus WoCoVA-GAVeCeLT-WINFOCUS suggerisce che il diametro esterno del catetere non deve superare un terzo del diametro interno della vena *(Lamperti ICM, 2012)*

2 – Appropriate technique of venipuncture

US guided venipuncture



Intensive Care Med
DOI 10.1007/s00134-012-2597-x

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International evidence-based recommendations on ultrasound-guided vascular access

Ultrasound guidance, by reducing puncture attempts, technical failure rates and mechanical complications, has to be preferred because of a reduced incidence of catheter-related thrombosis.

Use ultrasound !

2 – Appropriate technique of venipuncture

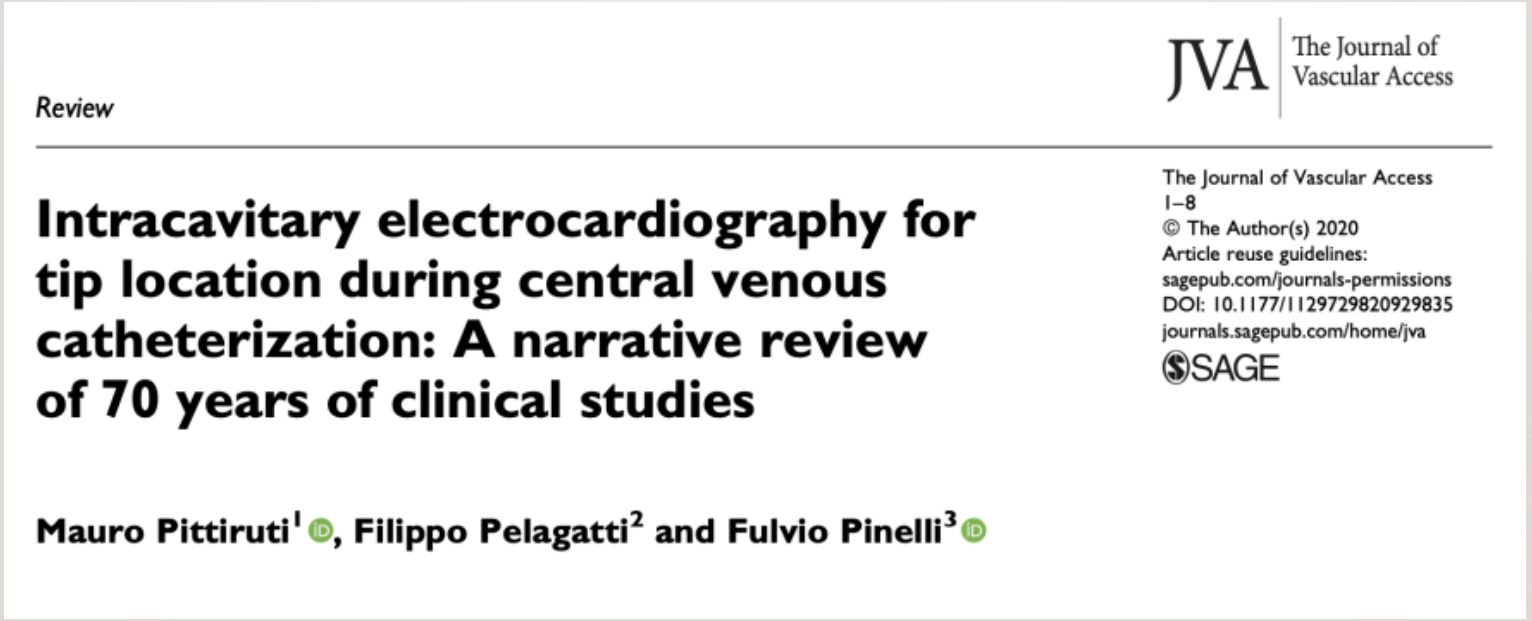
Use microintroducers !

Minimize vessel trauma

3 - ADEQUATE POSITION OF THE TIP

All the new guidelines agree that an incorrect tip position is a risk factor for "central" CRT

INTRAPROCEDURALE



Review

JVA The Journal of Vascular Access

Intracavitary electrocardiography for tip location during central venous catheterization: A narrative review of 70 years of clinical studies

Mauro Pittiruti[1], Filippo Pelagatti[2] and Fulvio Pinelli[3]

The Journal of Vascular Access
1–8

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JVA The Journal of Vascular Access

Editorial

ECHOTIP: A structured protocol for ultrasound-based tip navigation and tip location during placement of central venous access devices in adult patients

Antonio La Greca[1], Emanuele Iacobone[2], Daniele Elisei[2], Daniele Guerino Biasucci[3], Vito D'Andrea[4], Giovanni Barone[5], Geremia Zito Marinosci[6] and Mauro Pittiruti[1]

The Journal of Vascular Access
1–10

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JVA The Journal of Vascular Access

