



SANTOBONO PAUSILIPON
AZIENDA OSPEDALIERA PEDIATRICA



X Congresso GAVeCeLT
XI PICC - Day
Firenze, 4-5-6- dicembre 2017

Accessi venosi in pediatria

**La scelta tra cateteri in silicone vs.
cateteri in poliuretano: l'impatto sulle
complicanze a medio-lungo termine**

Ugo Graziano

AdVANCHE



Team Aziendale Accessi Vascolari

Silicone vs PUR

- polimeri elastomerici
- materiali di riferimento per la produzione di cateteri venosi centrali
- proprietà fisico-chimiche
 - Biostabilità
assenza di alterazioni strutturali indotte dalla permanenza in ambiente biologico
 - Biocompatibilità
assenza di interferenze negative patologiche sui tessuti biologici

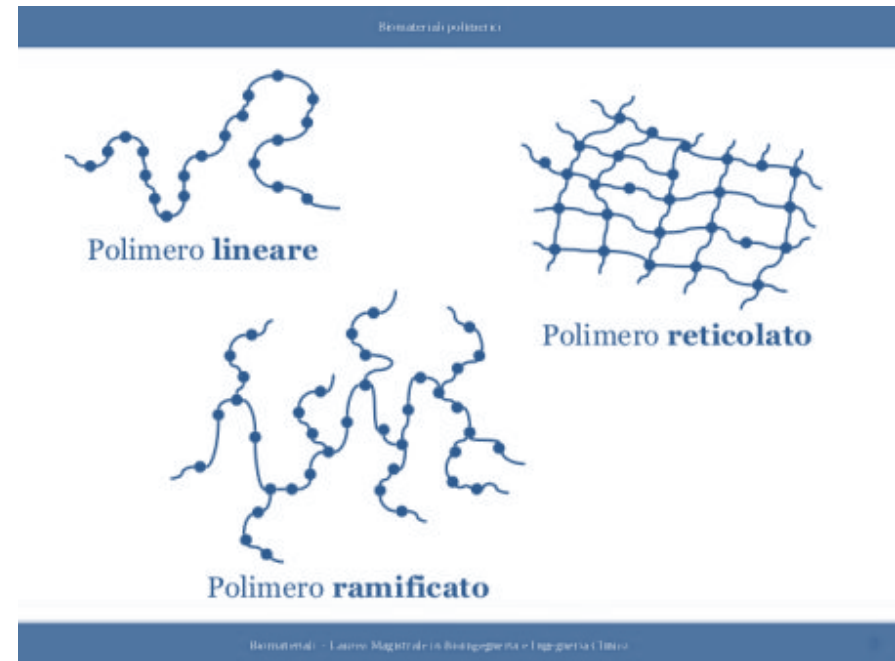
Materiali polimerici

Macromolecole organiche o inorganiche naturali o sintetiche

ripetizione periodica di unità strutturali (monomeri)

lunghissime catene assemblate in maniera diversa in base alla forza dei legami elettrochimici

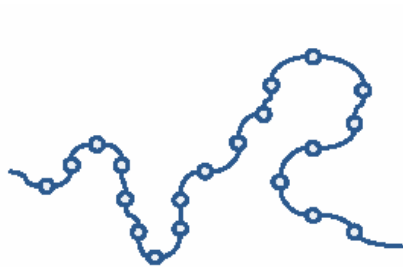
- ✓ legame debole (entanglement, forze di Van der Waals, dipolo-dipolo)
 - Struttura lineare
 - Struttura ramificata
- ✓ legame forte (covalente)
 - Struttura reticolata



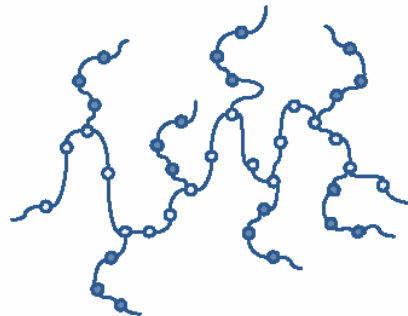
Proprietà fisiche dei polimeri

Termoplastici

transizione reversibile
dallo stato rigido allo
stato plastico (riduzione
della viscosità) in
funzione di un aumento
della temperatura



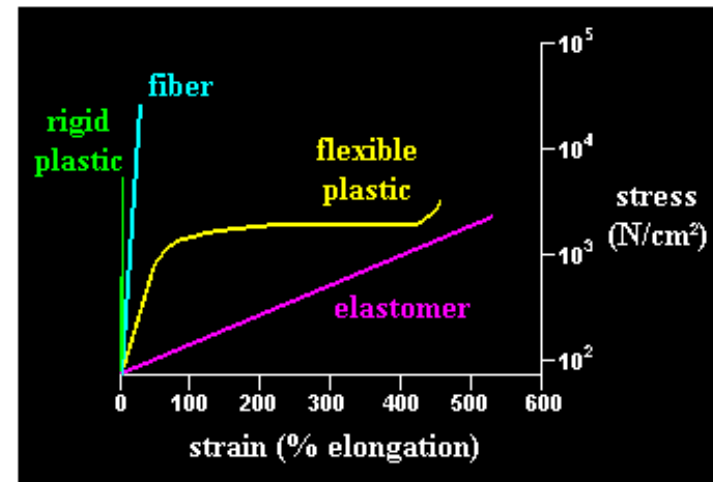
Polimero **lineare**



Polimero **ramificato**

Elastomerici

particolare suscettibilità
alle deformazioni
elastiche

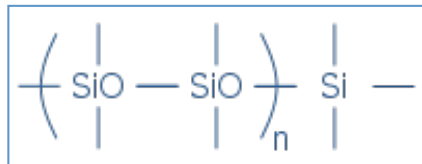


After Odian, George; *Principles of Polymerization*, 3rd ed., J. Wiley, New York, 1991, p.34.

Silicone vs PUR

Silicone o polisilossano

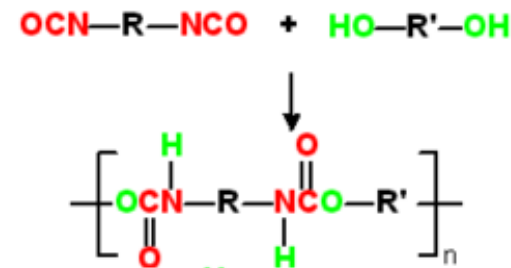
polimero inorganico sintetico
catene formate dalla
successione di monomeri



(elemento base = silicio)

Poliuretano

polimero organico sintetico
monomero: condensazione tra un
diisocianato ed un poliolo



catene alternate unite da legami
uretanici

hard = segmenti alifatici o aromatici
soft = segmenti polieteri, poliesteri o
policarbonati

Silicone vs PUR

Silicone

Maggiore biostabilità

- ✓ variazioni termiche
- ✓ aggressione chimica (idrofobia)
- ✓ sollecitazioni meccaniche
- ✓ invecchiamento

Minore biocompatibilità

- ✓ coefficiente di viscosità
- ✓ adesività
- ✓ rugosità
- ✓ fluttuazione endovasale

PUR

Minore biostabilità

- ✓ variazioni termiche
- ✓ aggressione chimica (idrofilia)
- ✓ sollecitazioni meccaniche
- ✓ invecchiamento

Maggiore biocompatibilità

- ✓ coefficiente di viscosità
- ✓ adesività
- ✓ rugosità
- ✓ fluttuazione endovasale

Cateteri in silicone

anni "80/"90 XX sec.

