UPDATE en DIALISIS 2009

Fundació Puigvert

Complicaciones NO infecciosas del catéter central para HD

Servicio Nefrología
Servicio Radiología

UNIDAD DIALISIS

Dr Joaquin Martinez

Acceso Vascular Ideal

• Uso inmediato o rápida maduración	• CATETER
• Larga supervivencia	• FAVI
• Flujos sanguíneos elevados para HD	• FAVI, INJERTO, CATETER
• Riesgo bajo de trombosis	
• Riesgo bajo de infecciones	• FAVI
• Fácil utilización / punción	• CATETER
• Hemostasia rápida al final técnica HD	
• Permite movilidad y confort en HD	• CATETER, FAVI, INJERTO
• Sin agujas (no dolor, no punciones accidentales…)	• CATETER

Tabla 2. Evaluación del paciente antes de la implantación del AV

Valoración	Implicación
Historia clínica	***Comorbilidad***
Edad. Sexo	Riesgo fracaso AV distal
Presencia DM	Calcificación vasos distales
Obesidad	Acceso red venosa
Historia vascular	Indicador macroangiopatía
Enfermedad cardiaca	Asociada a fracaso AV inicial
Insuficiencia Cardiaca	Condiciona utilización CC
Cirugía torácica. Marcapasos	
CC previos	Estenosis / trombosis vasos centrales
Enfermedades malignas	
Esperanza vida acortada	Empleo CC larga duración
Trastornos hemostasia	Tratamiento especifico previo
Edema brazo	Repermeabilización vasos centrales
Selección brazo no dominante	Influencia en calidad de vida
Fracasos AV anteriores	Planificación esmerada AV
Examen físico	***Comprende ambas EESS***
Inspección local	Cicatrices. Infecciones. Edema.
Circulación colateral. Tejido subcutáneo.	Punciones venosas.
Palpación	Examen red venosa con torniquete
	Presencia pulsos arteriales
	Test Allen
Medición TA ambas EESS	Detecta estenosis arteriales
Auscultación arterias	Detección estenosis

- GUIAS SEN de evaluación previa a la creación acceso vascular. Se podría añadir :

- Posibilidad Trasplante
  - Donante vivo
  - GRUPO AB !!!

Catéteres

- DOQI: prevalencia ideal <10%
- ¿Motivos?
  - Prestaciones inferiores (Qb)
  - Menor longevidad
  - Complicaciones potencialmente graves
    - En la colocación… ALGUNAS EVITABLES
    - A medio-largo plazo… INEVITABLES ?

TEMPORALES:

- **Catéter venoso central.....1980**
- **Catéter central tunelizado.Canaud.... 1986**
- **C.TESIO (Twin-cath Canaud+ cuff)….1992**

Pacientes en HD FAV vs Catéter en mayores 65 años

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	>65 años	FAV	CATÉTER
1994	19,60%	95%	5 %
2001	41,60%	75%	25%
2004	46,47%	66%	34%
2006	49,30%	66%	34%
2009	54%	70%	30%

