I vantaggi dell'utilizzo della colla in cianoacrilato

Dr. Antonio Gidaro

U.O.C. Medicina Generale / Vascular Access Team

H. Sacco Milan

gidaro.antonio@asst-fbf-sacco.it

A sticky love story

The Kodak 'K' logo was introduced in 1971. The version seen here – with the 'Kodak' name in a more modern typeface – was used from 1987 until the logo's discontinuation in 2006. A revised version was reintroduced in 2016.[71]

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cyanoacrylate glue

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> Eksp Khir Anesteziol. 1964 Jan-Feb:29:3-6.

[SUTURELESS JOINING OF TISSUES (EXPERIMENTAL STUDY ON CYACRINE GLUE)]

[Article in Russian]

G S LIPOVETSKII, B G GOLDINA, Ia KULKOVA, V P PEREPELKIN, A A DENISOVA, E I MANEVICH, M G SMIRNOVA

PMID: 14161490

BURNS 37 (2011) e1–e3

available at www.sciencedirect.com

ScienceDirect

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

Case report

Histoacryl glue: A burning issue

Benjamin Jamnadas-Khoda *, *Mohammed A.A. Khan*, *Gregory P.L. Thomas*, *Sudip J. Ghosh*

Plastic Surgery ST3, Department of Plastic and Reconstructive Surgery, Stoke Mandeville Hospital, United Kingdom

industrial environments. The surgical applications of cyanoacrylate glues were suggested soon after their commercial release, in 1959 [3] and their use first reported in the literature in 1969 [4]. In 1998, 2-octyl-cyanoacrylate received United States Food and Drug Administration (FDA) approval as a tissue adhesive in skin closure. Today it is employed in most

The New York Times

REALLY?

The Claim: Super Glue Can Heal Wounds

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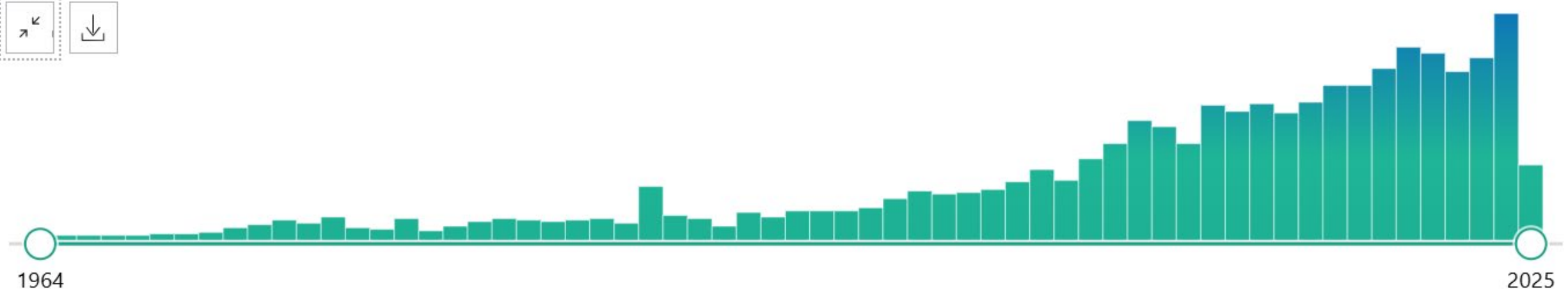
By Anahad O'Connor

Dec. 4, 2007

RESULTS BY YEAR

1,972 results

Page 1 of 198



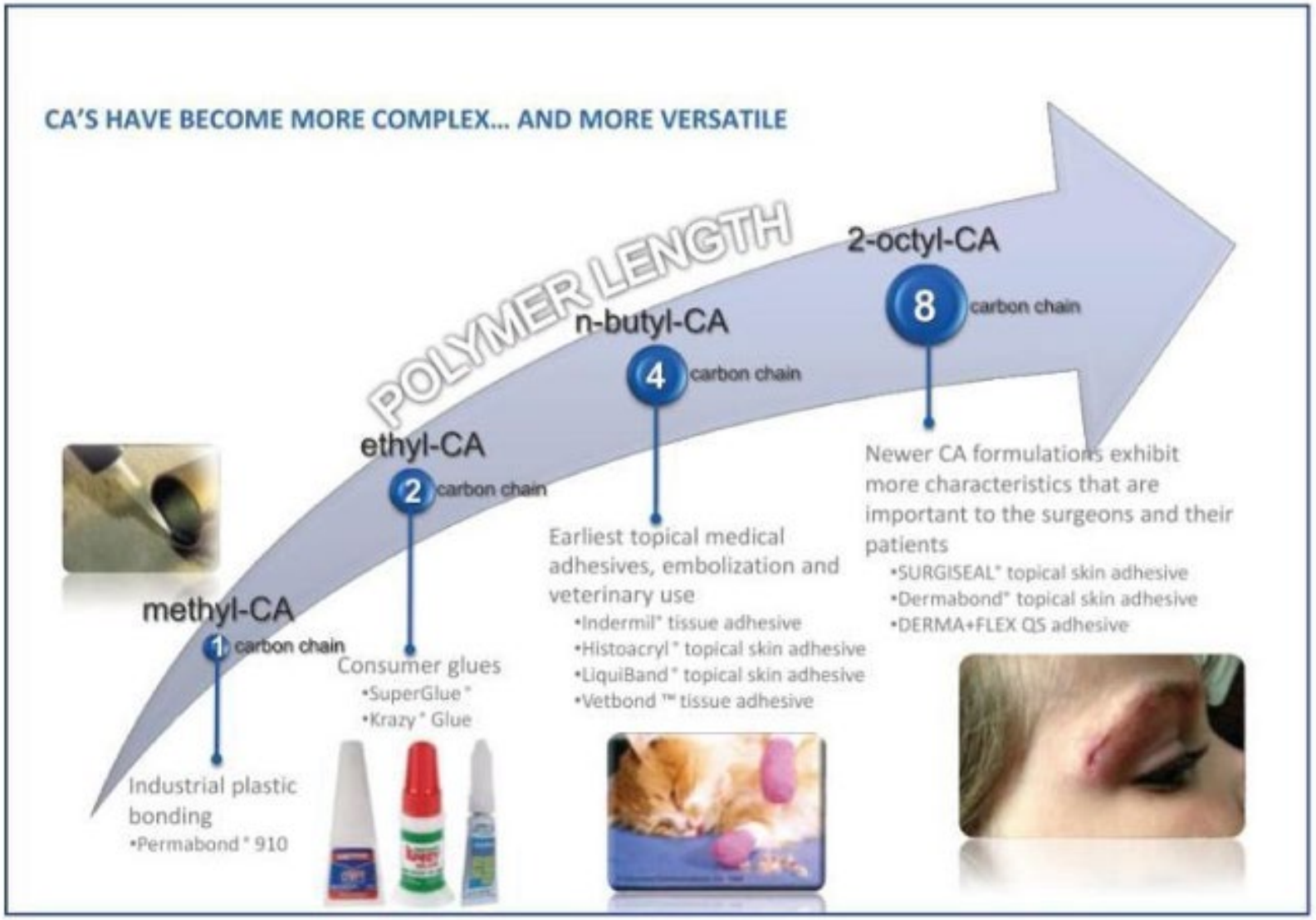


Figure 1. Cyanoacrylate development

Table 1. Comparison of older and newer cyanoacrylate tissue adhesives	
First generation	**Second generation**
Butyl-cyanoacrylate (BCA)	**2-octyl-cyanoacrylate (OCA)**
Quick drying	Longer drying time
Rigid/brittle	Higher tensile strength and more flexible
More cytotoxic	Less cytotoxic
Stronger thermal reaction	Reduced thermal reaction
Requires minimum 24 hours before fully water resistant	Immediately water resistant

Source: Internal testing by Adhezion Biomedical

Table 1. A selection of tissue adhesives used for skin closure or with vascular access devices*

Brand name (manufacturer)	Chemical constitution	Presentation (ml)	Storage (Celsius)	Time to degradation (days)	Properties
Histoacryl/Histoacryl Blue (B.Braun, Melsungen, Germany)	NBCA	0.5	< 22	7–10	■ High tensile strength ■ Microbial barrier ■ Quick setting time
Histoacryl Flexible (B.Braun, Melsungen, Germany)	NBCA + softener	0.5	< 25	7–10	■ High tensile strength ■ More flexible than NBCA ■ Less heat production on application ■ Microbial barrier
Dermabond (Ethicon, Somerville, NJ, USA)	OCA	0.36, 0.7	< 30	5–10	■ Higher tensile strength than NBCA ■ More flexible than NBCA ■ Microbial barrier
Surgiseal/SecurePortIV (Adhezion Biomedical, Wyomissing, PA, USA)	OCA	0.35, 0.5 (Surgiseal) 0.15 (SecurePortIV)	< 30	5–10	■ Higher tensile strength than NBCA ■ More flexible then NCBA ■ High moisture vapour transmission rate ■ Microbial barrier
Glubran Tiss2 (GEM, Viareggio, Italy)	NBCA + OCA	0.25, 0.35, 0.5	0–4	5–8	■ Improved flexibility ■ High tensile strength ■ Breathable ■ Less heat production on application ■ Microbial barrier
Indermil flexifuse (Connexicon, Dublin, Ireland)	NBCA + OCA	0.75	4–30	5–8	■ Flexibility ■ High tensile strength ■ Minimal heat produced ■ Microbial barrier

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DERMABOND™ PRINEO™

- 2-octyl cyanoacrylate

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TRUSETAL
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TRUGLUE®

- 2-octyl cyanoacrylate

LIQUIBAND®

SKIN CLOSURE SURGERY TISSUE A...
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SKINAFFIX

- 2-octyl cyanoacrylate

Review Article

Surgical Site Allergic Contact Dermatitis Due to 2-Octyl Cyanoacrylate: A Systematic Review and FDA MAUDE Review

James E. Fanning, BS; Maria J. Escobar-Domingo, MD; Marco Montoya, MD; Jose Foppiani, MD; Daniela Lee, BS; John B. Park, PharmD; Benjamin Rahmani, BS; Amitai S. Miller, BA; Sarah J. Karinja, MD; Ashley N. Boustany, MD; Sally Y. Tan, MD; and Bernard T. Lee, MD, MBA, MPH

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https://doi.org/10.1093/asj/sjae237
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and foot) (Table 1). The incidence of cutaneous reactions to 2-octyl cyanoacrylate ranged from 0.5% to 14%. Of the 7580 patients receiving adhesive glue containing 2-octyl cyanoacrylate for surgical site closure reported by included studies, 83 (1.09%) patients experienced a cutaneous reaction. Clinical descriptors of cutaneous reactions varied but erythema and pruritis were most commonly reported (Table 2). The reported timing of cutaneous reactions varied, ranging from 1 week to 7 weeks; 3 studies did not report any time points. Eight

Table 2. Surgical Incision Site Cutaneous Reactions to 2-Octyl Cyanoacrylate

Author and year	N	N (%)	Rash descriptors	Time to reaction
Pronio et al 2011[10]	32	2 (6.2)	Erythema	All <7 days
Chalmers et al 2017[11]	6008	29 (0.5)	Mild: erythema, infiltration, possible papules Moderate: erythema, infiltration, papules, and vesicles Severe: spreading or bullous reactions, extreme pruritis	Mean, 12 days (range, 2-42 days)
Holte et al 2017[12]	360	2 (0.6)	Mild surrounding erythema	NR
Nakagawa et al 2018[13]	100	7 (7.0)	Pruritic rash, skin redness, inflammation, delayed skin pigmentation	NR
Nigro et al 2020[14]	102	14 (14)	Erythema, urticaria, pruritis	Majority <7 days
Alotaibi et al 2021[2]	60	4 (6.6)	Erythema, pruritis, inflammation, hyperpigmentation	Range, 8-12 days
Lee et al 2021[15]	36	1 (2.8)	Eczematous eruption, blistering	NR
Park et al 2021[16]	739	20 (2.7)	Localized pruritic eczematous eruptions, papules, or vesicles	Range, 7-14 days
So et al 2021[17]	143	4 (2.8)	Localized eczema, pruritis, erythema, edema, or papulovesicular lesion	Mean, 3.9 weeks (range, 9 days-7 weeks)

NR, not reported by study.