Bio-stabilità

- ✓ inerzia chimica vs farmaci, tessuti e fluidi biologici
- ✓ inerzia fisica vs variazioni di temperatura
- ✓ Durata

Bio-compatibilità

tollerabilità nel tempo in ambiente biologico

proprietà chimico-fisiche

resistenza a:

- ✓ aggressione chimica (idrofobia)
- ✓ variazioni termiche
- ✓ invecchiamento
- ✓ sollecitazioni meccaniche

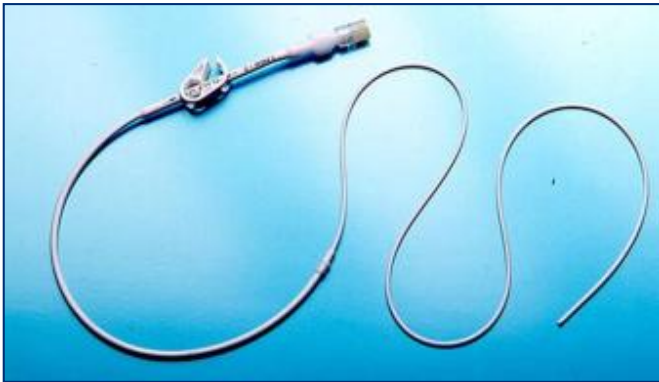
Compatibilità

- ✓ basso coefficiente di viscosità
- ✓ bassa adesività

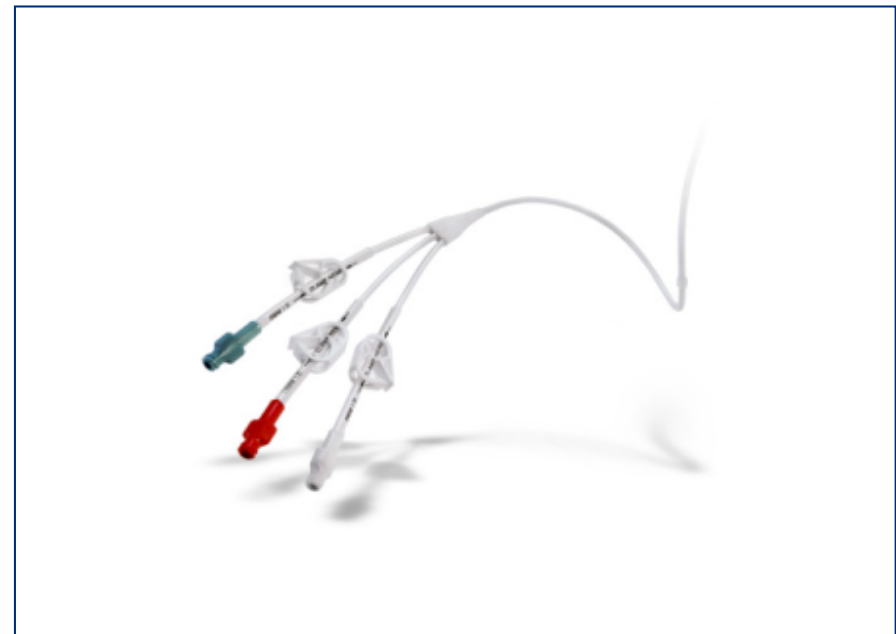
Cateteri in silicone

Broviac

altamente compatibili ed affidabili nel tempo in ambiente biologico



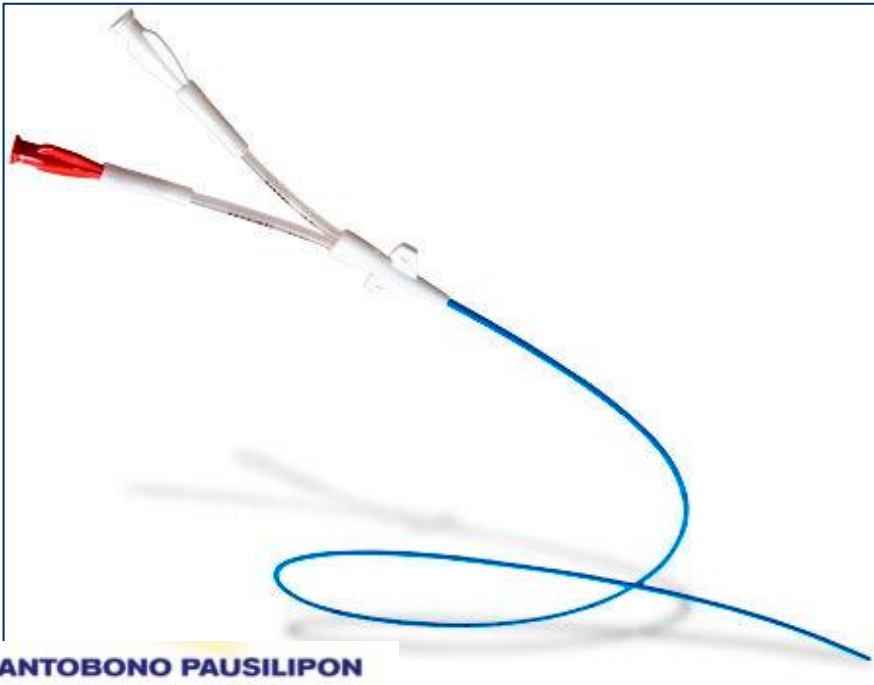
Hickman



Cateteri in silicone

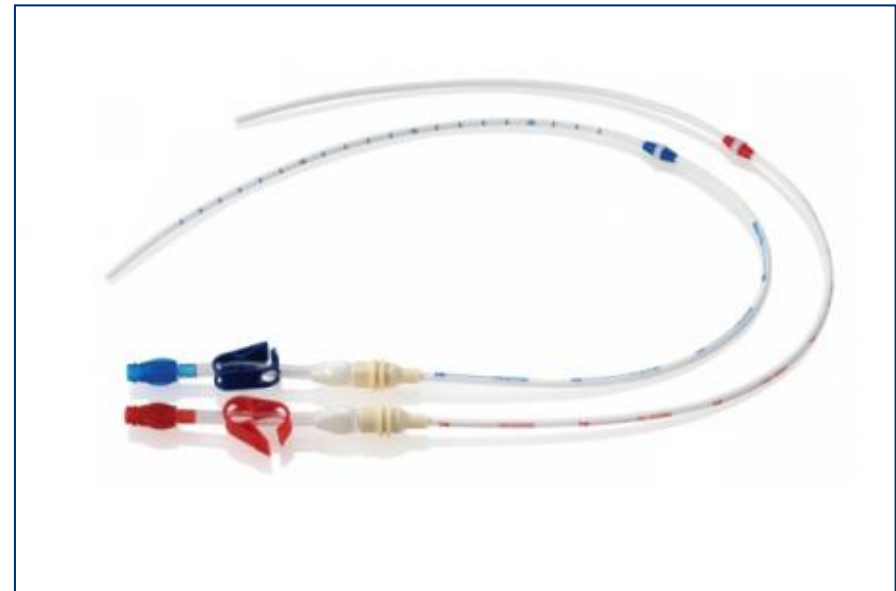
Groshong

eccellente stabilità chimico-fisica, comportamento inerte vs farmaci, fluidi e tessuti biologici



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Bioflex-Tesio



Cateteri in poliuretano (PUR)

anni "80/"90 XX sec.

Bio-stabilità

- ✓ inerzia chimica vs farmaci, tessuti e fluidi biologici
- ✓ termoplasticità
- ✓ Durata

Bio-compatibilità

tollerabilità nel tempo in ambiente biologico

proprietà chimico-fisiche

resistenza a:

- ✓ aggressione chimica (idrofilia)
- ✓ variazioni termiche (termoplasticità)
- ✓ invecchiamento
- ✓ sollecitazioni meccaniche

Compatibilità

- ✓ basso coefficiente di viscosità
- ✓ bassa adesività e rugosità

Cateteri in PUR

Certofix Duo



Gamcath



poliuretano power injectable (P-PUR)

dal 2005

CVC in PUR III
generazione

- ✓ > resistenza alle sollecitazioni meccaniche
- ✓ > resistenza alle sollecitazioni pressorie (300 psi)
- ✓ flussi elevati (5 ml/sec.)

Polieteri alifatici

- ✓ Tecoflex

Polieteri aromatici

- ✓ Tecothane
- ✓ Pellethane

Policarbonati alifatici

- ✓ Carbothane
- ✓ Chronoflex

Poliuretano power injectable (P-PUR)

Caratteristiche cateteri P-PUR:

- ✓ Maggiore resistenza alla tensione ed ai carichi di rottura del catetere e delle connessioni
- ✓ Maggiore resistenza alle sollecitazioni pressorie endoluminali
- ✓ Minore spessore parietale