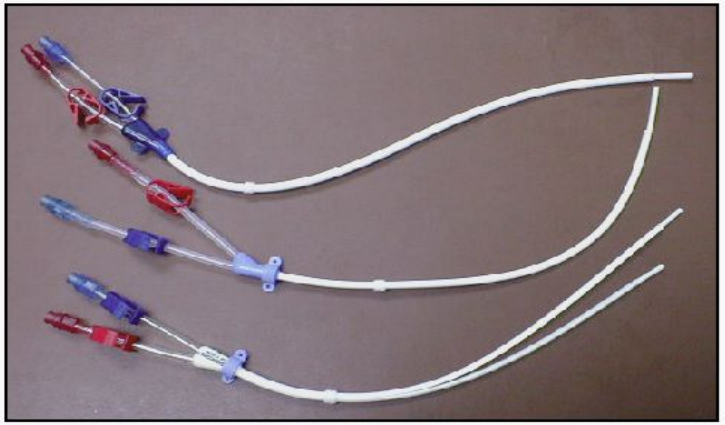
C

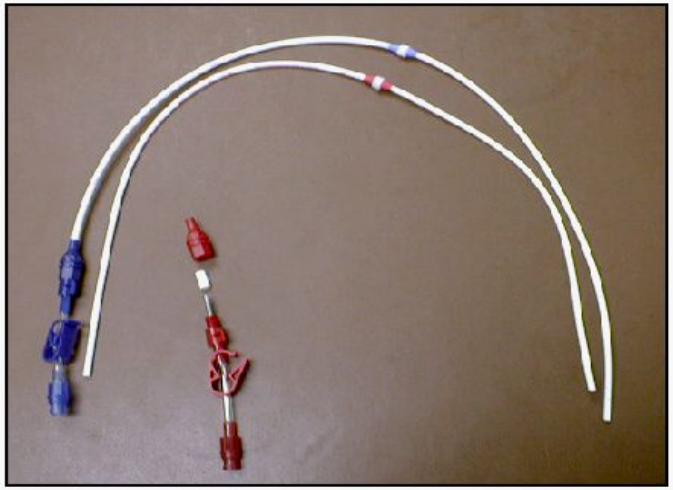
Catéter ideal para HD (Trerotola-2000)

- Fácil de insertar y extraer
- Económico
- Libre de infección
- Libre de fibrina (“invisible” al cuerpo)
- Que no cause trombosis y/o estenosis
- Flujos elevados sangre: >400 ml/min
- Larga duración
- Confortable y aceptable para el paciente

DOQI and Chronic Dialysis Catheters

- Real time ultrasound guided insertion recommended (Evidence/Opinion)
- Fluoroscopy mandatory for insertion (Opinion)
- No proven advantage of one cuffed catheter design over another (Evidence/Opinion)





- No hay datos que avalen superioridad de un modelo determinado de catéter sobre otro
- Cada Centro vive su propia experiencia

Nephrol Dial Transplant (2008) 23: 275–281
doi:10.1093/ndt/gfm582
Advance Access publication 21 September 2007

NDT
Nephrology Dialysis Transplantation

Original Article

Factors affecting long-term survival of tunnelled haemodialysis catheters—a prospective audit of 812 tunnelled catheters

Andrew C. Fry[1], Jon Stratton[2], Ken Farrington[1], Kapil Mahna[1], Sadasivam Selvakumar[3], Hilary Thompson[3] and Paul Warwicker[1]

[1]Lister Renal Unit, Stevenage, Hertfordshire, [2]The Renal Unit, Royal Cornwall Hospital Trust, Truro, Cornwall and [3]Department Of Surgery, Lister Hospital, Stevenage, Hertfordshire, England

There has been a paucity of data regarding survival of different catheter designs. Richard *et al.* [30], in a randomized prospective evaluation, compared the performance of 36 Tesio, 38 Ash Split (similar to Split-Cath) and 39 Opti-flow catheters, but given the relatively small numbers, were unable to demonstrate a significant difference in survival. Trerotola *et al.* [15], comparing 132 Ash-Split and Opti-flow catheters, were able to demonstrate a significant survival advantage for the Ash-Split ($P = 0.02$) [15].

We compared the performance of four types of commercially available tunnelled catheter. Two catheter designs—the HemoSplit and the Tesio twin catheter performed significantly better than the Split-Cath III and Permcath (median survival 727, 608, 308 and 286 days, respectively. There was no significant difference between the Hemosplit and Tesio survival). Using Cox Proportional Hazard modelling, the design of the TVC was confirmed as an independent predictor of line survival, and the Hemosplit and Tesio designs again demonstrated best survival.