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from 1 week to 7 weeks; 3 studies did not report any time points. Eight studies reported prescribed treatment, including topical corticosteroids (7 studies), oral antihistamines (3 studies), and oral corticosteroids (2 studies). Among the 83 patients, only 1 required return to the operating room for surgical site debridement, polyethylene linear

Author and year	N	N (%)	Prescribed treatment (%)	Prescribed allergy testing
Pronio et al 2011[10]	32	2 (6.2)	NR	NR
Chalmers et al 2017[11]	6008	29 (0.5)	Oral antihistamine (69) Topical corticosteroid (55) Oral corticosteroid (17)	None
Holte et al 2017[12]	360	2 (0.6)	Topical corticosteroid (50)	NR
Nakagawa et al 2018[13]	100	7 (7.0)	Topical corticosteroid (100)	NR
Nigro et al 2020[14]	102	14 (14)	Topical hydrocortisone (>50) Oral corticosteroids (21)	14 (100%) scratch testing
Alotaibi et al 2021[2]	60	4 (6.6)	Topical clobetasol (100) Oral prednisone (100) Oral loratadine (100)	NR
Lee et al 2021[15]	36	1 (2.8)	Wound debridement, polyethylene linear exchange, flap surgery for soft tissue necrosis	NR
Park et al 2021[16]	739	20 (2.7)	Topical corticosteroid (100) Oral antihistamine (100)	Patch testing if atypical morphology (% unknown)
So et al 2021[17]	143	4 (2.8)	Topical corticosteroid (100) Oral antihistamine (50)	None

Review Article

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Prescribed treatments of cutaneous reactions	All reports (%)
Corticosteroid (unspecified)	226 (37.1)
Antihistamine	167 (27.4)
No treatment reported	120 (19.7)
Methylprednisone	71 (11.7)
Hydrocortisone	53 (8.7)
Prednisone	33 (5.4)
Triamcinolone	28 (4.6)
Clobetasol	19 (3.0)

Table 5. Clinical Descriptions and Prescribed Treatment of Cutaneous Reactions After 2-Octyl Cyanoacrylate Surgical Site Closure Reported in the FDA MAUDE Database

Clinical descriptions of cutaneous reactions	All reports (%)
Rash	173 (28.4)
Itch	168 (27.6)
Hypersensitivity	153 (25.1)
Irritation	143 (23.5)
Reaction (unspecified)	141 (23.2)
Irritation/inflammation	104 (17.1)
Erythema	85 (14.0)
Inflammation	71 (11.7)
Blister	51 (8.4)
Infection	46 (7.6)
Tissue damage	36 (5.9)
Burn	34 (5.6)
Pain	32 (5.3)
Wound dehiscence	30 (4.9)
Discharge	29 (4.8)
Edema	28 (4.6)
Skin discoloration	20 (3.3)
Urticaria	12 (2.0)
Scar	11 (1.8)

Cosmetic Medicine

Review Article

Surgical Site Allergic Contact Dermatitis Due to 2-Octyl Cyanoacrylate: A Systematic Review and FDA MAUDE Review

James E. Fanning, BS; Maria J. Escobar-Domingo, MD; Marco Montoya, MD; Jose Foppiani, MD; Daniela Lee, BS; John B. Park, PharmD; Benjamin Rahmani, BS; Amitai S. Miller, BA; Sarah J. Karinja, MD; Ashley N. Boustany, MD; Sally Y. Tan, MD; and Bernard T. Lee, MD, MBA, MPH

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FDA MAUDE Database Review

A total of 609 clinician-inputted FDA MAUDE records were included for review. Four major categories of surgical procedures were iden-

Assorted	
Unspecified	49 (8.0)
Device implant	15 (2.5)

scientific reports

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Incidence and risk factor of allergic contact dermatitis to 2-octyl cyanoacrylate and n-butyl cyanoacrylate topical skin adhesives

Young Hwan Park, Jeong Seok Choi, Jung Woo Choi & Hak Jun Kim✉

We retrospectively reviewed 1145 patients (739 patients with 2-octyl cyanoacrylate and 406 patients with n-butyl cyanoacrylate) who underwent skin closure with topical skin adhesives. Variables suspected to correlate with ACD were retrieved from medical records and analyzed to determine risk factors. The incidence of ACD from the use of 2-octyl cyanoacrylate and n-butyl cyanoacrylate topical skin adhesives was 2.7% and 2.2%, respectively. There was no statistically significant difference in

Variable	ACD to 2-octyl cyanoacrylate (N = 20)		ACD to n-butyl cyanoacrylate (N = 9)	
	Odds ratio (95% CI)	p-value	Odds ratio (95% CI)	p-value
Age	0.981 (0.955–1.008)	0.159	0.229 (0.545–1.394)	0.547
Female	1.029 (0.362–2.926)	0.957	0.893 (0.201–3.979)	0.882
Diabetes	0.853 (0.107–6.822)	0.880	N/A	N/A
Smoking	0.469 (0.099–2.223)	0.340	0.397 (0.041–3.868)	0.427
Asthma	N/A	N/A	N/A	N/A
History of atopic dermatitis	N/A	N/A	N/A	N/A
History of allergies[a]	0.980 (0.116–8.319)	0.985	3.075 (0.280–33.761)	0.358
Neutrophil count	1.018 (0.967–1.071)	0.498	0.987 (0.915–1.065)	0.735
Eosinophil count	1.078 (0.843–1.379)	0.550	0.848 (0.531–1.353)	0.488
Anatomiccal region				
Lower leg including ankle joint	Reference value	0.806	Reference value	0.985
Forefoot	0.761 (0.205–2.824)	0.683	0.726 (0.082–6.410)	0.773
Midfoot	0.481 (0.105–2.199)	0.346	0.711(0.079–6.382)	0.761
Hindfoot	0.789 (0.212–2.929)	0.723	N/A	N/A

Table 2. Results of logistic regression analysis to assess the risk factors of allergic contact dermatitis to topical skin adhesives. *ACD* allergic contact dermatitis, *CI* confidence interval, *N/A* not applicable. [a]Antigens other than topical skin adhesives.

MEDICAL DEVICE MATERIAL PERFORMANCE STUDY

Cyanoacrylates Safety Profile

Report Details

Date of Submission

5/24/2021

Prepared For

U.S. FDA Center for Devices and Radiological Health

Submitted to

Ed Margerrison, PhD

Director, Office of Science and Engineering Laboratories (OSEL)
Center for Devices and Radiological Health
U.S. Food and Drug Administration

Other Applications

4 human studies (all RCTs [47-50]), provided evidence for this application of CA. Three of these studies[47-49] concerned procedures for anchoring dressings for catheter placement. These studies compared use of CA to other dressings and all involved pediatric patients. One study compared the use of CA to fibrin glue for attaching eye muscle to the sclera in strabismus

secure polyurethane dressing for a peripherally inserted central catheters (PICC) in children. One RCT[47] reported no incidences of dermatitis with use of CA, standard care, or integrated securement devices (ISDs). Two studies by Ullman and colleagues[47,48] found no evidence of increased itching associated with CA use. One study[47] found no incidences of itching in

One of the above RCTs[49] reported on all-cause skin irritation (which included itch, rash, skin tear and blisters) and found no significant difference in with use of CA to anchor dressings for PICC lines compared to use of SSDs or ISDs. However, the difference did trend toward significance (p=0.10), and incidences were highest with using CA (n=10 [31%] for CA versus n=5 [16%] and n=3 [10%] for SSDs and ISDs, respectively. Bruising was included in all-cause skin irritation but there was only

Ho do we apply CG?

Original research article

JVA The Journal of Vascular Access

The Journal of Vascular Access
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Addition of cyanoacrylate adhesive improves the strength of catheter securement and integrity of transparent dressing: Results from an in vitro test model

Sheng Zhang, Nastassia Price and Amanda Guido

Table 1. Method description of catheter securement and applying additional drops of OBCA under the transparent dressings.*

Method	Method description
1	Applying securement devices (OBCA, Tegaderm 9525HP (dressing A), or SorbaView SHIELD (dressing B)) alone, per product IFU
2	Applying OBCA per IFU to the catheter plus an additional 4 drops of OBCA applied and spread under the film dressing window area of where the dressing product would be placed after allowing 4 drops of OBCA to dry for 3 min (dressing A)
3	Applying OBCA per IFU to the catheter plus an additional 4 drops of OBCA applied and spread under film dressing window area and immediately applying transparent dressing products (dressing A or dressing B)
4	Applying OBCA per IFU to the catheter plus an additional 8 drops of OBCA applied and spread under entire film dressing area of where the dressing product would be placed after allowing 8 drops of OBCA to dry for 3 min (dressing A)
5	Applying OBCA per IFU to the catheter plus an additional 8 drops of OBCA applied and spread under entire film dressing area and immediately applying transparent dressing products (dressing A or dressing B)
6	Applying both OBCA and transparent dressing products (dressing A or dressing B), but without additional drops of OBCA applied to the window area of transparent dressing product.

*All studies were completed using 10 test samples per method, allowing the samples to rest at ambient room conditions for 30 min after the applied method.

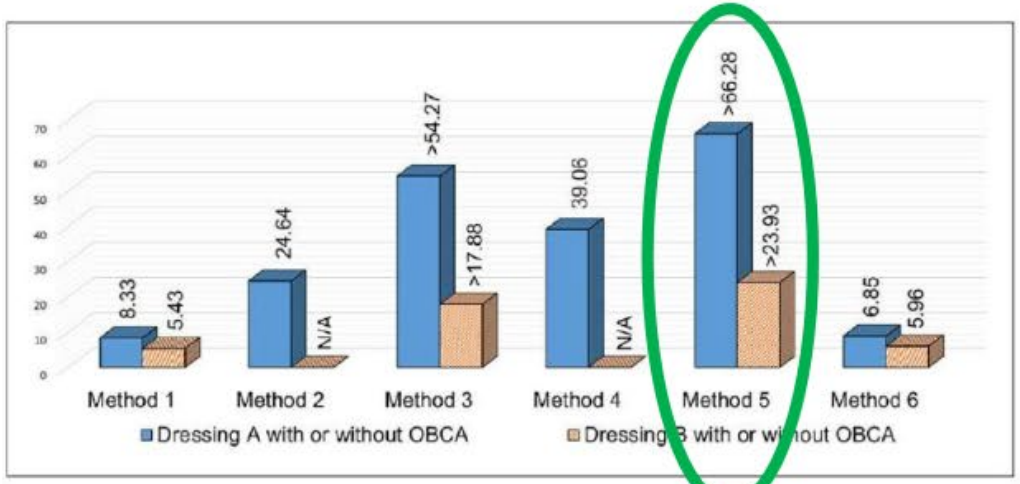


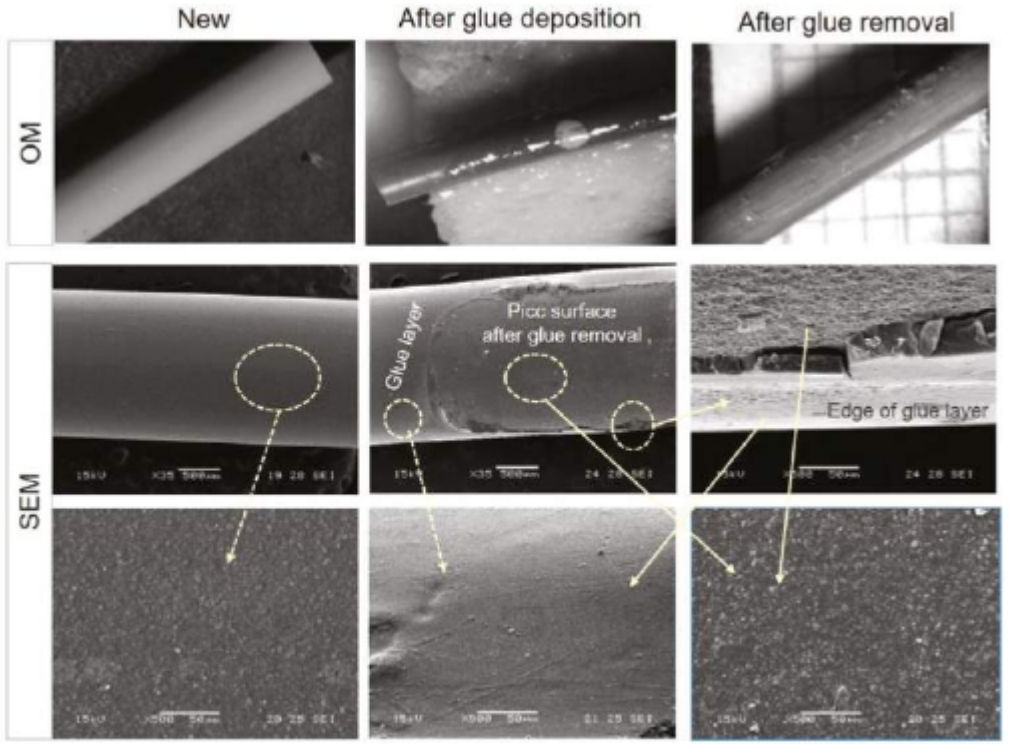
Figure 1. Adhesion strength (N) averages of transparent dressing with or without OBCA.
*Dressing B was not tested using Methods 2 and 4, represented by N/A. ">" symbol indicates that the catheter tubing broke prior to adhesion strength failure or was removed from the surface of the skin through a small opening in the dressing.

WoCoVA 8th World Congress on Vascular Access

Is it safe for DAV material?

- **2018, Di Puccio et al:**
  - In-vitro study → chemical/physical interactions
    - octyl-butyl-CG
    - 12 brands of PICCs (11 PUR; 1 silicone).
  - Analysis after 4, 8 and 12 weeks of contact with CG.
    - Long-term use of octyl-butyl- CG:
      - **No association with any damage to PUR catheters**
      - **It may alter the physical properties of silicone**

Fig. 3 - Examples of pictures from optical microscope (OM) and scanning electron microscope (SEM) analyses, comparing the initial surface of the PICC to the one covered with glue and to the final one, exposed after glue removal at 8 weeks.



USO DELLA COLLA NEI VAD

1. Stabilizzazione del dispositivo inserito
2. Barriera di protezione tra ambiente interno ed esterno
3. Prevenzione infezioni
4. Emostasi post inserzione

Review

J Vasc Access. 2021 Jun 4;11297298211023274. doi: 10.1177/11297298211023274.