- ✓ Minor grip della superficie
- ✓ Comportamento visco-elastico a 37°C

Vantaggi clinici:

- ✓ Maggiore durata e minore incidenza di complicanze meccaniche
- ✓ Power injectability
- ✓ Maggiore flusso a parità di ingombro vascolare
- ✓ Minore attrito endoteliale e migliore gestione delle complicanze occlusive
- ✓ Minore trauma da decubito endoteliale (fluttuazione nel lume vascolare)

Poliuretano power injectable (P-PUR)

Personal communication

LONG TERM POLYURETHANE CATHETER ALCOHOL COMPATIBILITY I, PHYSICAL AND RHEOLOGICAL STUDIES

Lecan Woo¹, John Wesley MD², Maryellen Zibell², Christopher Gardner² and William Anderson²

¹LWoo Associates LLC, Libertyville IL 60048

²Excelstor Medical, Neptune, NJ

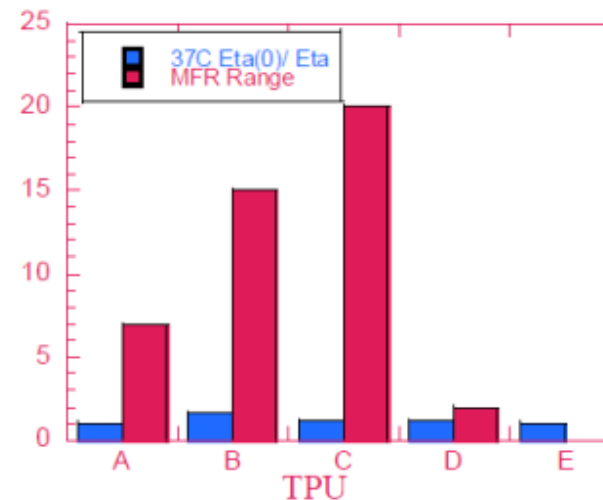
Abstract

Thermoplastic urethanes (TPU) offer broad property range, processing flexibility, and biocompatibility for medical applications. Alcohol based disinfectants have a long history of effective and safe use. Expanding on earlier rheology molecular weight data indicating minimal reduction, we conducted a long term compatibility study covering all known urethane types in a hemo-dialysis setting with a simulated clinical exposure protocol for 90 days. After 90 days exposure, minor changes in physical properties on the catheter body and components were detected, often similar to the saline control. Most importantly, resultant properties far exceeded ISO requirements for catheters.

Table 1. 90 day disinfectant exposure physical testing data.

Sample	ISO Req*	A	B	C	D	E
Catheter- Body (N)	15	146	199	288	262	224
Elongation (%)	NA	2993	1644	2165	1746	22184
Ext Tubing (N)	15	111	97	116	114	112
Elongation (%)	NA	444	770	699	655	6688
Catheter- Hub (N)	15	60	163	166	210	146
Ext Tubing to Hub (N)	15	91	95	123	147	152
Ext Tubing to Luer (N)	15	111	106	122	122	117
90 days Leakage P (KPa)	300	1152+-47	717+-34	1011+-34	1118+-300	900 +-99

*ISO 10555 requirements: 15 Newtons, and 300 KPa leakage pressure

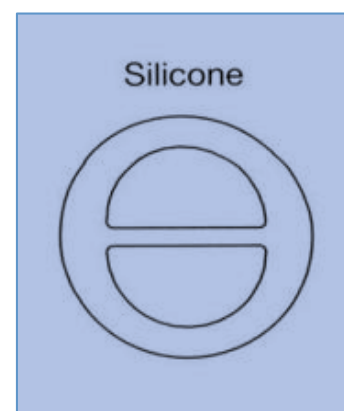
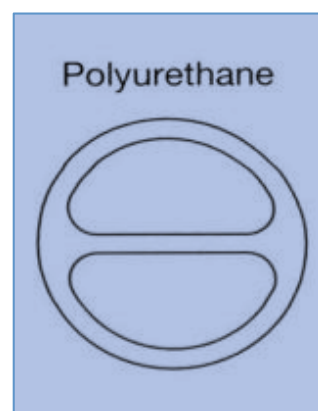