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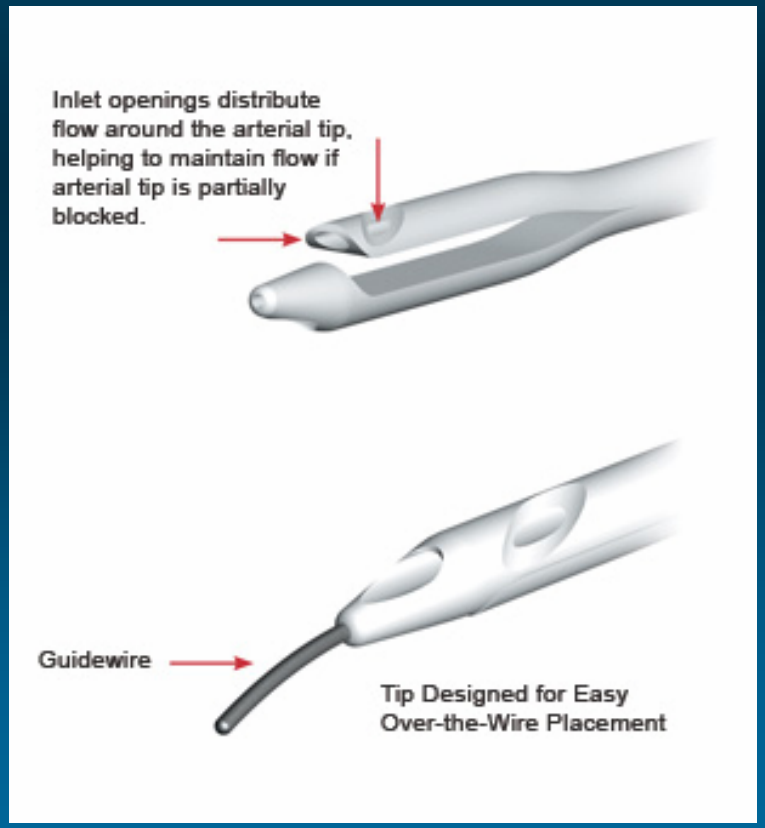
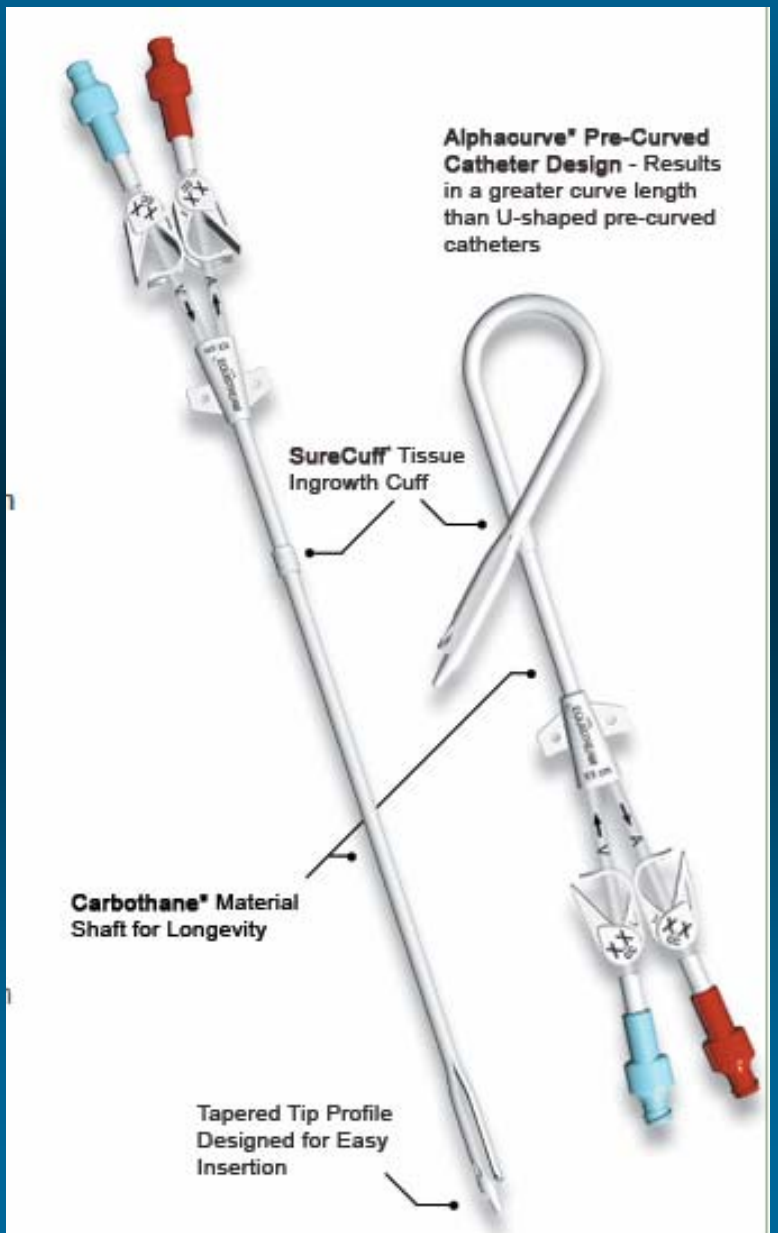
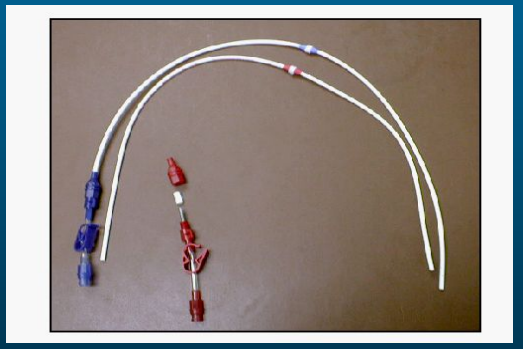