European recommendations on the proper indication and use of peripheral venous access devices (the ERPIUP consensus): A WoCoVA project

Mauro Pittiruti[1], Ton Van Boxtel[2], Giancarlo Scoppettuolo[1], Peter Carr[3], Evangelos Konstantinou[4], Gloria Ortiz Miluy[5], Massimo Lamperti[6], Godelieve Alice Goossens[7], Liz Simcock[8], Christian Dupont[9], Sheila Inwood[10], Sergio Bertoglio[11], Jackie Nicholson[12], Fulvio Pinelli[13] and Gilda Pepe[1]

2021

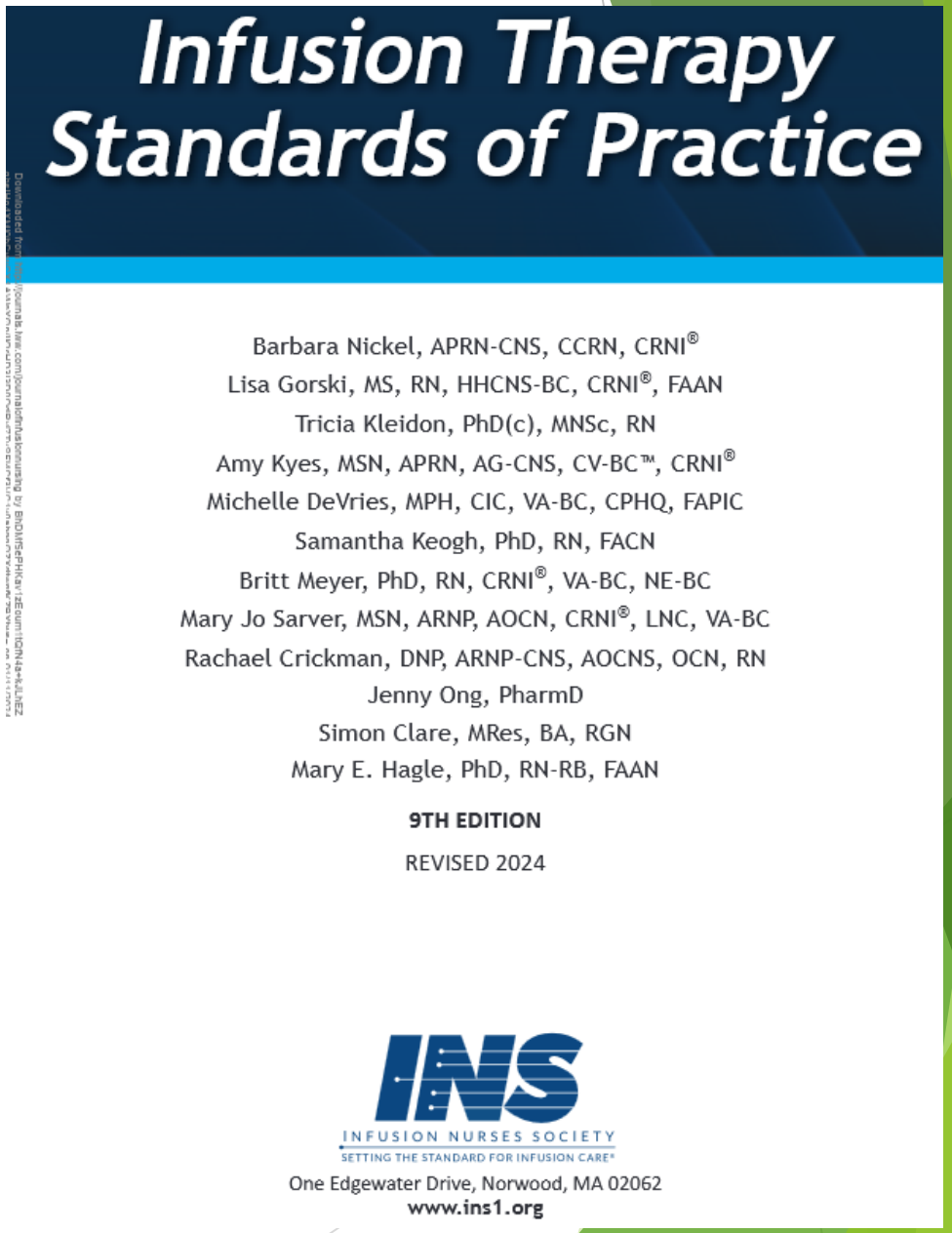
All PVADs should have the exit site covered and protected with semipermeable transparent dressings.[9] Cyanoacrylate glue, if applied in minimal quantity (0.2 ml) around the exit site, may reduce the risk of local bleeding and of bacterial contamination by the extra-luminal route, by sealing the breech. Cyanoacrylate is especially indicated in patients at high risk of bleeding (cirrhosis, chronic renal failure, hematologic diseases, patients on anticoagulants,

Minimize the risk of dislodgment using the following strategies:

- *place PVADs in the forearm or upper arm, avoiding areas of flexion*
- *if insertion is in the hand, the external jugular vein, or the lower limb is unavoidable, remove within 24–48 h*
- *use a sutureless device to secure the PVAD*
- *use a semipermeable transparent dressing*
- *consider the use of cyanoacrylate glue.*

Practice Recommendations

A. Use a securement method, such as adhesive securement device (ASD), integrated securement device (ISD), subcutaneous anchor securement system (SASS), or tissue adhesive (TA), in addition to the primary dressing, to stabilize and secure VADs. Inadequate securement can cause dislodgement and complications requiring premature removal.



Editorial

JVA The Journal of Vascular Access

The Journal of Vascular Access
2024, Vol. 25(1) 5–13

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The SIP protocol update: Eight strategies, incorporating Rapid Peripheral Vein Assessment (RaPeVA), to minimize complications associated with peripherally inserted central catheter insertion

Fabrizio Brescia[1], Mauro Pittiruti[2], Timothy R Spencer[3] and Robert B Dawson[4]

Abstract

Insertion of Peripherally Inserted Central Catheters (PICCs) is potentially associated with the risk of immediate/early adverse events, some of them minimal (repeated punctures) and some relevant (accidental arterial puncture or nerve-related injury). Several strategies adopted during the insertion process may minimize the risk of such events, including late complication risks such as infection, venous thrombosis, or catheter dislodgment and/or malposition. This paper describes an update version of the SIP protocol (Safe Insertion of PICCs), an insertion bundle which includes eight effective strategies that aims to minimize immediate, early, or late insertion-associated complications. These strategies include: preprocedural ultrasound assessment utilizing the RaPeVA (Rapid Peripheral Venous Assessment) protocol; appropriate skin antiseptic technique; choice of appropriate vein, adoption of the Zone Insertion Method™; clear identification of the median nerve and brachial artery; ultrasound-guided puncture; ultrasound-guided tip navigation; intra-procedural assessment of tip location; correct securement of the catheter, and appropriate protection of the exit site. This updated version of the SIP protocol includes several novelties based on the most recent evidence-based scientific literature on PICC insertion, such as the clinical relevance of the tunneling technique, the use of ultrasound for intra-procedural tip navigation and tip location, and the new technologies for the protection of the exit site (cyanoacrylate glue) and for the securement of the catheter (subcutaneous anchorage).

Table 1. The eight steps of the SIP Protocol.

Step 1	*Pre-procedural evaluation*—choose most appropriate vein by systematic ultrasound examination of the veins of the arms (see the RaPeVA protocol)
Step 2	*Appropriate antiseptic technique*—adopt a strict policy of hand hygiene, skin antisepsis with 2% chlorhexidine in 70% isopropyl alcohol, and use of maximal barrier precautions
Step 3	*Choice of vein size and exit site*—evaluate the diameter of the vein so to have an ideal catheter-vein ratio (1:3 or less); place the exit site in the green zone (see Dawson's ZIM™); consider the opportunity of tunneling the catheter, if the most appropriate vein is in the yellow zone (see the RAVESTO protocol)
Step 4	*Clear identification of median nerve and brachial artery*—identify each structure before venipuncture, using ultrasound
Step 5	*Ultrasound-guided venipuncture*—access a deep vein of the arm (either basilic or brachial vein), preferably adopting the short axis/out-of-plane approach, and use of a micro-introducer kit
Step 6	*Ultrasound-based tip navigation*—assess the correct direction of the guidewire, by a supra-clavicular ultrasound scan (see the ECHOTIP protocol)
Step 7	*Intra-procedural assessment of tip location*—use intracavitary ECG and/or ultrasound (subcostal or apical view, using the "bubble test"; see the ECHOTIP protocol)
Step 8	*Appropriate securement of the catheter and protection of the exit site*—use sutureless devices only; reduce the risk of bleeding and bacterial contamination using cyanoacrylate glue and semi-permeable transparent membrane dressings

USO DELLA COLLA NEI VAD

1. Stabilizzazione del dispositivo inserito
2. Barriera di protezione tra ambiente interno ed esterno
3. Prevenzione infezioni
4. Emostasi post inserzione

2012

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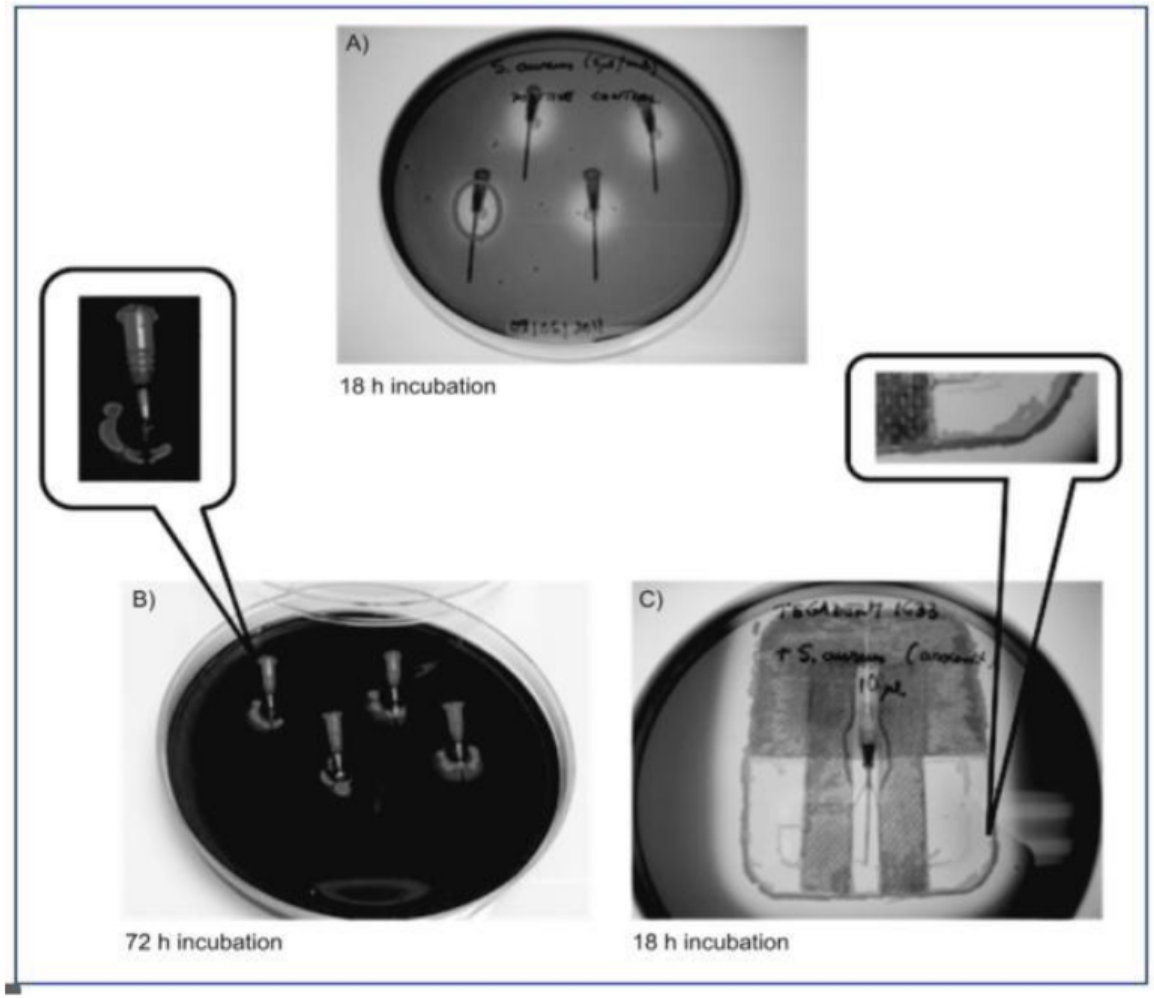

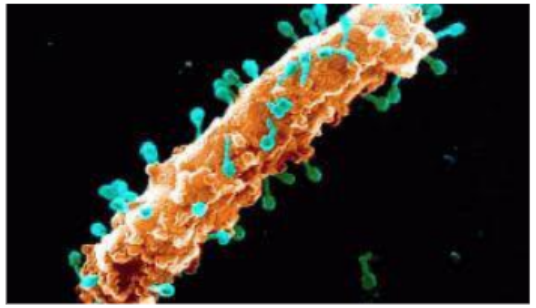

Anaesth Intensive Care 2012; 40: 460-466

Cyanoacrylate tissue adhesives – effective securement technique for intravascular catheters: in vitro testing of safety and feasibility

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SUMMARY

Partial or complete dislodgement of intravascular catheters remains a significant problem in hospitals despite current securement methods. Cyanoacrylate tissue adhesives (TA) are currently used to close skin wounds as an alternative to sutures. These adhesives have high mechanical strength and can remain in situ for several days. This study investigated in vitro use of TAs in securing intravascular catheters (IVC). We compared two adhesives for interaction with IVC material, comparing skin glues with current securement methods in terms of their ability to prevent IVC dislodgement and to inhibit microbial growth. Two TAs (Dermabond®, Ethicon Inc. and Histoacryl®, B. Braun) and three removal agents (Remove™, paraffin and acetone) were tested for interaction with IVC material by use of tensile testing. TAs were also compared against two polyurethane (standard and bordered) dressings (Tegaderm™ 1624 and 1633, 3M Australia Pty Ltd) and an external stabilisation device (Statlock®, Bard Medical, Covington) against control (unsecured IVCs) for ability to prevent pull-out of 16 G peripheral IVCs from newborn fresh porcine skin. Agar media containing pH-sensitive dye was used to assess antimicrobial properties of TAs and polyurethane dressings to inhibit growth of *Staphylococcus aureus* and *Staphylococcus epidermidis*. Neither TA weakened the IVCs ($P > 0.05$). Of removal agents, only acetone was associated with a significant decrease in IVC strength ($P < 0.05$). Both TAs and Statlock significantly increased the pull-out force ($P < 0.01$). TA was quick and easy to apply to IVCs, with no irritation or skin damage noted on removal and no bacterial colony growth under either TA.