- A) Tecoflex
- B) Tecothane
- C) Carbothane
- D) Pellethane
- E) Chronoflex

Minime variazioni strutturali determinate
in vitro da stress test fisici e/o chimici

Maggiore flusso a parità di ingombro endo-vascolare

Confronto tra sezioni di CICC per emodialisi a doppio lume da 14 Fr



PICC e CICC in P-PUR

Pro-PICC



Pro-Line



Complicanze infettive

non esistono studi
clinici che
evidenziano
differenze nella
incidenza di
complicanze
infettive correlabili
ai diversi materiali
utilizzati per CV
(P-PUR vs SIL)

- Beau 1999
- Hoffer 2001
- Pittiruti 2009
- Cohen 2011
- Miyakagi 2012

Complicanze infettive

EPIC 2007

epic2: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England

R.J. Pratt^{a*}, C.M. Pellowe^a, J.A. Wilson^{a,b}, H.P. Loveday^a, P.J. Harper^a, S.R.L.J. Jones^a, C. McDougall^b, M.H. Wilcox^c

ESPEN 2009



ESPEN Guidelines on Parenteral Nutrition: Central Venous Catheters (access, care, diagnosis and therapy of complications)

Mauro Pittiruti^a, Helen Hamilton^b, Roberto Biffi^c, John MacFie^d, Marek Pertkiewicz^e

CDC 2011



Guidelines for the Prevention of Intravascular Catheter-Related

Is, 2011

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Fattori correlabili al rischio settico:

- ✓ vascular proactive planning
- ✓ training dello staff
- ✓ protocollo di inserzione
- ✓ protocollo di gestione dell'exit-site
- ✓ protocollo di gestione dell'hub

Complicanze trombotiche

non esistono studi
clinici che
evidenziano
differenze nella
incidenza di
complicanze trombo-
emboliche correlabili
ai diversi materiali
utilizzati per CV
P-PUR vs CV SIL

- Beau 1999
- Pittiruti 2009
- Bonizzoli 2011
- Miyakagi 2012

Complicanze trombotiche

Gavecelt 2007

Conclusions of the Consensus

Silicone and second-third-generation polyurethane catheters are less thrombogenic than polyethylene or PVC ones. A lower diameter catheter and a single lumen might be protective against the risk of central venous thrombosis.

Strength B recommendation.

Journal of thrombosis and Haemostasis 2013

Journal of Thrombosis and Haemostasis, 11: 71-80

DOI: 10.1111/jth.12071

ORIGINAL ARTICLE

International clinical practice guidelines for the treatment and prophylaxis of thrombosis associated with central venous catheters in patients with cancer

P. DEBOURDEAU,*† D. FARGE,†‡ M. BECKERS,§¶ C. BAGLIN,§¶ R. M. BAUERSACHS,** B. BRENNER,†† D. BRILHANTE,‡‡ A. FALANGA,§§ G. T. GEROTZAFIAS,¶¶ N. HAIM,*** A. K. KAKKAR,††† A. A. KHORANA,‡‡‡ R. LECUMBERRI,§§§ M. MANDALA,¶¶¶ M. MARTY,**** M. MONREAL,††††,‡‡‡‡ S. A. MOUSA,§§§§ S. NOBLE,¶¶¶¶ I. PABINGER,***** P. PRANDONI,††††† M. H. PRINS,‡‡‡‡‡ M. H. QARI,§§§§§ M. B. STREIFF,¶¶¶¶¶ K. SYRIGOS,***** H. R. BÜLLER††††††† and H. BOUNAMEUX††††††††

JVA 2015

JVA

ISSN 1129-7298

J Vasc Access 2015; 00 (00): 000-000
DOI: 10.5301/jva.5000930

REVIEW

A comparison of silicone and polyurethane PICC lines and postinsertion complication rates: a systematic review

Fattori correlabili al rischio trombo-embolico:

✓ vascular proactive planning

✓ screening trombofilico

✓ puntura ecoguidata vs. 'blind'

✓ rapporto tra diametro della vena e calibro del catetere

✓ corretta posizione della punta

✓ uso di sistemi sutureless

Complicanze meccaniche

Molti studi clinici hanno dimostrato un rischio di rottura e/o dislocazione più elevato per il silicone rispetto al PUR

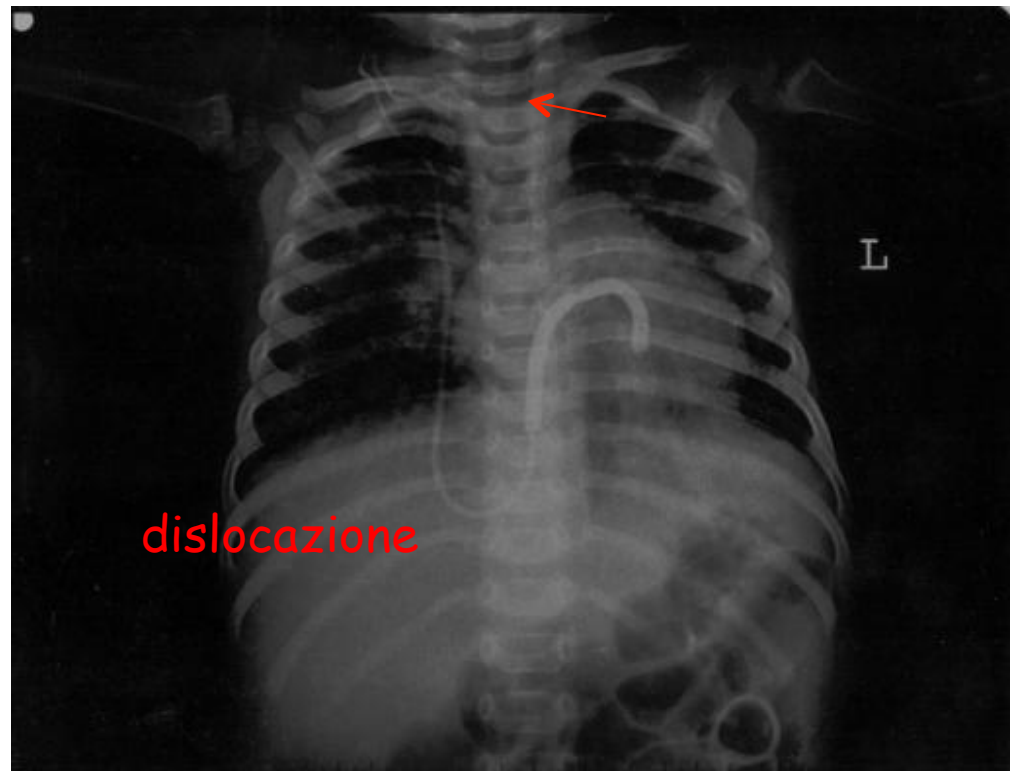
Rudin 1990

Beau 1999

Hoffer 2001

Pittiruti 2009

Cohen 2011



Complicanze meccaniche

Uno studio prospettico non controllato ha mostrato una superiorità del P-PUR rispetto al PUR e al SIL riguardo a tutte le complicanze meccaniche

Br J Nurs. 2009 Jan 8-21;18(1):8-18.