Editorial

Neo-ECHOTIP: A structured protocol for ultrasound-based tip navigation and tip location during placement of central venous access devices in neonates

Giovanni Barone[1], Mauro Pittiruti[2], Daniele G Biasucci[3], Daniele Elisei[4], Emanuele Iacobone[4], Antonio La Greca[2], Geremia Zito Marinosci[5] and Vito D'Andrea[6]

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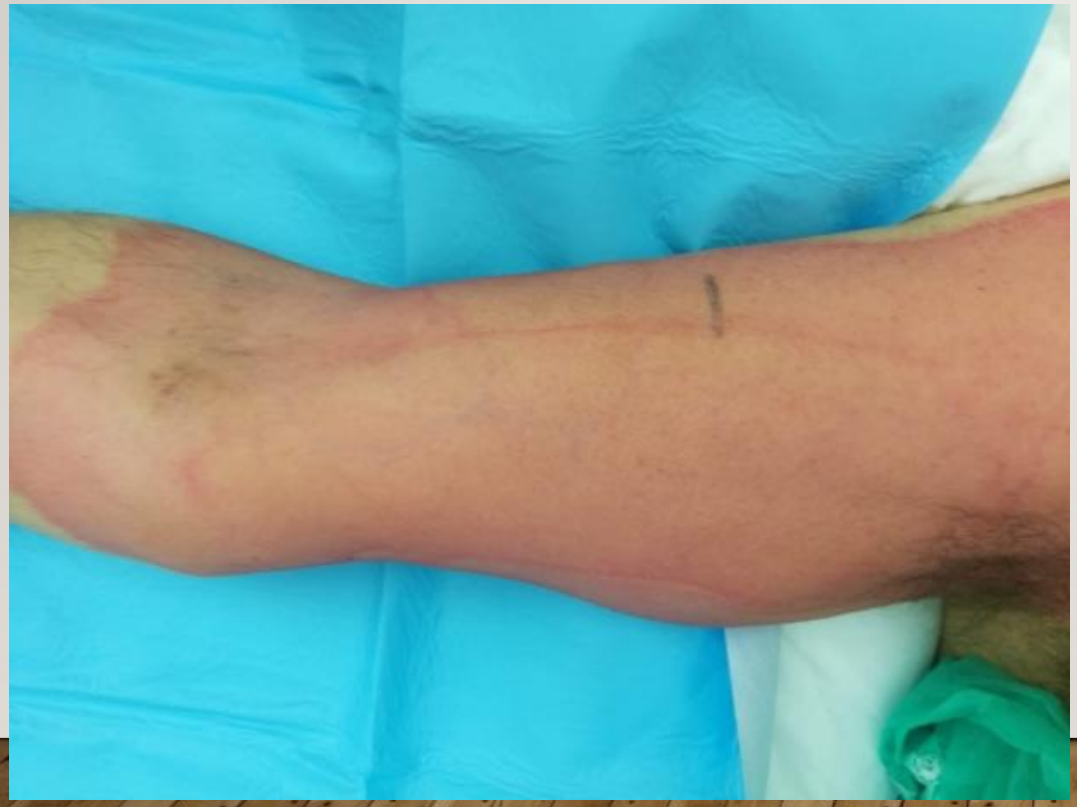
4 – STABILIZE THE CATHETER