EQUISTREAM* Long-Term Hemodialysis Catheter



IMPORTANTE : Información producto asequible



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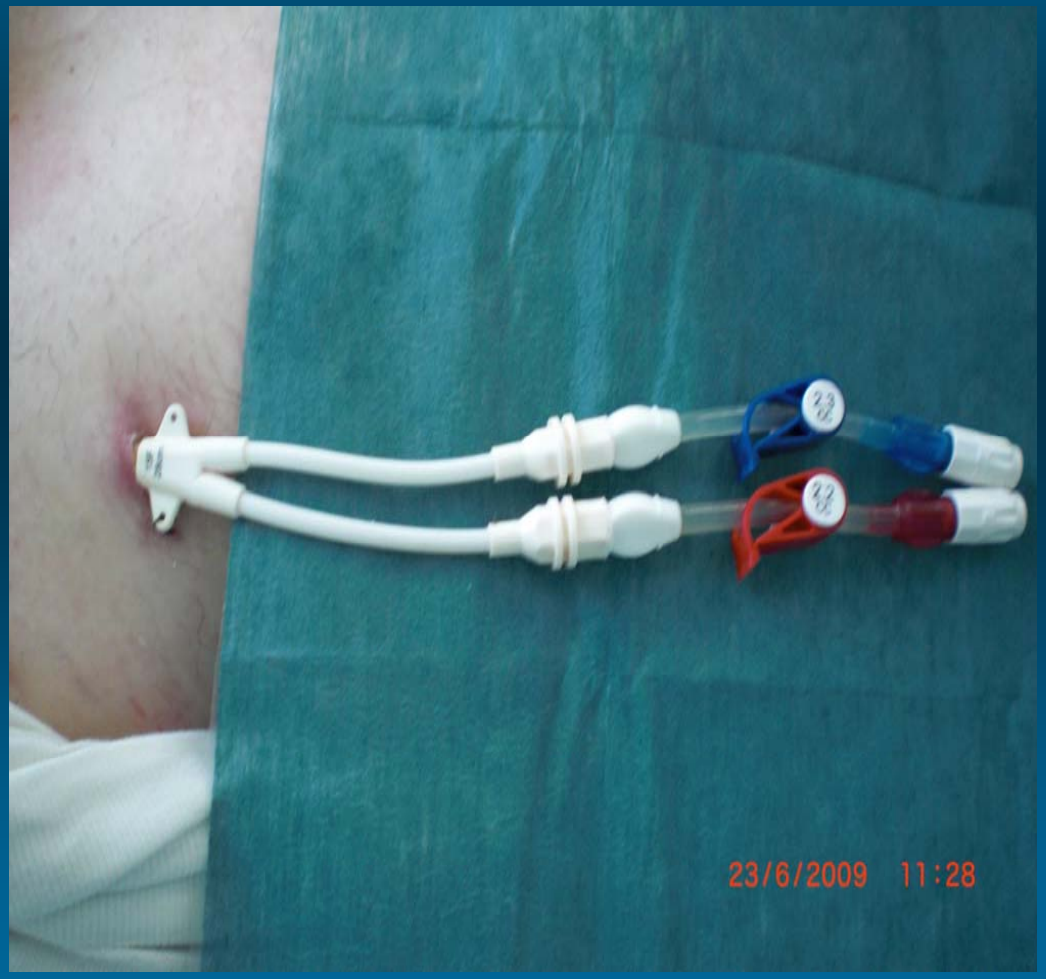
Poll Question:

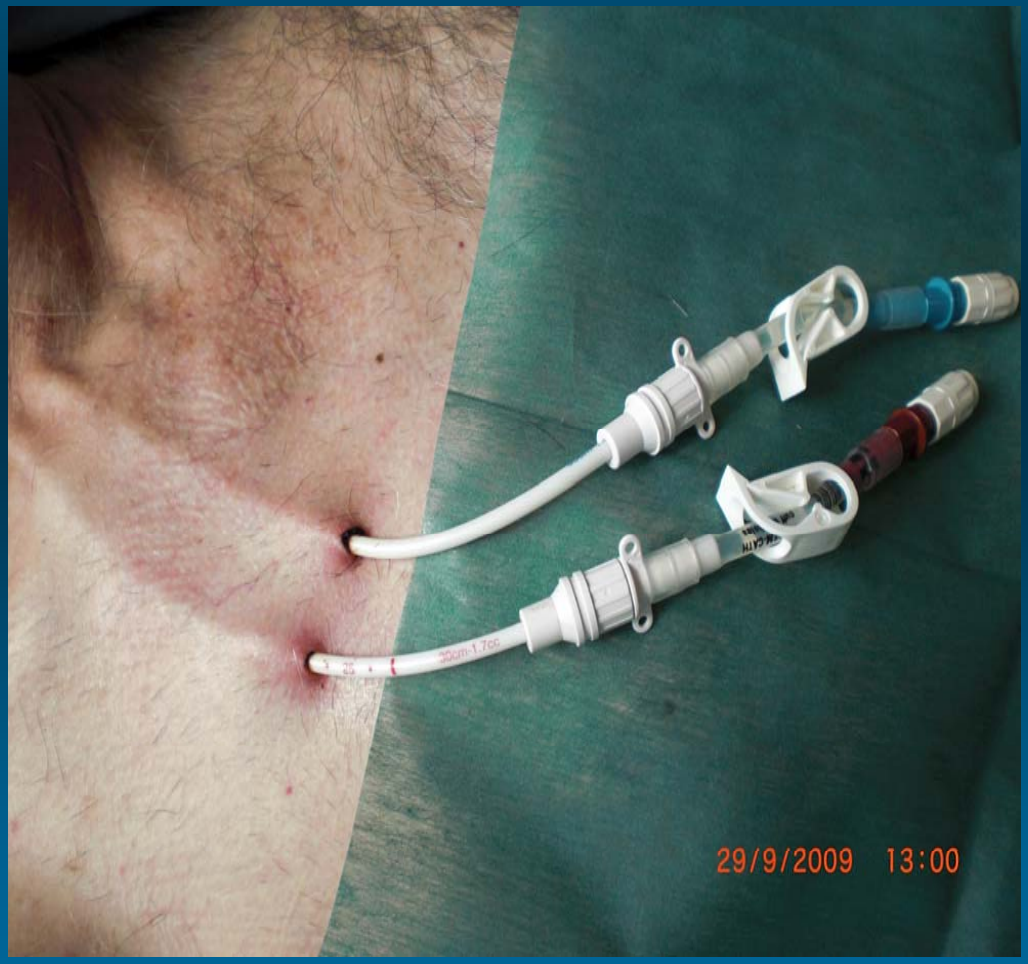
In your experience, what flow rates are typically obtainable using a 14.5FR DLC?

(poll suggested by member john15122)

- A: 450-500 ml/min
- B: 400-450 ml/min
- C: 300-400 ml/min
- D: 250-300 ml/min
- E: Less than 250 ml/min

IMPORTANTE : Información producto asequible para saber distinguir los diversos tipos catéteres





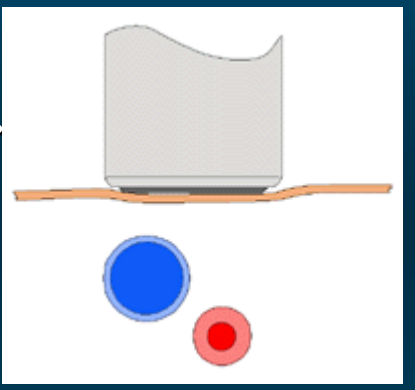
Período 1993-2009

- **Catéteres implantados en nuestro centro:**
  - **3673**
  - **Tunelizados: 1024 (28 %)**
- **Pacientes:**
  - **2297**
- **Número procedimientos suma catéteres femorales, recambios y sustituciones de no tunelizados a tunelizados**