Comparison of three peripherally-inserted central catheters: pilot study.

Di Giacomo M¹.

Author information

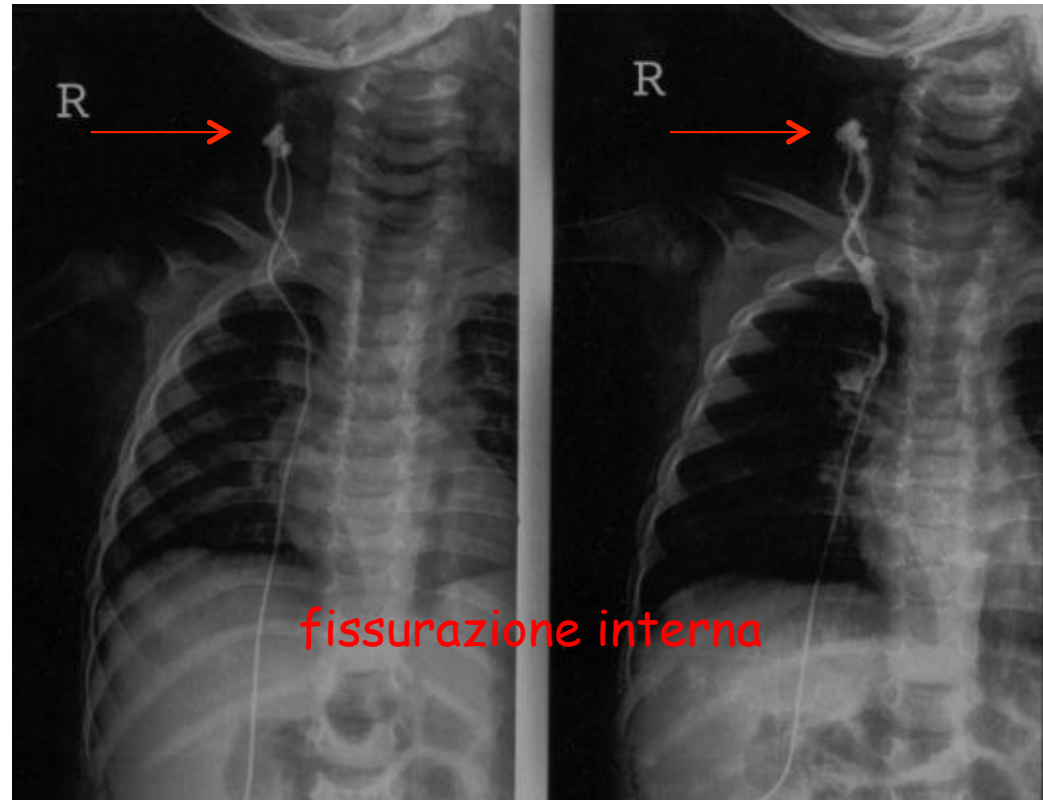
Di Giacomo Br J Nurs 2009

Retraction in

Retraction. [Br J Nurs. 2014]

Abstract

Peripherally-inserted central catheters (PICCs) are non-tunneled, central catheters inserted through a peripheral vein of the arm. They are 50-60 cm long and are usually made of either silicone or second-third generation polyurethane. PICCs can be used for prolonged, continuous or intermittent infusion therapies (up to 3 months) both in hospitalized patients and in patients treated as outpatients, in a hospice, or at home. When establishing a vascular service it is key to select a PICC that meets the requirements of safety, cost-effectiveness, high resistance (ability to take increasing fluid volumes with high pressure devices) and durability, and low complications rate. The complications and dwell times of three different PICCs were studied: coated polyurethane, valved silicone and power-injectable. The study was conducted at the chemotherapy suite at the author's hospital with the aim of selecting the right PICC based on low incidence of complications, resistance and enhanced dwell time. Results show a low incidence of complications and long dwell time among patients with the power-injectable PICC. Furthermore, this study demonstrated a reduction on the rate of occlusion and rupture with power-injectable PICCs, which makes them safer to use for administration of chemotherapy and other vesicant agents, as well as for the management of patients in critical care.



Complicanze meccaniche

Evidenza scientifica di una esposizione più elevata alle complicanze meccaniche dei cateteri in silicone :

✓ dislocazione

✓ rottura

fissurazione esterna o interna

frattura/ embolia segmento distale

The Journal of Vascular Access 2000; 1: 36-39

BIOMATERIALS

Campisi JVA 2000

Groshong catheters: technical aspects and clinical features

C. CAMPISI, L. CAMILLUCCI¹, A. CAMPOPIANO¹, C. FANIZZA¹, A. SARDONIO

National Research Council – Institute of Biomedical Technologies, Rome - Italy

¹ISPESL – National Institute for Occupational Prevention and Safety - Monteporzio Catone, Rome - Italy

Groshong PICC and home care: an opportunity. Clinical experience after the first 200 implants

S. SPAZIANI¹, T. MICHELI¹, B. VINCENZI¹, C. CAMPISI¹

Spaziani JVA 2000

¹Rep. Analgesic and Palliative Therapy Unit, ASL Frosinone, Frosinone - Italy

²Biomedical Campus, Rome - Italy

³National Research Council, Institute of Biomedical Technologies, Rome - Italy

ABSTRACT: Peripherally Inserted Central Catheters (PICC) represent an alternative for critical patient care, and are safer to implant in home patients.

The authors report on their experience with the first 200 4 Fr Groshong PICC implanted during the last 18 months. The procedure can be easily applied at home (98% successful implant rate), without the need for fluoroscopic or ultrasound guidance. Moreover, the authors believe that the X-ray control after implant is not strictly necessary. After 11,570 days/catheters, only 5 devices were explanted because of complications: 4 because of sepsis and peripheral phlebitis, and the last was explanted by another medical staff for unclear reasons. The complications needing no explanation were a total of 32: for 12 of them the external portion of tube was damaged during use, while for the other 20 the internal clots were resolved with forced flushing.