Key Words: intravascular catheter, dressings, Dermabond, Histoacryl, pull-out force, antibacterial effect

JIP

The antibacterial effect of 2-octyl cyanoacrylate (Dermabond®) skin adhesive

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Key words: Dermabond®, hip replacement, knee replacement, orthopaedic surgery, prevention, surgical site infection, tissue adhesive, tissue glue

Abstract

Dermabond® is a tissue adhesive commonly used for wound or surgical incision closure. Its use has previously been associated with a reduction in wound infection, and it has been thought to act as a physical barrier to bacteria accessing the wound. This study aimed to establish whether the Dermabond® adhesive demonstrated any intrinsic antimicrobial properties. Solidified pellets of Dermabond® were placed on standardised Agar plates cultured with a variety of pathogens. Inhibition of growth was demonstrated against Gram-positive bacteria. Culture swabs taken from the inhibition rings demonstrated no growth, suggesting that Dermabond has a bactericidal mechanism of action.

Based on the design of this study, the results suggest that Dermabond® demonstrates bactericidal properties against Gram-positive bacteria. Its use for wound closure following surgical intervention may reduce postoperative wound infection by Gram-positive organisms.

technique (Mangram et al. 1999); 5.8% of patients with an SSI will die as a result of the infection (de Lissovoy et al. 2009). The average length of stay for orthopaedic patients without infection is five days, which increases to 12 with SSI (de Lissovoy et al. 2009).

The most common pathogen reported as causing an SSI following orthopaedic surgery is *Staphylococcus aureus*, which accounts for 39% of infections, of which 58% are meticillin sensitive, and 42% meticillin resistant. Following TKR coagulase-negative *Staphylococci* (CNS) is the most common infective pathogen, comprising 30% of infections. Other common pathogens are *Enterobacteriaceae* (18.8%), *Enterococcus* spp. (8.0%), *Pseudomonas aeruginosa* (3.6%), *Pseudomonas* spp. (3.3%), *Streptococcus* spp. (2.8%), anaerobic bacilli (1.4%), anaerobic cocci (1.3%), *Acinetobacter* spp (0.4%), and fungi (0.3%) (Elgohari et al. 2010).

Wound closure technique has been studied as a potential means of reducing SSI. A meta-analysis revealed that using sutures rather than staples significantly reduced the incidence of postoperative infection following orthopaedic surgery (Smith et al. 2010). The use of 2-octyl cyanoacrylate tissue adhesive is commonplace in plastic and cardiac sur-

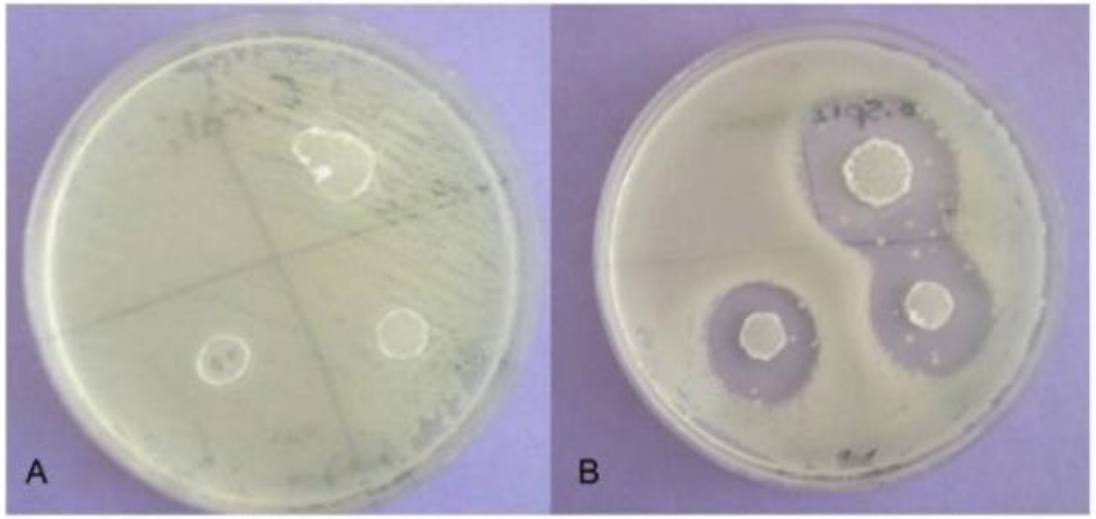

Figure 2. *Photograph showing no inhibition of growth of a Gram-negative bacteria (A) and inhibition of growth of a Gram-positive bacteria (B) around the pellets of Dermabond®*

Table 1. Size of inhibition ring around pellet after 10 days incubation

Micro-organism	Inhibition ring
Meticillin-resistant *Staphylococcus aureus*	+++
Coagulase-negative Staphylococcus	++
Oxford Staphylococcus	+++
Group G Streptococcus	+++
Escherichia coli	–
Pseudomonas aeruginosa	–
Candida albicans	–

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Major Article

Antibacterial effect and proposed mechanism of action of a topical surgical adhesive

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- 2018

Table 1

Antibacterial effect of the uninitiated product after a 3-minute contact time: detailed results versus *Pseudomonas aeruginosa*

Replicate No.	Log 10 survivors	Log 10 reduction	Neutralization challenge
1-19	0	8 – 0 = 8	+
20	1.48 = 1	8 – 1 = 7	+

P aeruginosa versus negative control

Dilution	Count
10^{-4}	TNTC, TNTC
10^{-5}	>200, >200
10^{-6}	27, 58
10^{-7}	5, 3
cfu/10 mL	4.3×10^7
Log 10	7.63 = 8
Summary of kill against 7 clinically relevant organisms	Average (n = 20) log 10 reduction
Methicillin-resistant Staphylococcus aureus	8
Escherichia coli	8
P aeruginosa	8
Klebsiella pneumoniae	7
Staphylococcus epidermidis	7
Corynebacterium pseudodiphtheriticum	8
Staphylococcus aureus	8

NOTE. The filtrates were also plated and had no growth. The results for all organisms were equivalent as shown above. On challenge with <100 cfu, all dilution tubes were positive, meaning no carryover residual cyanoacrylate was present in the dilution tubes. The results for all the eight organisms tested were equivalent having

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Original research articles

Reduction of bacterial colonization at the exit site of peripherally inserted central catheters: A comparison between chlorhexidine-releasing sponge dressings and cyano-acrylate

Emanuele Gilardi [1], Alfonso Piano[1], Pietro Chellini[1], Barbara Fiori[2], Laura Dolcetti[3], Mauro Pittiruti [4], and Giancarlo Scoppettuolo[3]

Introduction: A serious complication associated with Central Venous Access Device (CVAD) is infection because of bacterial contamination, either by the extra-luminal or by the intra-luminal route.

We evaluated the efficacy, the safety, and the cost-effectiveness of two strategies for non-inferiority in controlling bacterial colonization of the exit-site of Peripherally-Inserted Central Catheters (PICC).

Methods: After PICC placement, a skin swab of the exit site was taken and cultured. In group A the exit site was sealed with N-butyl-cyanoacrylate glue, while in group B a chlorhexidine-releasing sponge dressing was applied. A second skin culture was taken at day 7.

Results: A total of 51 patients were enrolled in each group. In 42 patients the second skin culture was not performed because of 20 patients were lost at follow-up or deceased and in 22 patients the dressing needed to be changed early, because of local bleeding (13 cases, in group B) or because of dressing detachment (four in group A and five in group B). The microbiological study was completed in 36 patients in group A and 24 in group B. No microorganisms were isolated in any patient.

Conclusions: Both strategies were effective in controlling bacterial colonization. Glue was effective in reducing local bleeding, and it was more cost-effective than sponge dressing. During the first week, when local bleeding and bacterial colonization must be prevented, glue might be more appropriate than chlorhexidine-releasing dressing; after the first week chlorhexidine-releasing dressing might be preferable, considering that the safety of glue application on the skin for prolonged periods is still questionable.

USO DELLA COLLA NEI VAD

1. Stabilizzazione del dispositivo inserito
2. Barriera di protezione tra ambiente interno ed esterno
3. Prevenzione infezioni
4. Emostasi post inserzione

including wound and laceration closure [1], repair of gastric varices [2], incisional hernias [3], retinal detachment [4], and for securing epidural catheters [5]. They have numerous advantages over traditional sutures [6], with the potential to reduce complications associated with traditional methods for both the patient and doctor. They are safe (having been tested extensively in a wide range of areas) and cost effective, with less need for local anaesthetic and dry dressings. They prevent the need for painful suturing and suture removal with the potential for significant reductions in percutaneous injuries from suture needles and better cosmetic results for the patient [7]. They are tough, durable, have high mechanical strength and can remain in place for a number of days. In addition, such agents have intrinsic bactericidal properties [8], another advantage in the context of long-term catheters used in ICU where catheter-related infections are a common problem.

Here we describe the use of Histoacryl® tissue adhesive (B Braun, Sheffield, UK) to secure a standard three-port femoral central venous catheter in an obese male burns patient. To our knowledge such use of tissue adhesives has not been described before. It is, however, an obvious application for these agents (with all the advantages described above), especially in individuals in whom suturing may be difficult due to positional or anatomical reasons, or in whom the catheter is required to stay in for a long period of time, as with our patient. After insertion, the catheter is coated sparingly with a thin layer of adhesive to anchor it at the insertion point and wing tips (Fig. 5) and then held in place for about 30 s while the adhesive sets. This is much less time consuming than using sutures. The adhesive can safely be removed at any time using acetone if necessary, for example for repositioning. Otherwise, it starts to loosen naturally after 5–10 days, and washes off with soap and water [9].

We have secured over 30 lines using this glue with complete success and have undertaken a successful volunteer study securing epidural catheters (abstract

Tissue adhesive as an alternative to sutures for securing central venous catheters

Tissue adhesives have been used in the past for a wide range of applications,

Ireland

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Correspondence

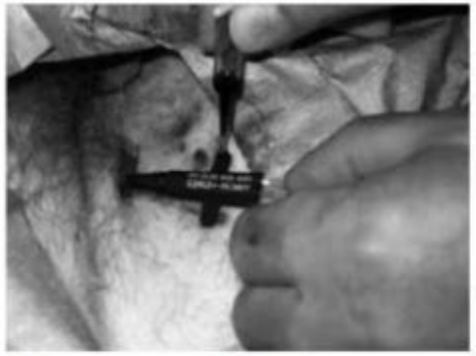

Figure 5 CVP catheter being secured with tissue adhesive.

Anaesthesia, 2007, **62**, pages 966–974

submitted). We have also secured 50 thoracic epidurals in place in following thoracotomy with excellent results.

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2007

Tissue adhesive as an alternative to sutures for securing central venous catheters

Anaesthesia, 2008, **63**, pages 551–560

We read with interest the article 'Tissue adhesive as an alternative to sutures for securing central venous catheters' [1]. We agree with the use of tissue glue for catheter fixation. One of the authors has several years experience in using this technique for the securing peripheral intravenous cannula, arterial lines and central venous catheters.

We would, however, like to highlight some other points which were not illustrated in the correspondence. Whilst we agree that cyanoacrylate glues have a high tensile strength, the shear strength is not as great. Therefore, while acetone solvent will dissolve a bond, equally and perhaps more simply, the bond will be broken with a rotational action between the bonded items. The idea of intrinsic bactericidal properties of the glue was stated, however the added benefit of haemostasis was not highlighted. The presence of blood beneath the dressing will give any bacteria a rich growth medium, lack of this may reduce the infection rates.

It is our opinion that most lines are subject to a motion rather like a piston when secured by sutures. This increases tissue trauma and may introduce bacteria into the puncture site. A line that has been adhered to the skin does not move in this manner.

We would like to advise caution of the use of these adhesives with any device that has been coated in a low energy compound, such as silicone. The strength of the bond achieved is very poor.