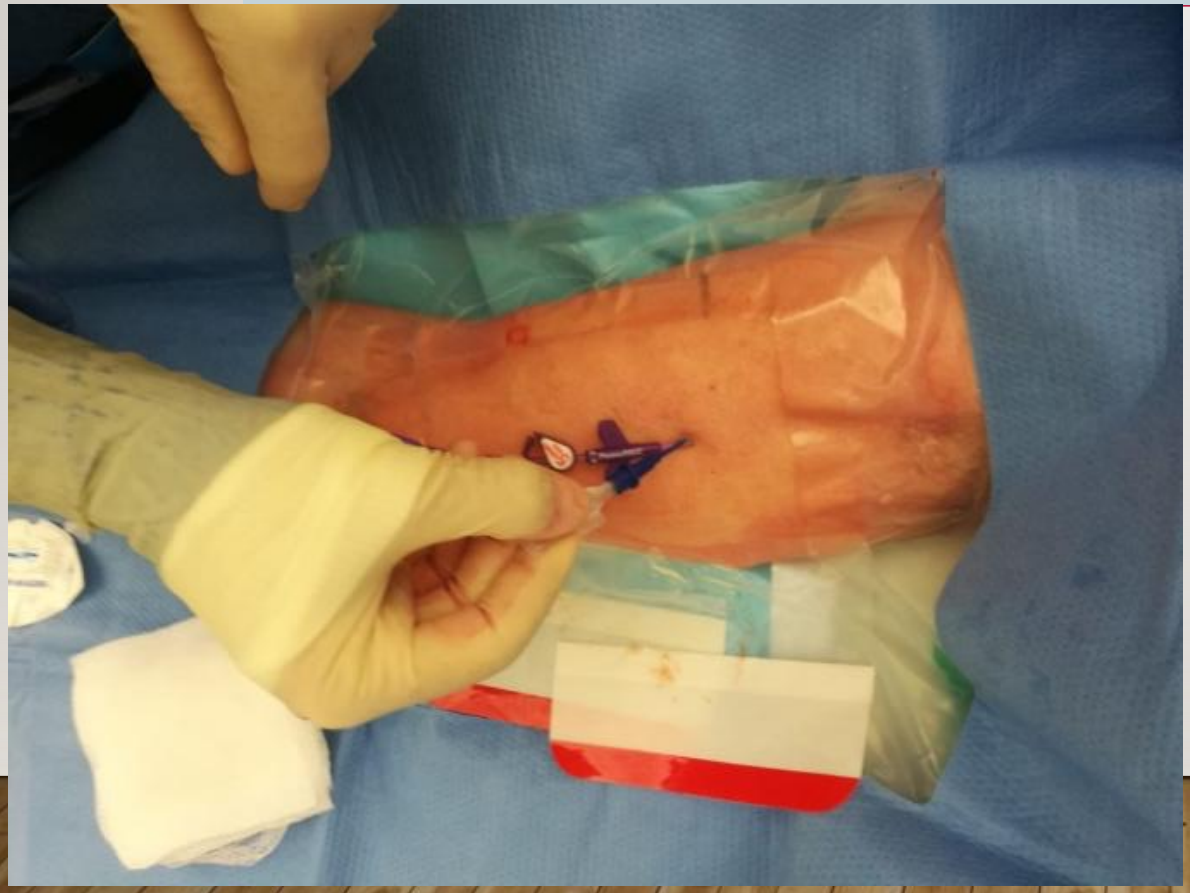
A ‘mobile’ VAD is more prone to exert mechanical trauma on the vein wall at the puncture site.

4 – STABILIZE THE CATHETER
A MULTIMODAL STRATEGY



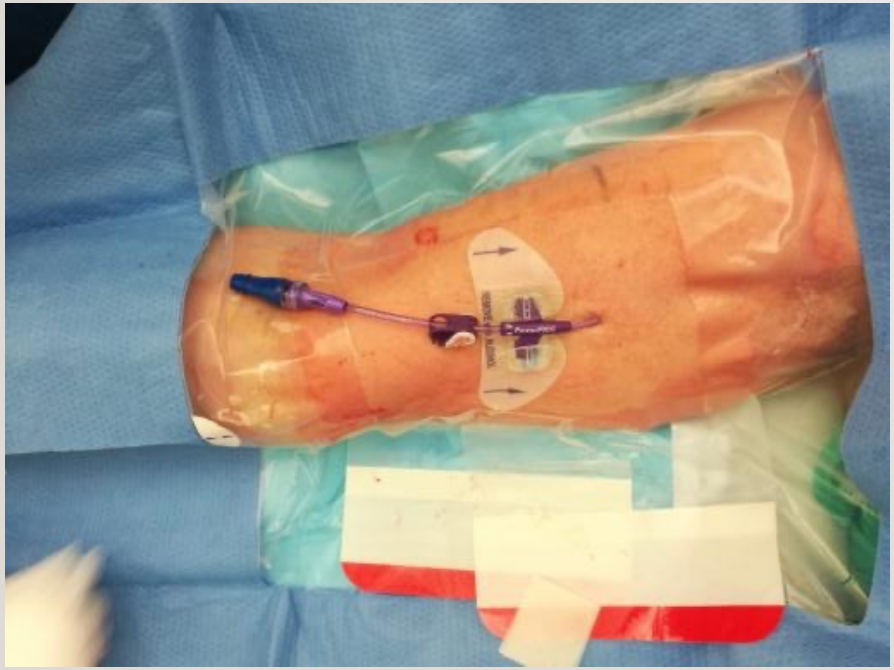
1. Proper choice of the exit site (midarm, infraclavicular, mid thigh)

4 – STABILIZE THE CATHETER
A MULTIMODAL STRATEGY



2. Cyanoacrylate glue at the exit site

4 – STABILIZE THE CATHETER
A MULTIMODAL STRATEGY



3. Sutureless device (SAS to be preferred in patients at high risk of catheter displacement)

4 – STABILIZE THE CATHETER
A MULTIMODAL STRATEGY

4. Exit site protection with semipermeable transparent membrane

TAKE HOME MESSAGES

- FS e CRT sono due condizioni molto diverse
  - istologia, patogenesi, criteri diagnostici e significato clinico
- La GF è un fenomeno parafisiologico non prevenibile;
- La CRT è prevenibile, anche se non completamente, con una corretta tecnica di impianto
  - Scelta del vaso; ecoguida; tip location; stabilizzazione

GRAZIE

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