The authors conclude that Groshong PICC can be considered the gold standard for home care management of critical patients, taking into account the quality of pure silicon, the presence of a valve and the specially-made closed-tip.

Complicanze meccaniche

Cohen J Vas. Interv Radiol 2011

J Vasc Interv Radiol. 2011 May;22(5):636-41. doi: 10.1016/j.jvir.2011.01.433.

Silicone and polyurethane tunneled infusion catheters: a comparison of durability and breakage rates.

Cohen AB¹, Dagli M, Stavropoulos SW Jr, Mondschein JJ, Soulen MC, Shlansky-Goldberg RD, Solomon JA, Chittams JL, Theriot LA SO.

⊕ Author information

Abstract

PURPOSE: To examine the overall durability and breakage rates of dual-lumen silicone catheters in comparison with power-injectable dual-lumen polyurethane catheters.

MATERIALS AND METHODS: Patients who received a 10-F dual-lumen silicone catheter or 9.5-F dual-lumen polyurethane catheter between January 2002 and July 2009 were identified through a quality assurance database. Medical records were reviewed retrospectively. A total of 117 silicone and 94 polyurethane catheters were identified in 192 patients. Reasons for catheter placement and removal were recorded, as were cases of breakage and repairs. Catheter durability was compared; survival analysis was also performed.

RESULTS: Breakage occurred in nine of 117 silicone catheters (8%) and none of 94 polyurethane catheters ($P = .005$). Most catheters were placed for malignancy (162 of 211; 77%); nonmalignant indications such as total parenteral nutrition accounted for 49 out of 211 catheters (23%). The mean silicone catheter dwell time was 99 days (11,612 total catheter-days), and the mean polyurethane catheter dwell time was 78 days (7,362 total catheter-days). There was no significant difference in overall duration of function (ie, survival) between silicone and polyurethane catheters ($P = .12$). The infection rates were 3.6 per 1,000 catheter-days for silicone catheters and 3.5 per 1,000 catheter-days for polyurethane catheters (P value not significant).

CONCLUSIONS: There were fewer catheter fractures with the polyurethane catheter compared with the silicone catheter, although there was no difference in the total access site service interval for the two catheter types.

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J Vasc Access 2014;15 (5): 391-395

DOI: 10.5301/jva.5000361

Balsorano JVA 2014

ORIGINAL ARTICLE

Fractures of totally implantable central venous ports: more than fortuity. A three-year single center experience

Paolo Balsorano^a, Giulia Galducci^a, Ilaria De Fanti^b, Samuel Kagan Evans^c, Angelo Raffaele De Gaudio^a, Cecilia Pelagatti^a

^a Department of Health Science, Section of Anaesthesiology, Intensive Care and Pain Medicine, AOUC Careggi, Florence - Italy

^b Department of Pulmonary and Critical Care Medicine, Rhode Island Hospital, Providence, RI - USA

^c Department of Oncology, Section of Anesthesiology and Intensive Care, AOUC Careggi, Florence - Italy

ABSTRACT

Purpose: Totally implantable venous access devices (Ports) represent the mainstay for infusion therapy in patients undergoing chemotherapy, total parenteral nutrition and/or long-term antibiotic treatment. Amongst mechanical complications, lesions of the catheter wall represent a rare but potentially severe condition. We report our experience with the accidental detection of catheter ruptures in a series of ports removed for complication or for end of use.

Methods: All ports removed from January 2011 to June 2013 were considered. All removed ports had been inserted according to a standardized protocol including ultrasound-guided percutaneous venipuncture (out-of-plane or in-plane approaches) and electrocardiogram-guided positioning of the tip. Once removed, each catheter was checked by inspection and saline instillation in order to evaluate the integrity of the device itself and rule out possible ruptures.

Results: In over 338 removed ports, 12 Groshong catheters out of 65 (18.5%) had evidence of partial rupture of the catheter wall. Amongst considered variables, "out-of-plane" approach and type of port (silicon, closed tip with Groshong valve) were the only ones significantly associated with catheter ruptures ($p=0.0003$ and 0.0008 , respectively). We could detect no evidence of rupture in any silicon open-ended catheter (Celsite ports) or in any catheter inserted by "in-plane" approach to the vein.

Conclusions: The actual advantage of using port connected with Groshong silicon catheters should be questioned, since apparently they are more fragile than standard catheters. Furthermore, ultrasound-guided "out-of-plane" puncture of the

heters, Port mechanical complications, Totally implantable

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J Vasc Access 2015; 16 (1): 47-51
DOI: 10.5301/jva.5000308
ORIGINAL ARTICLE

Wang QI, JVA 2014

Percutaneous retrieval of PICC fractures via the femoral vein in six cancer patients

QI Wang, Bin Xiong, ChuanSheng Zheng, GanSheng Feng, Ming Liang, HuiMin Liang

Department of Radiology, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan - People's Republic of China

ABSTRACT

Purpose: To investigate the feasibility and safety of the interventional technique of retrieving the fractured peripherally inserted central catheter (PICC) segments within the vessels via the femoral vein.

Methods: From July 2007 to January 2012, we performed percutaneous retrieval of PICC fractures in six cancer patients who accepted chemotherapy via PICC. The fractures occurred during the traction of the catheter and were diagnosed with chest plain film radiography and/or computed tomography. The patients included four cases of ovarian cancer, one case of breast cancer and one case of cervical cancer. The fractures were retained in the vessels of the patients for 1 to 10 days. According to the location of the ends of the PICC fractures, three methods were employed using the most commonly used interventional devices in the digital subtraction angiography suite.

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J Vasc Access 2015; 16 (2): 130-136
DOI: 10.5301/jva.5000314
ORIGINAL ARTICLE

Crocoli A, JVA 2015

Central venous access devices in pediatric malignancies: a position paper of Italian Association of Pediatric Hematology and Oncology

Alessandro Crocoli^a, Assunta Tornesello^a, Mauro Pittiruti^a, Angelica Barone^a, Paola Muggeo^a, Alessandro Inerna^a, Angelo Claudio Molinari^a, Valeria Grillenzoni^a, Viviana Durante^a, Maria Pia Cicalese^a, Giulio Andrea Zanazzo^a, Simone Cesaro^a

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JVA
ISSN 1129-7298

J Vasc Access 2016; 17 (6): 535-541
DOI: 10.5301/jva.5000606
ORIGINAL RESEARCH ARTICLE

Soichi JVA 2016

Fracture of totally implanted central venous access devices: a propensity-score-matched comparison of risks for Groshong silicone versus polyurethane catheters