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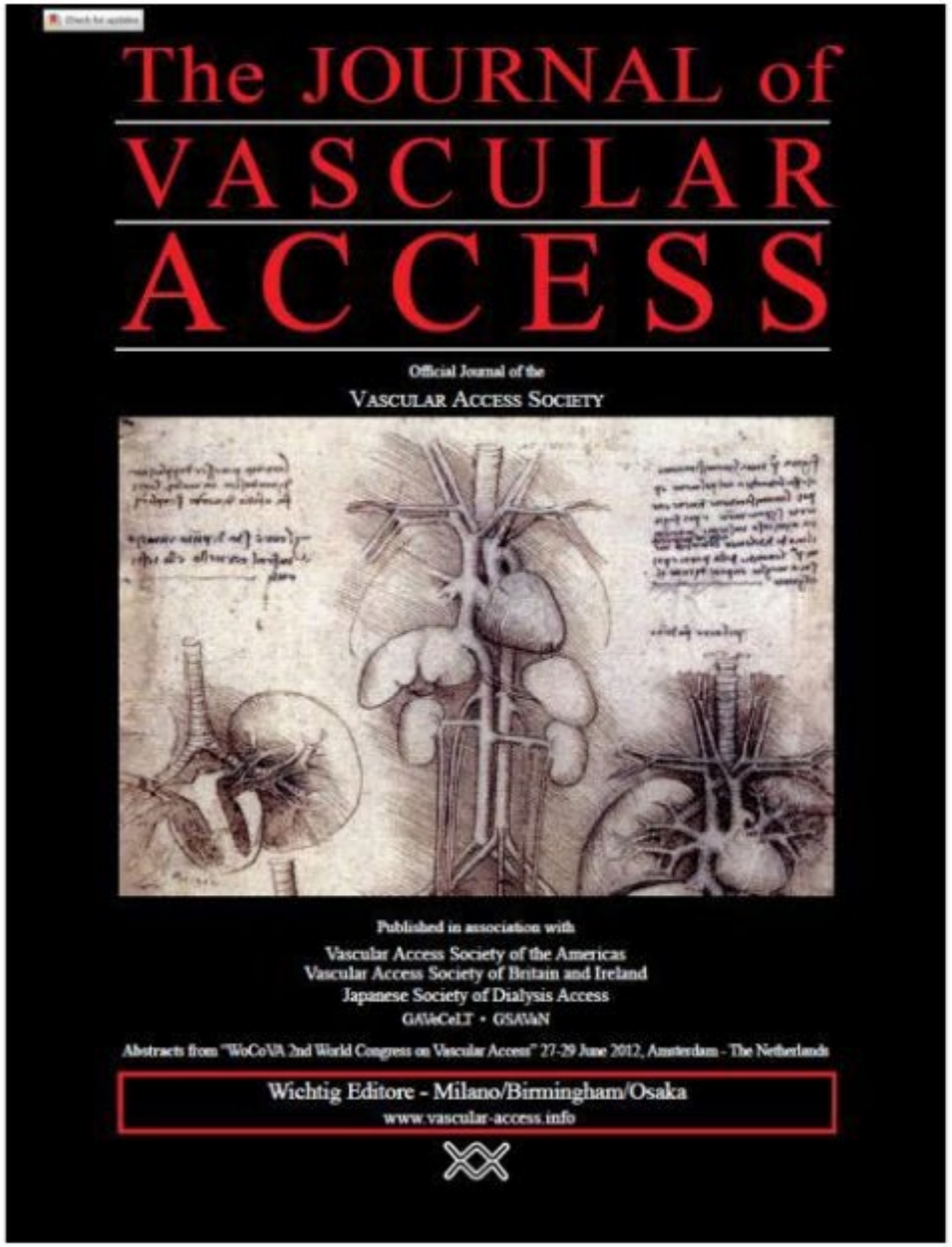
Reference

1 Wilkinson JN, Sheikh N, Jayamaha J. Tissue adhesive as an alternative to sutures for securing central venous catheters. *Anaesthesia* 2007; **62**: 969–70.

- Ancora dubbi sull'emostasi
- Idea chiara sulla prevenzione del pistoning



- 45 PICC (senza reverse tapering)
- No sanguinamento a 1 ora e 24 ore 100%
- No reazioni avverse 100%

P-012
CYANOACRYLATE GLUE PREVENTS EARLY BLEEDING OF THE EXIT SITE AFTER PICC PLACEMENT

M Pittiruti[1], A Emoli[2], G Scoppettuolo[2]
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Introduction: Early bleeding from the exit site after PICC placement is a very common event that causes difficulties in the patient's care and logistical problems. In our experience, the rate of significant local bleeding after placement of PICCs without reverse tapering may be as high as 40% at 1 hour and 15% at 24 hrs.
Methods: The aim of this pilot study was to verify the efficacy of a cyanoacrylate glue in reducing the risk of early bleeding at the exit site after PICC placement. We studied a group of adult patients consecutively undergoing placement of polyurethane PICCs without reverse tapering in a non-intensive ward of our Hospital. All PICCs were inserted according to the same protocol, which included 2% chlorhexidine antisepsis, maximal sterile barriers, ultrasound guidance, EKG guidance and securement with sutureless device. Two minutes after placement of the glue, the exit site was covered with a temporary gauze dressing, which was replaced by transparent membrane at 24 hrs. All patients were assessed at 1 hour and at 24 hours.
Results: In 45 consecutive patients, there was no significant local bleeding at 1 hour or at 24 hours after PICC placement. No local adverse reaction occurred.
Discussion & conclusions: Glue is an inexpensive and highly effective tool for avoiding the risk of early bleeding of the exit site after PICC placement. We also suggest that in the next future the glue might prove to have beneficial collateral effects on the risk of extraluminal contamination (by reducing the entrance of bacteria in the space between the catheter and the skin), as well as on the risk of dislocation (by increasing the stability of the catheter inside the skin breach).

2012

2014

ORIGINAL ARTICLES

A pilot trial of bordered polyurethane dressings, tissue adhesive and sutureless devices compared with standard polyurethane dressings for securing short-term arterial catheters

Melannie Edwards, Claire M Rickard, Ivan Rapchuk, Amanda Corley, Nicole Marsh, Amy J Spooner, Gabor Mihala and John F Fraser

Millions of peripheral arterial catheters (ACs) are used around the world each year.[1] Intensive care unit patients typically require an AC for continuous blood pressure monitoring, repeated blood gas sampling, and, in particular, for arterial blood gas analyses. Despite the ubiquity of AC use, up to 25% of ACs fail prematurely by accidental dislodgement, occlusion or infection. This is often related to inadequate dressing and securement of catheters to the skin.[1-3] For many years, the most commonly used AC dressing has been standard polyurethane (SPU) transparent dressings, which are small, transparent, rectangular films with an adhesive layer. These are inexpensive and popular but there is no evidence that they provide adequate securement, apart from functioning merely as a wound dressing, and they rarely maintain adhesion in diaphoretic patients, or if the site is oozing or bleeding.[3,4] Guidelines recommend SPU dressings generically for all types of intravascular catheters,[5] but they may not be suitable for ACs due to the anatomical and usage characteristics of ACs. Guideline recommendations for SPU dressing use in ACs are expert-based rather than evidence-based.[6]

In recent years, bordered polyurethane (BPU) dressings (similar to SPU dressings but with a toughened, adhesive fabric border) have come into use. They have not yet been rigorously and independently tested for use with ACs, compared with SPU dressings. An independent, non-randomised study in peripheral intravenous catheters ($n = 407$), reported less device failure with BPU dressings than SPU dressings but this was not statistically significant (BPU dressing failure, 19%; SPU dressing failure, 29%; $P = 0.18$).[7] Another option for ACs is to use a sutureless securement device (SSD), strong adhesive pads that offer additional anchor points into which the AC can be clipped for securement, with an SPU dressing still used as a wound covering. After implementation of SSDs in a United States ICU, AC failure rates were 60/468 (13%). A historical control group using adhesive strips saw AC failure of 253/995 (25%) ($P < 0.001$).[3] The Centers for Disease Control and Prevention recommend SSDs for central venous catheters to prevent vessel inflammation, catheter migration or

ABSTRACT

Objectives: To improve arterial catheter (AC) securement and reduce AC failure; to assess feasibility of a large randomised controlled trial.

Design, setting and participants: A four-arm, parallel, randomised, controlled, non-blinded pilot trial with 195 intensive care patients taking part, in a tertiary referral hospital in Brisbane, Australia from May to November 2012.

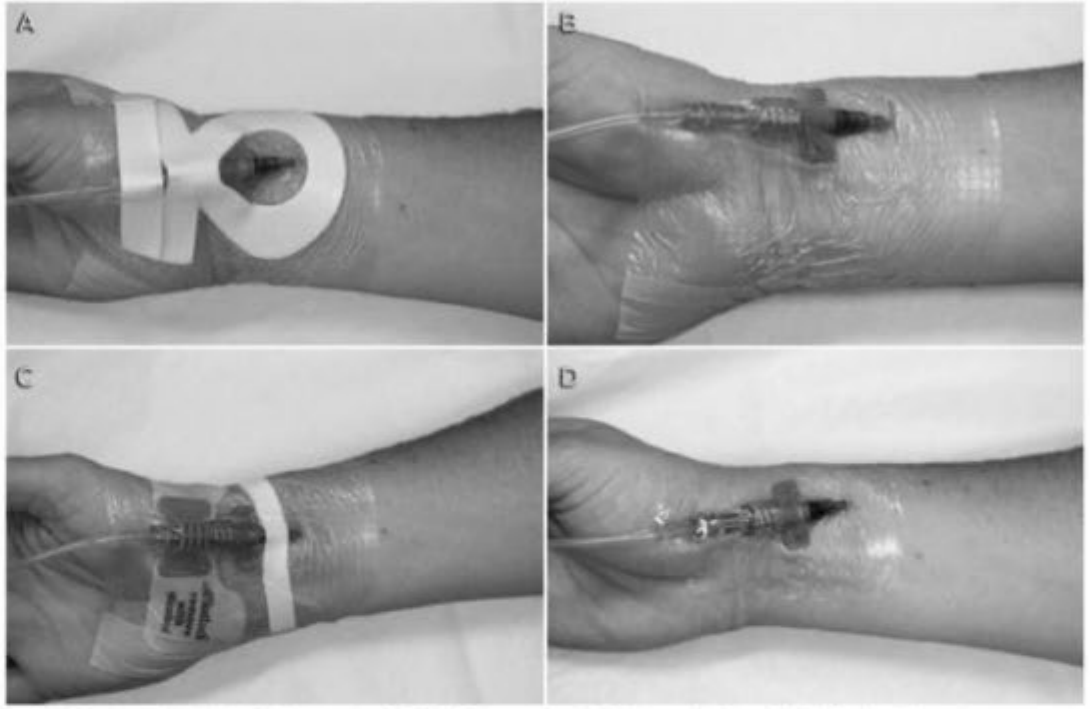
Interventions: Standard polyurethane (SPU) dressing (controls); bordered polyurethane (BPU) + SPU dressing; tissue adhesive (TA) + SPU dressing; and sutureless securement device (SSD) + SPU dressing (no sutures used).

Main outcome measures: AC failure, ie, complete dislodgement, occlusion (monitor failure, inability to infuse or fluid leaking), pain or infection (local or blood).

Results: Median AC dwell time was 26.2 hours and was comparable between groups. AC failure occurred in 26/195 patients (13%). AC failure was significantly worse with SPU dressings (10/47 [21%]) than with BPU + SPU dressings (2/43 [5%]; $P = 0.03$), but not significantly different to TA + SPU (6/56 [11%]; $P = 0.18$) or SSD + SPU (8/49 [16%]; $P = 0.61$). The dressing applied at AC insertion lasted until AC removal in 68% of controls; 56% of BPU + SPU dressings; 73% of TA + SPU dressings; and 80% of SSD + SPU dressings (all $P > 0.05$). There were no infections or serious adverse events. Patient and staff satisfaction with all products was high. Median costs (labour and materials) for securement per patient were significantly higher in all groups compared with the control group (SPU, $3.48 [IQR, $3.48–$9.79]; BPU + SPU, $5.07 [IQR, $5.07–$12.99]; SSD + SPU, $10.90 [IQR, $10.90–$10.90]; TA + SPU, $17.70 [IQR, $17.70–$38.36]; all $P < 0.01$).

Conclusion: AC failure occurred significantly less often with BPU + SPU dressings than with SPU dressings. TA + SPU and SSD + SPU dressings should be further investigated and compared with BPU + SPU dressings as controls. The novel approach of TA + SPU dressings appeared safe and feasible.

Figure 1. Intervention dressings for securing short-term arterial catheters.



A = BPU + SPU intervention. B = TA + SPU intervention. C = SSD + SPU intervention. D = SPU intervention (control). BPU = bordered polyurethane. SPU = standard polyurethane. TA = tissue adhesive. SSD = sutureless securement device.

Table 3. Arterial catheter (AC) clinical outcomes, by study group ($n = 195$)

Outcome	SPU ($n = 47$)	BPU + SPU ($n = 43$)	SSD + SPU ($n = 49$)	TA + SPU ($n = 56$)
AC failure, P*	na	0.029	0.606	0.176
Yes, n (%)	10 (21%)	2 (5%)	8 (16%)	6 (11%)
No, n (%)	37 (79%)	41 (95%)	41 (84%)	50 (89%)
AC hours, n	1528	1763	1692	2165
AC life (hours), median (IQR)	25.2 (22–30.5)	26.8 (21.9–51.3)	25.9 (23.8–34.3)	26.5 (23.5–49.6)
Incidence rate,† median (IQR)	6.55 (3.52–12.2)	1.13 (0.28–4.54)	4.73 (2.36–9.45)	2.77 (1.25–6.17)
Incidence rate ratio, median (IQR)	na	0.17 (0.02–0.81)	0.72 (0.25–2.03)	0.42 (0.13–1.29)

A: medicazione standard + bordata; B: medicazione standard + colla; C: sutureless + standard; D: standard

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Research paper

Novel technologies can provide effective dressing and securement for peripheral arterial catheters: A pilot randomised controlled trial in the operating theatre and the intensive care unit

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Randomised controlled trial
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ABSTRACT

Background: Peripheral arterial catheters are widely used in the care of intensive care patients for continuous blood pressure monitoring and blood sampling, yet failure – from dislodgement, accidental removal, and complications of phlebitis, pain, occlusion and infection – is common. While appropriate methods of dressing and securement are required to reduce these complications that cause failure, few studies have been conducted in this area.