Soichi Kojima^a, Takao Hiraki^a, Hideo Gobara^a, Toshihiro Iguchi^a, Hiroyasu Fujiwara^a, Yusuke Matsui^a, Toshiharu Mitsuhashi^a, Susumu Kanazawa^a

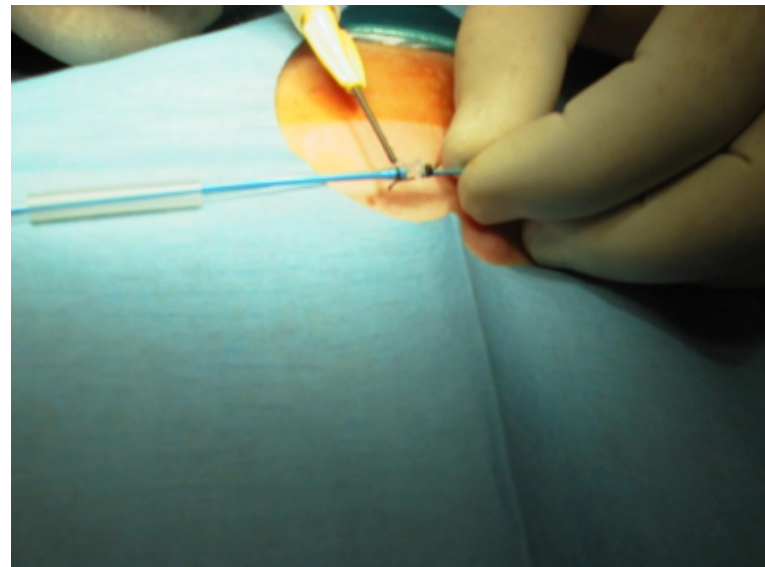
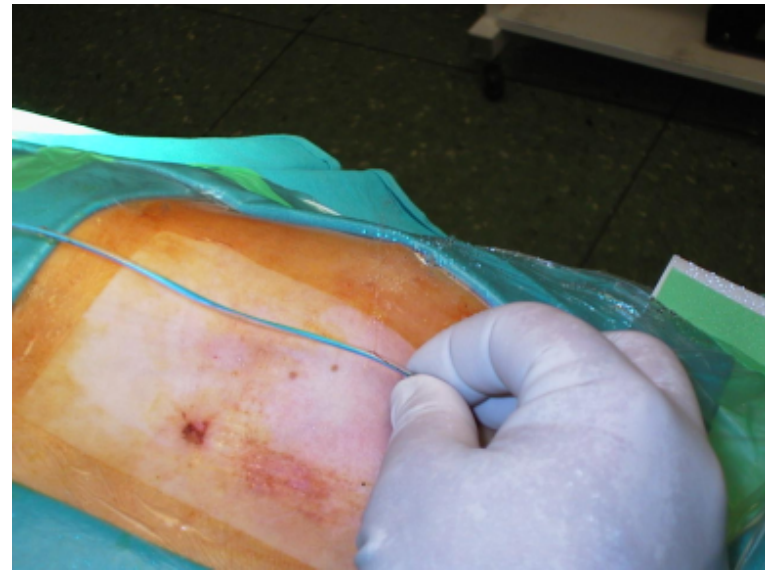
^a Department of Radiology, Okayama University Medical School, Okayama - Japan

^a Department of Epidemiology, Okayama University Medical School, Okayama - Japan

Complicanze meccaniche

Evidenza clinica di una esposizione più elevata alle complicanze meccaniche dei cateteri in silicone :

- ✓ dislocazione
- ✓ rottura
- fissurazione esterna o interna
- frattura/ embolia
segmento distale



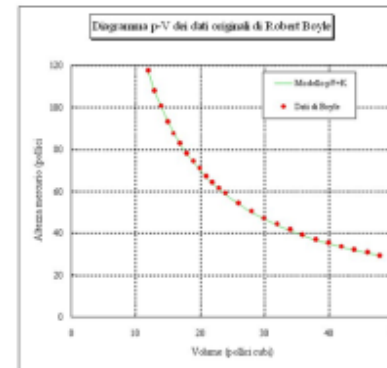
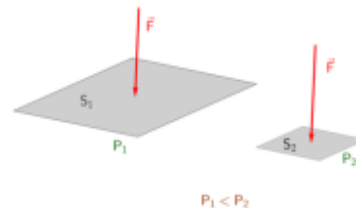
Statica e dinamica dei fluidi

$$P = F / S$$

PASCAL
(PRESSIONE)

$$PA = \frac{\text{newton}}{\text{metri quadrati}} = \frac{N}{m^2}$$

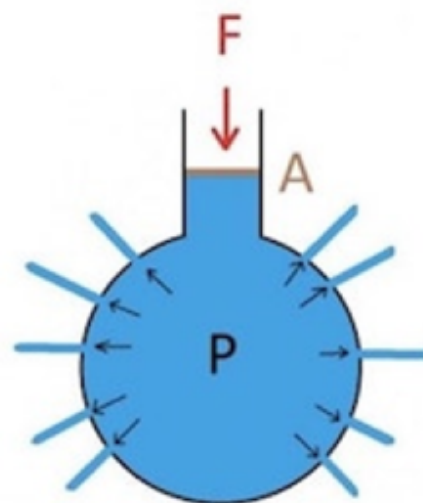
La pressione è inversamente proporzionale alla superficie di applicazione della forza



Legge di Boyle - Mariotte

A temperatura costante la pressione di un fluido è inversamente proporzionale al suo volume

$$P \times V = \text{costante}$$



Principio di Pascal

Una variazione di pressione esercitata su di un punto di un fluido confinato viene trasmessa inalterata ad ogni punto del contenitore

Complicanze occlusive

Non evidenza descritta in letteratura o clinicamente valutabile di differenze tra silicone e PUR in termini di rischio di occlusione.

Il P-PUR potrebbe avere vantaggi:

- ✓ disostruzione più facile con flushing forzato
- ✓ utilizzo di siringhe di vol. < 10 ml.
- ✓ minore richiesta di disostruzioni trombolitiche
- ✓ minore incidenza di PWO e fibrin sleeve

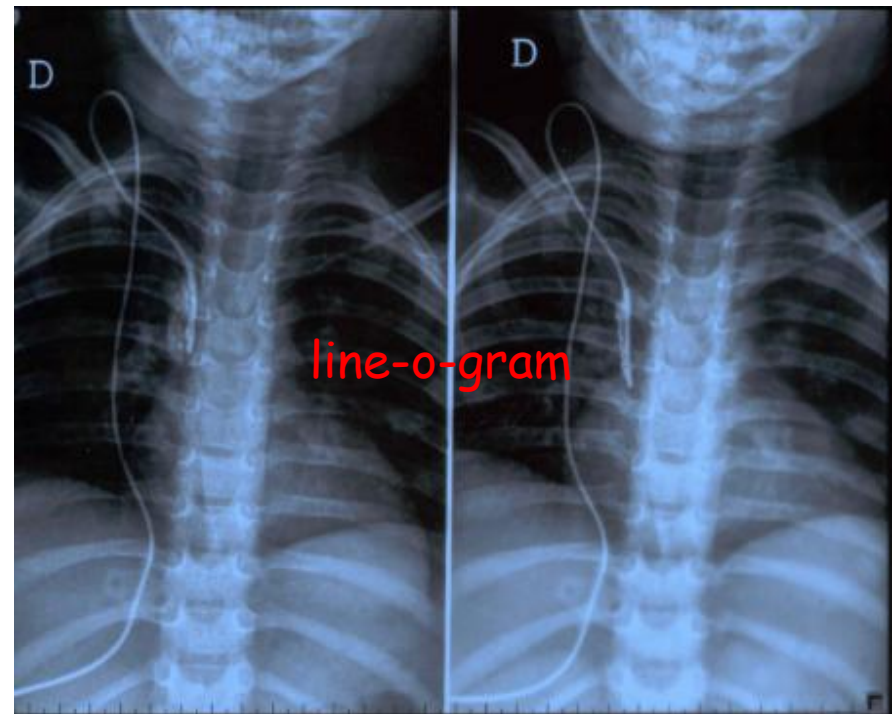
Fattori correlabili al rischi occlusivo:

- ✓ vascular proactive planning
- ✓ protocollo di gestione dell'hub (flushing pulsato, NFC a pressione neutra)
- ✓ protocollo di gestione della linea infusionale

Complicanze occlusive

Evidenza clinica di una esposizione più elevata ad alcune complicanze occlusive dei cateteri in silicone:

- ✓ fibrin sleeve
- ✓ PWO

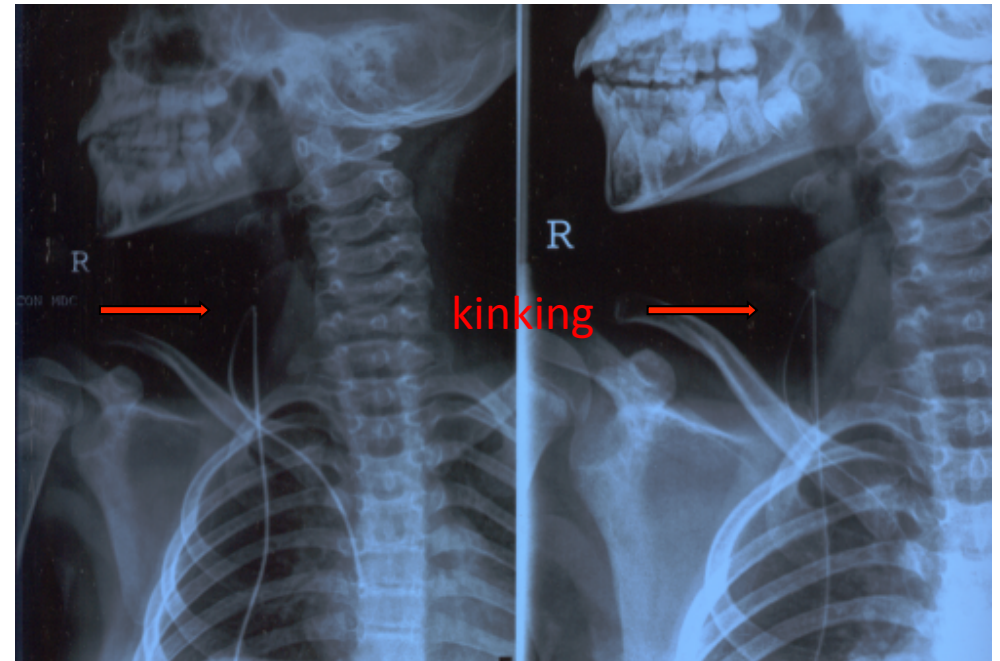


Raccomandazione

accessi coronali alla vena
anonima o postero-laterali
inferiori alla vena giugulare



prevenzione del kinking



Performance fisica

Il P-PUR supporta flussi e pressioni maggiori rispetto al silicone

- ✓ minore spessore parietale a parità di calibro
- ✓ maggiore resistenza alle sollecitazioni meccaniche

Queste caratteristiche suggeriscono una migliore versatilità ed una migliore durata nell'utilizzo clinico

Performance clinica

Recenti studi hanno
evidenziato grande
affidabilità e
versatilità dei cateteri
in P-PUR in termini di
flusso e resistenza ai
regimi pressori

Angle 1997

Rivitz 1997

Salis 2004

Coyle 2004

Pittiruti 2012

Poli 2016

Performance clinica

- ✓ alti flussi (5 ml/sec)
- ✓ alti regimi pressori (300psi)
- ✓ compatibilità con mdc ad alta viscosità
- ✓ misura della pressione venosa centrale
- ✓ resistenza ai traumi meccanici
- ✓ disostruzione più facile (flushing forzato)
- ✓ minore incidenza di complicanze secondarie
- ✓ maggiore durata
- ✓ costi sovrapponibili a altri CV in PUR o SIL

P-PUR > silicone

In oltre un decennio di utilizzo clinico i CV in P-PUR rispetto ai CV in silicone:

- ✓ non hanno dimostrato di essere correlati ad importanti differenze in termini di complicanze infettive e/o trombo-emboliche
- ✓ hanno dimostrato di essere correlati a significative differenze in termini di complicanze meccaniche
- ✓ sono correlabili probabilmente ad una minore incidenza di complicanze occlusive e sicuramente associabili ad una più semplice e veloce disostruzione.

VADs in PUR pover-injectable



Conclusioni

I CV in P-PUR consentono:

- ✓ prolungata durata temporale
- ✓ resistenza alle sollecitazioni meccaniche
- ✓ compatibilità a flussi infusivi elevati (5ml/sec.)
- ✓ compatibilità a regimi pressori elevati (300 psi)
- ✓ disostruzione più facile con flushing forzato
- ✓ utilizzo di siringhe di vol. < 10 ml.
- ✓ minore richiesta di disostruzioni trombolitiche
- ✓ minore incidenza di PWO e fibrin sleeve

Conclusioni

I cateteri venosi centrali in P-PUR costituiscono attualmente i devices a medio-lungo termine (CICC - PICC - PORT) da preferire nella programmazione di un accesso vascolare essendo caratterizzati da:

- ✓ ottimale performance clinica
(durata, sicurezza e % di complicanze)
- ✓ ottimale rapporto costo benefici

A & Q



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