Objectives: To determine initial effectiveness of one dressing and two securement methods versus usual care, in minimising failure in peripheral arterial catheters. Feasibility objectives were considered successful if 90/120 patients (75%) received the study intervention and protocol correctly, and had ease and satisfaction scores for the study dressing and securement devices of ≥7 on Numerical Rating Scale scores 1–10.

Methods: In this single-site, four-arm, parallel, pilot randomised controlled trial, patients with arterial catheters, inserted in the operating theatre and admitted to the intensive care unit postoperatively, were randomly assigned to either one of the three treatment groups (bordered polyurethane dressing (n = 30); a sutureless securement device (n = 31); tissue adhesive (n = 32)), or a control group (usual practice polyurethane dressing (not bordered) (n = 30)).

Results: One hundred and twenty-three patients completed the trial. The primary outcome of catheter failure was 2/32 (6.3%) for tissue adhesive, 4/30 (13.3%) for bordered polyurethane, 5/31 (16.1%) for the sutureless securement device, and 6/30 (20%) for the control usual care polyurethane. Feasibility criteria were fulfilled. Cost analysis suggested that tissue adhesive was the most cost effective.

Table 2
Primary outcome and secondary outcomes by group.

Outcome variable	Control SPU n = 30	BPU n = 30	SSD n = 31	TA n = 32
Hours till removal	24.3	24.9	25.0	24.3
Median (25–75% percentile)	(21.5–25.5)	(21.3–27)	(21.4–26.8)	(21.9–26.5)
p value[a]		0.34	0.26	0.55
Primary				
Failure				
n (%)	6 (20%)	4 (13.3%)	5 (16.1%)	2 (6.3%)
p value[a]		0.73	0.73	0.14
Catheter hours	755	786	829	859
Failure rate per 1000 AC days	7.94	5.09	6.03	2.33
95% CI	(3.57–17.68)	(1.91–13.56)	(2.51–14.48)	(0.58–9.31)
Failure rate ratio		0.64	0.76	0.29
95% CI		(1.13–2.70)	(0.18–2.98)	(0.03–1.64)
p value[a]		0.51	0.66	0.13
Secondary[b]				
Blocked catheter	3 (10.0%)	1 (3.3%)	3 (9.7%)	2 (6.3%)
Total monitor failure	1 (3.3%)	4 (13.3%)	4 (12.9%)	2 (6.3%)
Accidental removal	3 (10.0%)	2 (6.7%)	0 (0.0%)	0 (0.0%)
Painful	1 (3.3%)	0 (0.0%)	2 (6.5%)	0 (0.0%)
Local infection	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Suspected BSI	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

CI, confidence interval.
[a] Fisher's exact two-sided test.
[b] Do not add to 100% due to multiple possible outcomes.

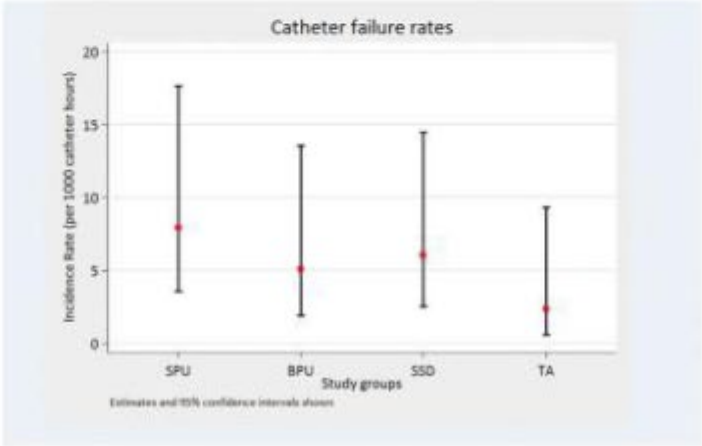

Fig. 2. Catheter failure rates by group per 1000 catheter hours. SPU, usual care/standard polyurethane; BPU, bordered polyurethane; SSD, sutureless securement device; TA, tissue adhesive.

CATETERI ARTERIOSI IN ICU

2015

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Original Article

Securement Methods for Peripheral Venous Catheters to Prevent Failure: A Randomised Controlled Pilot Trial

Nicole Marsh, Joan Webster, Julie Flynn, Gabor Mihala, Barbara Hewer, John Fraser, and Claire M. Rickard

Purpose To assess the effectiveness of four securement methods to prevent peripheral intravenous catheter (PIVC) failure.

Methods A single-centre, four-arm, randomised, controlled, non-blinded, superiority pilot trial was conducted in a tertiary referral hospital in Queensland (Australia), between November 2012 and January 2013. Adult patients, with a PIVC expected to remain in situ for ≥24 hours and admitted to general medical or surgical wards, were randomly allocated to standard polyurethane dressing (control, SPU), tissue adhesive (TA) with an SPU, bordered polyurethane dressing (BPU) or sutureless securement device (SSD) with an SPU, experimental groups. The primary endpoint was PIVC failure, defined as premature device removal before the end of therapy because of pain, blockage, leaking, accidental removal and local or catheter-related bloodstream infection.

Results PIVCs were used for an average of 2.6 days across all study groups (n = 85). Catheter failure was lowest in the TA group (3/21, 14%) and highest in the control group (8/21, 38%), with BPU and SSD failure at 5/20 (25%) and 5/23 (22%), respectively. The adjusted hazard ratio of catheter failure was lowest in the TA group (0.50, 95% CI: 0.13-1.98), and then the BPU (0.52, 95% CI: 0.15-1.78) and SSD (0.61, 95% CI: 0.20-1.91) groups. No patient was suspected of a local or catheter-related bloodstream infection.

Conclusions Current SPU dressings alone do not prevent many cases of PIVC failure. TA appears promising as an innovative solution, but may not be suitable for all patients. A larger Australian National Health and Medical Research Council (NHMRC)-funded trial has commenced.

Keywords
Intravenous, Occlusive dressings, Randomised controlled trial, Securement device, Tissue adhesives, Vascular access devices

2015

TABLE II - Patient outcomes by study group (n = 85)

	SPU n = 21	BPU n = 20	SSD n = 23	TA n = 21
Catheter failed	8 (38.1)	5 (25.0)	5 (21.7)	3 (14.3)
Catheter fail rate (95% CI)[a]	6.92 (3.46,13.84)	3.82 (1.59,9.18)	3.14 (1.31,7.55)	2.40 (0.77,7.44)
Catheter fail rate ratio (95% CI)[a]	n/a	0.55 (0.14,1.91)	0.45 (0.12,1.57)	0.35 (0.06,1.45)
Catheter survival[b]	-	p = 0.201	p = 0.093	p = 0.142
Catheter removal reason[c]				
Completed therapy	11 (52.4)	15 (75.0)	14 (60.9)	17 (81.0)
Routine replacement	4 (19.1)	2 (10.0)	4 (17.4)	1 (4.8)
Blockage	5 (23.8)	2 (10.0)	1 (4.4)	2 (9.5)
Leaking	1 (4.8)	1 (5.0)	1 (4.4)	0 (0.0)
Accidental removal	0 (0.0)	1 (5.0)	1 (4.4)	1 (4.8)
Painful	4 (19.1)	1 (5.0)	2 (8.7)	1 (4.8)
Unknown	0 (0.0)	0 (0.0)	0 (0.0)	1 (4.8)
Catheter hours in situ[d]	55.0 (30.4)	65.4 (32.3)	69.2 (35.2)	59.5 (27.7)
Dressing time to apply (sec)[e]	20.0 (10-30)	25.0 (20-30)	45.0 (40-50)	48.0 (40-55)
Dressing ease of application[e]	10.0 (9-10)	9.0 (9-10)	7.0 (5-8)	8.0 (7-9)
Dressing ease of removal[e]	7.5 (4-10)	10.0 (9-10)	8.0 (7-9.5)	8.5 (3-9)
Dressing patient satisfaction[e]	8.0 (5-9)	9.0 (8-10)	8.5 (7-10)	10.0 (9-10)

n(%) presented unless specified otherwise.
[a]Per 1000 catheter hours.
[b]p-value of the log-rank test for equality of survival functions.
[c]More than one reason could be recorded.
[d]Mean (SD).
[e]Median (25%-75%).
BPU = bordered polyurethane dressing group; SPU = standard polyurethane dressing group; SSD = sutureless securement device group; TA = tissue adhesive group.

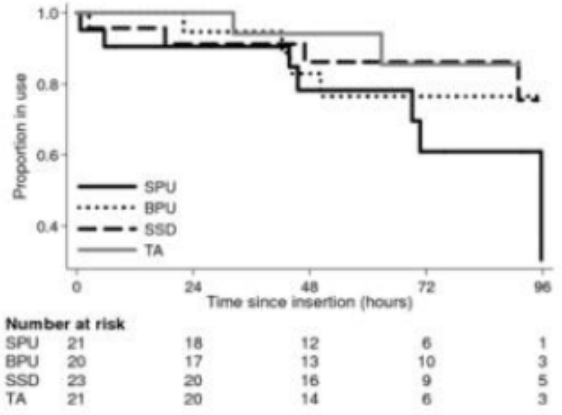

Fig. 2 - Kaplan-Meier survivor functions by treatment group. SPU = standard polyurethane dressing group; BPU = bordered polyurethane dressing group; SSD = sutureless securement device group; TA = tissue adhesive group.

2016

Journal of the Association for Vascular Access
Volume 21, Issue 4, December 2016, Page 249

Cyanoacrylate Glue and Central Venous Access Device Insertion

Mauro Pittiruti, Giancarlo Scoppettuolo, Alessandro Emoli, Andrea Musarò, Daniele Biasucci

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Background

The use of glue for venous access devices has been recently introduced in the clinical practice in Europe, at first with the purpose of stopping the bleeding from the exit site of PICCs. Later on, it has been used also for preventing bleeding from the exit site of dialysis catheters. At the same time, glue has been extensively used for closing skin incisions performed when tunneling PICCs, CICCs or FICCs or when preparing a subcutaneous pocket for totally implantable venous access devices (port …

Method

We reviewed our experience with glue in different types of venous access during the last 12 months: (1) In 348 non-tunneled PICCs (pediatric patients, adult patients with expected high risk of local bleeding because of renal failure, hepatic dysfunction, coagulation disorders or anticoagulant treatment, as well as in non-hospitalized patients who get a PICC inserted for home care), we sealed the exit site with glue at the end of the procedure; (2) in 165 non-tunneled CICCs and FICCs in adults …

Results

Cyano- acrylate glue was 100% effective in preventing post-insertion bleeding from the exit site. Also, in PICCs, glue was effective in preventing extra-luminal bacterial contamination of the catheter. In pediatric CICCs, a specific insertion bundle including glue as one of the main recommendations was effective in achieving a tenfold reduction of the incidence of CRBSI. …

Conclusion

Glue is inexpensive, safe for the patient, safe for the material of the devices, and - most important - highly cost-effective. …

Randomized Controlled Trial > J Vasc Interv Radiol. 2017 Jan;28(1):111-116.
doi: 10.1016/j.jvir.2016.08.009. Epub 2016 Nov 9.

Randomized Controlled Trial of Octyl Cyanoacrylate Skin Adhesive versus Subcuticular Suture for Skin Closure after Implantable Venous Port Placement

Jonathan G Martin [1], Scott T Hollenbeck [2], Gemini Janas [1], Ryan A Makar [1], Waleska M Pabon-Ramos [1], Paul V Suhocki [1], Michael J Miller [1], David R Sopko [1], Tony P Smith [1], Charles Y Kim [3]

Affiliations + expand

PMID: 27836404 DOI: 10.1016/j.jvir.2016.08.009

- 2017

Purpose: To compare early outcomes of skin closure with octyl cyanoacrylate skin adhesive versus subcuticular suture closure.

Materials and methods: Over a 7-month period, 109 subjects (28 men and 81 women; mean age, 58.6 y) scheduled to undergo single-lumen implantable venous port insertion for chemotherapy were randomly assigned to skin closure with either octyl cyanoacrylate skin adhesive or absorbable subcuticular suture after suturing the deep dermal layer. Subjects were followed for episodes of infection or dehiscence within 3 months of port implantation. At 3 months, photographs of the healed incision were obtained and reviewed by a plastic surgeon in a blinded fashion who rated cosmetic scar appearance based on a validated 10-point cosmesis score.

Results: Of subjects, 54 were randomly assigned to skin adhesive, and 55 were randomly assigned to subcuticular suture. No subjects had incision dehiscence. Infection rates at 3 months were similar between groups (2.1% vs 4.0%; P = 1.0). The mean cosmesis scores were 4.40 for skin adhesive and 4.46 for subcuticular suture (P = .898). The superficial skin closure time was 8.6 minutes for suture versus 1.4 minutes for skin adhesive (P < .001).

Conclusions: Scar cosmesis and patient outcomes did not significantly vary between skin adhesive versus subcuticular suture, although skin closure time was significantly less with skin adhesive.

Original research article

JVA The Journal of Vascular Access

The Journal of Vascular Access
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Comparison of complications after closure of totally implantable venous access devices with non-absorbable suture and n-butyl-2-cyanoacrylate (NBCA) skin adhesive: Propensity score matching analysis

Su Been Lee[1], Lyo Min Kwon[1], Kyung Sup Song[1], Young Soo Do[1], Jung Ho Park[2] and Bum Jun Kim[3]

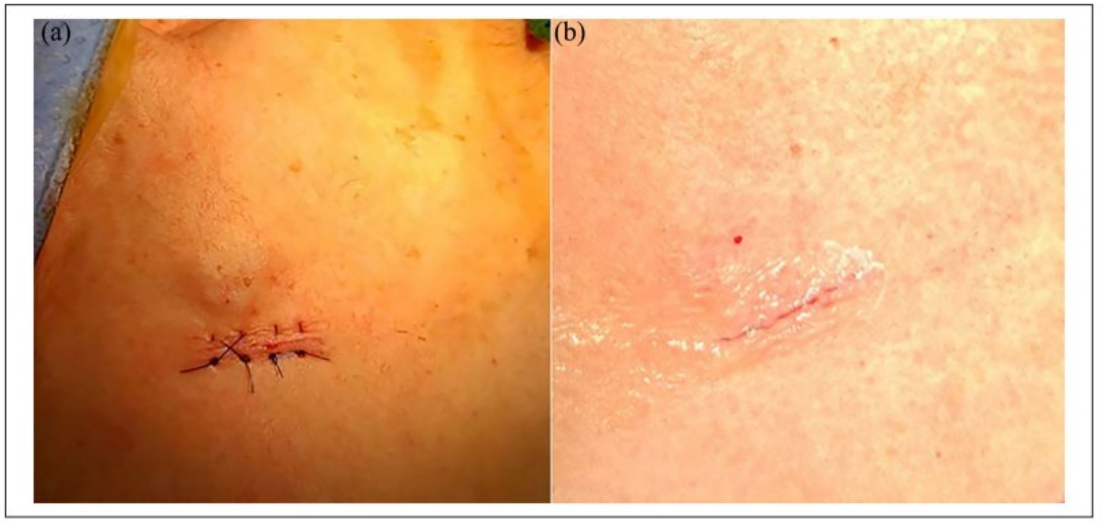

Figure 1. Two different methods of closure of skin wounds: (a) NAS group: a vertical mattress suture with 3-0 Nylon was used and (b) NBCA group: after the subcutaneous fat layer was sutured by subcuticular interrupted suture with 3-0 Vicryl, an NBCA skin adhesive was applied to close the wound.
NAS: non-absorbable suture; NBCA: n-butyl-2-cyanoacrylate.

Abstract

Purpose: This study aimed to compare the complication rates of non-absorbable suture (NAS) and n-butyl-2-cyanoacrylate (NBCA) skin adhesive for skin closure during totally implantable venous access devices (TIVADs) implantation.

Methods: Between March 2020 and February 2021, 586 consecutive patients who underwent TIVAD implantation were retrospectively analyzed. Two groups of patients suture with NAS ($n = 299$) or NBCA ($n = 287$) were followed up for 18 months to compare the occurrence of infection, thrombosis, and non-thrombotic malfunction. A total of 364 cases were extracted using propensity score matching in a 1:1 ratio. Mean TIVADs maintenance days were analyzed using Kaplan-Meier survival analysis.

Results: Nineteen cases of complications occurred (0.294/1000 catheter-days) in the NAS group and 17 cases (0.210/1000 catheter-days) in the NBCA group. The difference in the complication rates between the two groups was not statistically significant ($p = 0.725$) after propensity score matching. Mean TIVADs maintenance days were 627.3 days in NAS group and 697.6 days in NBCA group. There was no statistically significant difference in the number of TIVADs maintenance days between the two groups ($p = 0.081$).

Conclusion: In TIVADs implantation, skin closure using NBCA showed no difference in the occurrence of infectious complications compared with conventional non-absorbable skin suture.

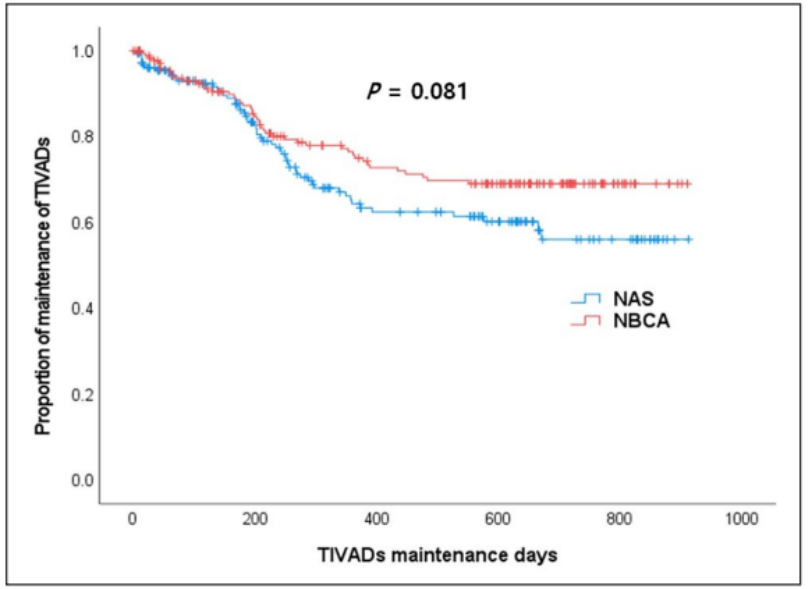

Figure 4. Comparison of TIVADs maintenance days.
NAS: non-absorbable suture; NBCA: n-butyl-2-cyanoacrylate; TIVADs: totally implantable venous access devices.

Original Article

SAGE Open Medicine

Effectiveness of cyanoacrylate glue in the fixation of midline catheters and peripherally inserted central catheters in hospitalised adult patients: Randomised clinical trial (CIANO-ETI)

SAGE Open Medicine
Volume 11: 1–9

DOI: 10.1177/20503121231170743
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SAGE

Ferran Padilla-Nula[1], Alejandro Bergua-Lorente[1], Jordi Farrero-Mena[1], Anna Escolà-Nogués[1], Miriam Llauradó-Mateu[1], Carme Serret-Nuevo[1] and Filip Bellon[2]

Abstract

Objective: The objective of the study was to assess the efficacy of the use of cyanoacrylate glue (CAG) as a means of securing midline catheters and peripherally inserted central catheters with the modified micro-Seldinger technique in adult hospitalised patients.

Methods: Randomised clinical trial with two groups (1:1): control and intervention. The control group received a securement method with a sutureless device plus transparent dressing and the intervention group received the same securement method plus the CAG. The study was approved by the Drug Research Ethics Committee of the Lleida Health Region.

Results: A total of 216 patients were assessed. The two groups of the trial were homogenously distributed in terms of sociodemographic and clinical variables. The intervention group had a statistically significant lower incidence of peri-catheter bleeding and/or oozing during the 7-day study period (odds ratio (OR), 0.6; 95% confidence level (CI), 0.44–0.81; $p < 0.001$) and a statistically significant lower incidence of catheter dislodgements during the first 24 h (OR, 0.2; 95% CI, 0.04–0.91; $p = 0.03$). There were no statistically significant differences in the incidence of phlebitis (OR, 1.30; 95% CI, 0.60–2.83; $p = 0.56$) or catheter-related pain (OR, 0.88; 95% CI, 0.40–1.94; $p = 0.84$).

Conclusion: Midline catheters and peripherally inserted central catheters secured with CAG had fewer complications than catheters not secured with this adhesive.

nursing reports

MDPI

Systematic Review

Brachial Tunneled Peripherally Inserted Central Catheters and the Risk of Catheter Complications: A Systematic Review and Meta-Analysis

Davide Giustivi [1], Mattia Donadoni [2], Stefano Maria Elli [3], Francesco Casella [2], Massimiliano Quici [2], Chiara Cogliati [2], Silvia Cavalli [3], Giulia Rizzi [2], Leyla La Cava [2], Arianna Bartoli [2], Elena Martini [2], Alba Taino [2], Martina Perego [2], Antonella Foschi [4], Roberto Castelli [5], Maria Calloni [2] and Antonio Gidaro [2,*]

Table 1. Study characteristics.

Author, Years	Country, Type, and Time of Enrollment	Tunneling Tech.	Skin Closure	PICC Dressing *	Definition of Wound Oozing	Definition of Thrombosis	Definition of Infection	Definition of Dislodgement
Dai et al., 2019 [31]	China Monocentric from July 2018 through May 2019 (11 months)	Large peripheral cannula 14 G	Wound closure strip	Gauze and transparent membrane	Wound oozing as an important outcome was recorded when oozing lasted more than 24 h. Grade 1 was a small amount of oozing lasting for 2–3 days, Grade 2 was oozing lasting for 4–5 days, and Grade 3 was oozing lasting more than 6 days	Venous thrombosis was classified as symptomatic or asymptomatic and confirmed as having an association with the PICC or occurring within 5 days of extubation	Infections resulting from the use of catheters were defined according to national infection-control guidelines.	Catheter dislodgement was recorded when the tip moved more than 2 cm.
Xiao et al., 2021 [32]	China Monocentric from July 2019 through January 2020 (7 months)	Blunt tunneler	Wound closure strip	Gauze and transparent membrane	Oozing that lasted >24 h after placement. Classified into three grades according to severity: Grade 1 (bleeding lasting for 2 to 3 days), Grade 2 (bleeding lasting for 4 to 5 days), and Grade 3 (bleeding lasting >6 days).	The presence of an intraluminal thrombus as confirmed by color Doppler ultrasound. Classified as symptomatic or asymptomatic (symptomatic thrombosis was diagnosed when symptoms occurred).	Defined according to the Centers for Disease Control and Prevention and classified as local infection or central line-associated bloodstream infection.	Exposed portion of PICC prolapsed by >2 cm.
Li et al., 2023 [33]	China Monocentric from March 2021 through August 2021 (6 months)	Blunt tunneler	Nylon sutures	Gauze and transparent membrane	Oozing that lasted for more than 24 h.	Venous thrombosis was identified by pain and swelling of the arm and confirmed by B-mode ultrasound	Infections included local skin infections and CLABSI, which were diagnosed by clinical physicians and confirmed by blood culture results.	The catheter shifted more than 2 cm
Sheng et al., 2023 [34]	China Multicenter (three hospital) from August 2011 through December 2021 (5 months)	Blunt tunneler	Octyl cyanoacrylate skin adhesive	Glue and transparent membrane	N/A	CRT was confirmed by ultrasound or CT examination showing the presence of a thrombus in the vein with a catheter	Infections were defined according to Infectious Diseases Society of America criteria	Catheter malposition was defined as exposed length prolapsed ≥5 cm
Maria et al., 2019 [35]	Greece Monocentric from August 2014 through February 2015 (7 months)	Large peripheral cannula 14 G	Nylon sutures	Glue and transparent membrane	N/A	N/A	N/A	N/A

Legend: PICC: Peripherally Inserted Central Catheter; *: dressing in first 48 h.

Original research article

JVA The Journal of Vascular Access

A GAVeCeLT bundle for central venous catheterization in neonates and children: A prospective clinical study on 729 cases

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2023, Vol. 24(6) 1477–1488
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SAGE

Mauro Pittiruti[1], Davide Celentano[2], Giovanni Barone[3], Vito D'Andrea[4], Maria Giuseppina Annetta[5] and Giorgio Conti[2]

Abstract

Background: In the pediatric patient, central venous catheterization may be associated with relevant complications. Though, most of them may be prevented by a wise choice of materials, methods, and techniques. Evidence-based insertion bundles for central venous catheterization have been developed in the adult patient, but not in neonates and children.

Methods: The Italian Group for Long Term Venous Access Devices (GAVeCeLT) has developed an insertion bundle for central venous catheterization in neonates, infants, and children, which includes seven evidence-based strategies: (1) preprocedural ultrasound evaluation, (2) appropriate aseptic technique, (3) ultrasound guided venipuncture, (4) intraprocedural tip location by non-radiological methods, (5) proper choice of the exit site by tunneling, (6) sutureless securement, and (7) protection of the exit site using glue and transparent membranes. The effectiveness and safety of this bundle has been tested in a prospective study.

Results: All neonates, infants and children requiring a non-emergency central line (except for umbilical venous catheters and epicutaneo-cava catheters) were included in the study. Out of 729 central line insertions, there were no immediate complications (no pneumothorax, no arterial puncture, no malposition); the incidence of early and late complications (local ecchymosis, dislodgment, local pain, exit site infection) was 3.7%; in the first 2 weeks after insertion, no catheter-related bacterial infection or catheter-related thrombosis was recorded.

Conclusion: The results of this prospective study strongly validate the hypothesis that an insertion bundle is highly effective in optimizing the safety of the maneuver, reducing immediate, early, and late complications.

(6) *Sutureless securement of the catheter*: As currently recommended,[7] sutures were never used for catheter securement. Securement was achieved exclusively by skin adhesive sutureless devices (StatLock, BD; GripLok, Zevon) or by subcutaneous anchorage (SecurAcath, Interrad), or by semipermeable transparent membrane integrated with a stabilization device (SorbaView Shield, Centurion).

(7) *Protection of the exit site with glue and semipermeable transparent membranes*: Cyanoacrylate glue was consistently used to seal the exit site, with the purpose of stabilizing the catheter, reducing the oozing/bleeding, and decreasing the risk of bacterial contamination by the extraluminal route. Either butyl or octyl-butyl cyanoacrylate was indifferently used. The exit site was consistently covered with transparent dressing with high permeability (high MVTR = high Moisture Vapor Transfer Rate) (Tegaderm Advance, 3M; IV3000, Smith & Nephew; SorbaView, Centurion); a value of MVTR > 1500[23] was considered acceptable.

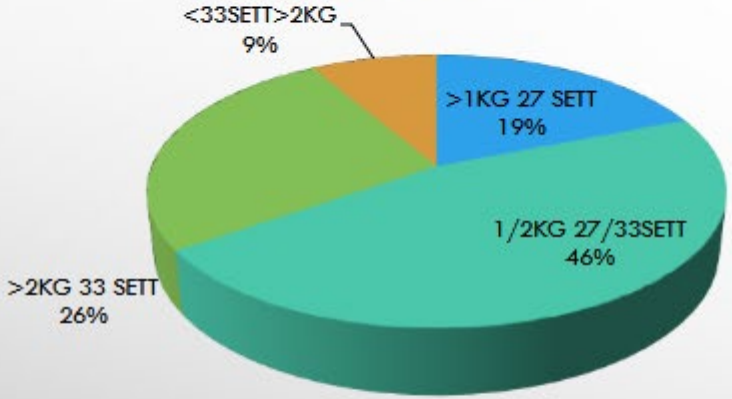
Table 4. Post-procedural complications.

	Neonates ($n = 68$)	Infants ($n = 173$)	Children ($n = 488$)
Dislodgment	—	1 (0.6%)	2 (0.4%)
Local ecchymosis	—	2 (1.16%)	7 (1.4%)
Infection of the exit site	—	—	1 (0.2%)
Local pain at the exit site	—	—	14 (2.9%)

SECURING EPICUTANEO-CAVAL CATHETERS (ECC) IN TERM AND PRE-TERM NEONATES: A CHANGE OF PRACTICE

Romitti MG – Pediatric/Neonatal nurse – Neonatal Intensive Care Unit – Spedali Civili – Brescia Italy

NEONATI



VALUTATI 95 EXIT SITES
TRE VOLTE AL GIORNO

2019

ASSEGNATO SCORE

VERIFICATA LUNGHEZZA D'INTRODUZIONE DEL CATETERE

RESULTS: The ECC exit sites assessed, scored and recorded have been totally 95 ; 28 Nutriline® (2fr) 67 Premicath® (1fr) . Neonates clinical data were as follows:
18 weighting less than 1000g, under 27 weeks of gestational age
44 above 1000g over 27 w, but less than 33 w and 2000g
25 over 33 w, weighting more than 2000g
8 over 33 w, but under 2000g
The visual score of all the exit sites assessed was "zero" meaning no sign of inflammation and/or infection.
The insertion length at the following dressing changes was found unmodified.

THE JOURNAL OF PEDIATRICS • www.jpeds.com

ORIGINAL ARTICLES

Securement of Umbilical Venous Catheter Using Cyanoacrylate Glue: A Randomized Controlled Trial

Vito D'Andrea, MD[1], Giorgia Prontera, MD[1], Giovanni Pinna, MD[2], Francesco Cota, PhD[1], Simona Fattore, MD[1], Simonetta Costa, PhD[1], Martina Migliorato, MD[1], Giovanni Barone, MD[3], Mauro Pittiruti, MD[4], and Giovanni Vento, MD[1]

Objective To evaluate the role of cyanoacrylate glue in reducing dislodgement of umbilical venous catheters (UVCs).

Study design This was a single-center, randomized, controlled, nonblinded trial. All infants requiring an UVC according to our local policy were included in the study. Infants with a UVC with a centrally located tip as verified by real-time ultrasound examination were eligible for the study. Primary outcome was the safety and efficacy of securement by cyanoacrylate glue plus cord-anchored suture (SG group) vs securement by suture alone (S group), as measured by reduction in dislodgment of the external tract of the catheter. Secondary outcomes were tip migration, catheter-related bloodstream infection, and catheter-related thrombosis.

Results In the first 48 hours after UVC insertion, dislodgement was significantly higher in the S group than in the SG group (23.1% vs 1.5%; $P < .001$). The overall dislodgement rate was 24.6% in the S group vs 7.7% in the SG group ($P = .016$). No differences were found in catheter-related bloodstream infection and catheter-related thrombosis. The incidence of tip migration was similar in both groups (S group 12.2% vs SG group 11.7%).

Conclusions In our single-center study, cyanoacrylate glue was safe and effective for securement of UVCs, and particularly effective in decreasing early catheter dislodgments. *(J Pediatr 2023;260:113517).*

Trial registration UMIN-CTR Clinical Trial; Registration number: R000045844.

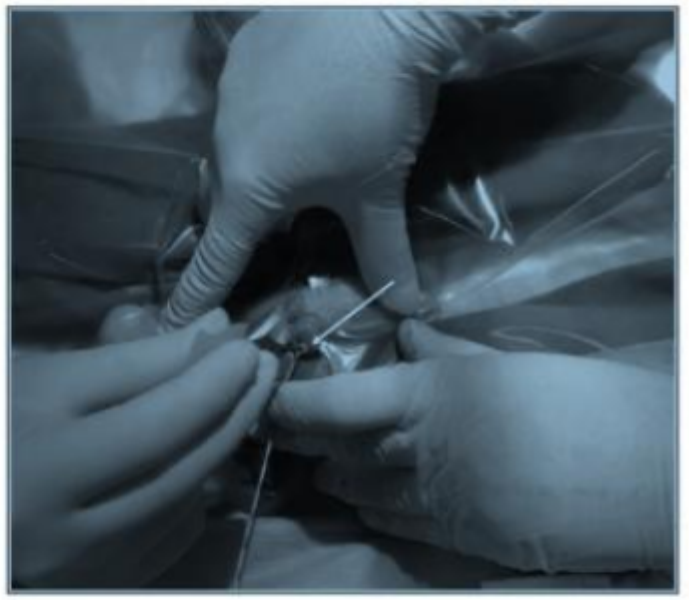


Figure 1. Application of cyanoacrylate glue vial with a dispensing tip to the umbilical stump to seal the UVC.

RCT su UVC: SG vs S; dislodgment: 1.5% vs 23.1% a 48 ore; CRBSI and phlebitis: no difference

CONCLUSIONI

Table 1. Italian Group of Long-Term Venous Access Devices recommendations on the use of glue in venous access

1. Use cyanoacrylate glue

- As an additional securement of peripheral venous access devices at a high risk of dislodgement
  Particularly in peripheral catheters with expected duration >48 hours
- For sealing the exit site of any central venous access device soon after insertion to avoid post-procedural local bleeding, prevent unscheduled dressing changes and protect the exit site from bacterial contamination during the first week
  Use chlorhexidine-releasing sponge dressing (in non-tunnelled central catheters) after the first week
- For closing any skin incision related to venous access procedures (skin incisions for tunnelling or for subcutaneous port placement)
  Never use stitches

2. Remember to prefer butyl-cyanoacrylate or octyl-butyl-cyanoacrylate

3. Use a minimal amount of cyanoacrylate glue and only at the time of insertion

Source: Pittiruti and Scoppettuolo (2021)

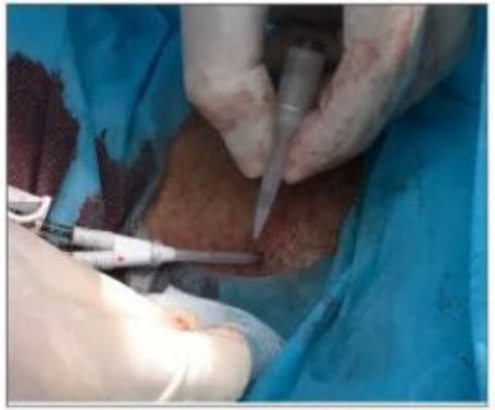


Figure 8. Glue used for sealing exit site of dialysis catheter

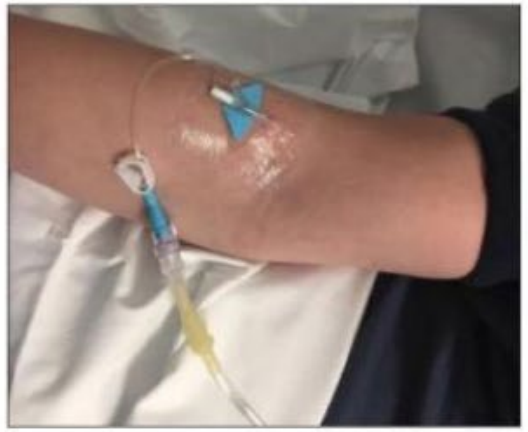


Figure 4. Glue used to seal the exit site of a short peripheral cannula

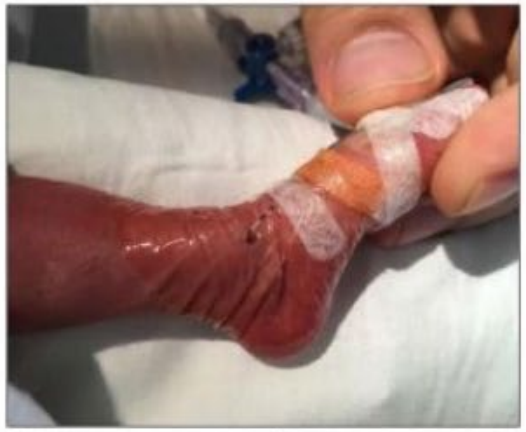


Figure 5. Glue used to secure of an epicutaneo-cava catheter in a pre-term neonate

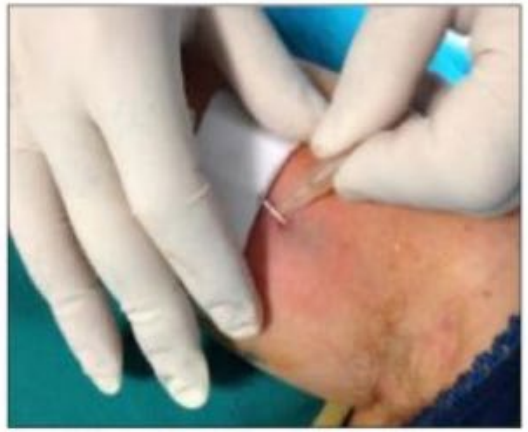


Figure 6. Glue used to seal the exit site of a midline catheter

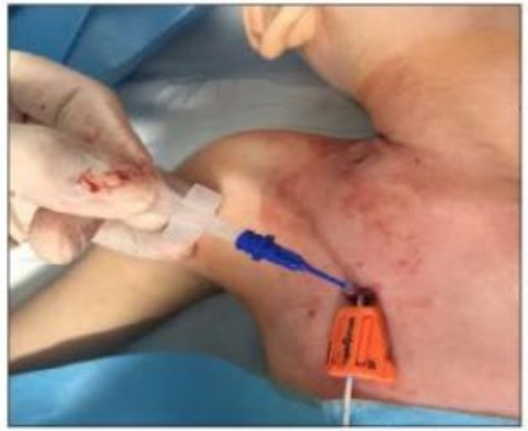
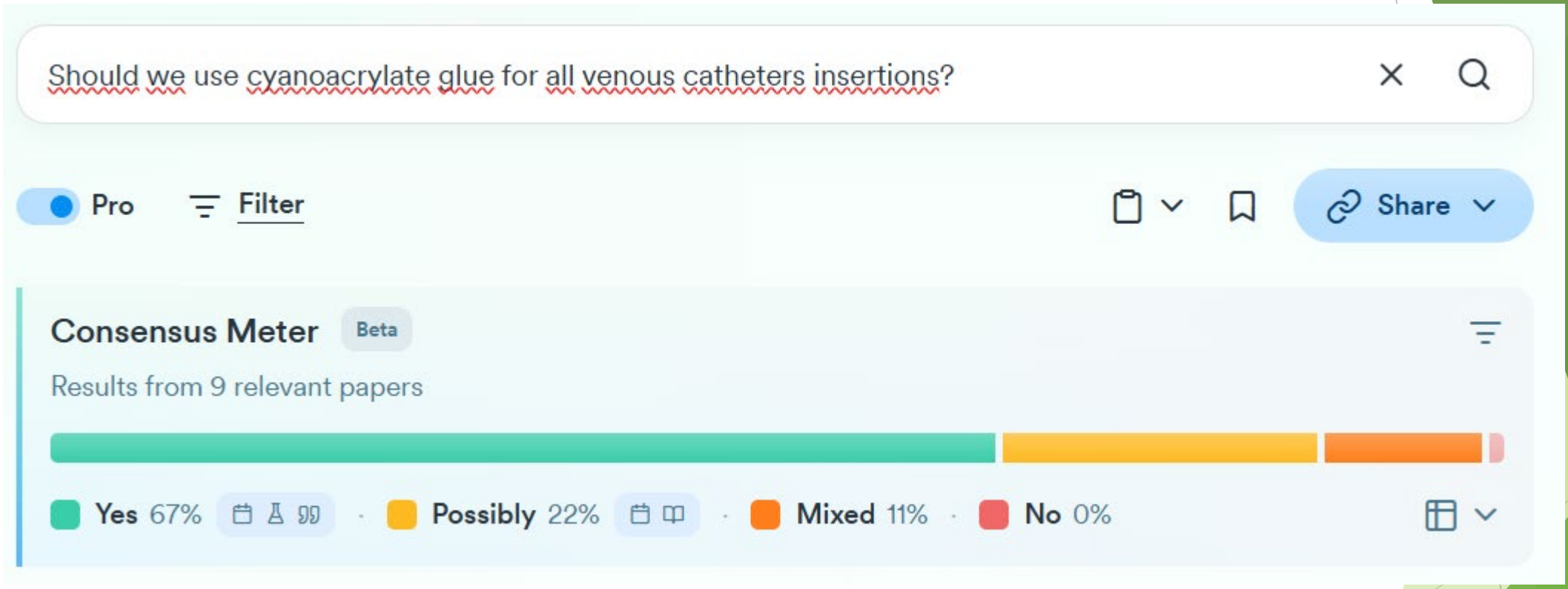


Figure 7. Glue used for sealing the exit site of a centrally inserted central catheter in a small infant


Should we use cyanoacrylate glue for all venous catheters insertions?
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Yes 67%
Possibly 22%
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