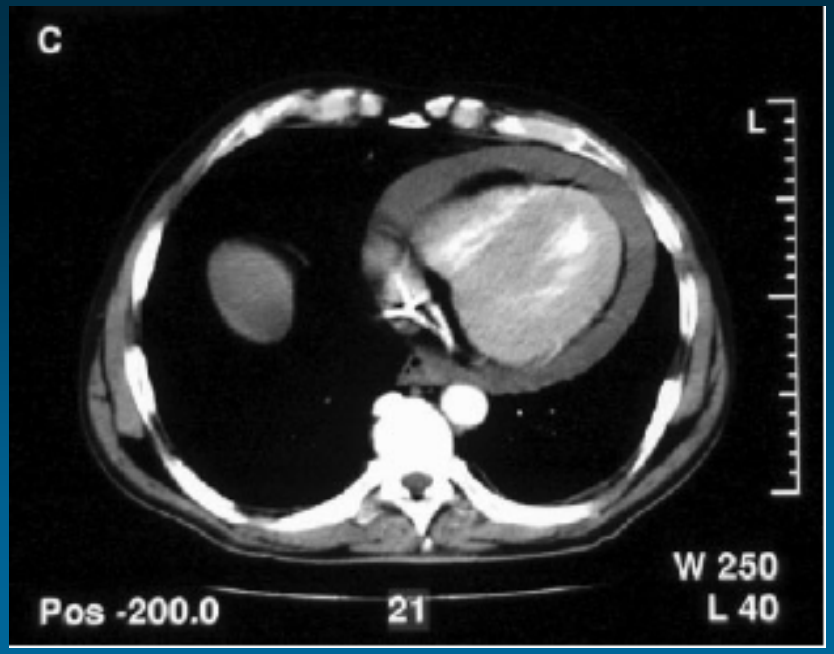
Número pacientes	Número procedimientos por paciente
1384	1
597	2
160	3
76	4
80	5 ó mas

Complicaciones inmediatas (1)

- Accidentes en la PUNCION
  - Punción ARTERIAL (5-10%?)
    - Actuación: correcta hemostasia, control..
    - Prevención: aguja fina, ecografía (1-3%), experiencia.
  - Punción VENOSA profunda
    - Hemotórax, hemomediastino
    - Punción pleuro-pulmonar (1-10% subclavia)
    - FAV (femoral ++)
    - Punción plexo nervioso
    - Punción conducto torácico
  - Hemopericardio
  - Punción traqueal



-Cambio Catéter temporal a Tunelizado
-Personal experimentado
-OJO guía y DILATADOR



Cardiac tamponade . . . a wire too far?

Sir,

On many occasions dialysis is initiated with a temporary jugular venous catheter which is later exchanged for a permanent tunnelled venous catheter, pending creation of an arteriovenous fistula. The exchange of catheter over a guide wire is usually a low-risk procedure and in uncomplicated cases, a chest radiograph is not warranted [1,2]. Cardiac tamponade is a rare complication following initial insertion of a central vein catheter via the Seldinger technique. We report a case of cardiac tamponade, following routine exchange of a temporary jugular catheter to a permanent tunnelled catheter.

A 56-year-old man with advanced renal failure secondary to diabetic nephropathy presented with pulmonary oedema. On the 10th day of admission, his temporary right internal jugular catheter was changed for a permanent tunnelled catheter. The procedure was performed by an experienced practitioner. The procedure was uneventful, although a straight guide wire was used after initial difficulty passing

Pericardial tamponade is thought to arise when dilator, cannula or guidewire punctures the myocardial wall [3,4]. This case illustrates that this complication can also arise when catheters are exchanged over a guide wire. In this patient, the initial difficulty experienced trying to pass a J-tipped guide wire led to the use of a straight wire. For practical reasons, the majority of central venous catheters are placed without real-time radiological screening. The position of the guide wire is estimated by the operator. Guide wires with distance markers may improve the operator's awareness of the distance advanced in a central vein and reduce the risk of accidental myocardial injury. Chest radiography is often unhelpful, as in this case, in confirming or refuting a diagnosis of pericardial tamponade. Echocardiography is the primary imaging modality for

POSSIBLE COMPLICATIONS

The use of an indwelling central venous catheter provides an important means of venous access for critically ill patients; however, the potential exists for serious complications including the following:

- Air Embolism
- Bleeding
- Brachial Plexus Injury
- Cardiac Arrhythmia
- Cardiac Tamponade
- Catheter or Cuff Erosion Through the Skin
- Catheter Embolism
- Catheter Occlusion
- Catheter Occlusion, Damage or Breakage due to Compression Between the Clavicle and First Rib[1]
- Catheter-related Sepsis
- Endocarditis
- Exit Site Infection
- Exit Site Necrosis
- Extravasation
- Fibrin Sheath Formation
- Hemotoma
- Hemothorax
- Hydrothorax
- Inflammation, Necrosis or scarring of skin over implant area
- Intolerance Reaction to Implanted Device
- Laceration of Vessels or Viscus
- Perforation of Vessels or Viscus
- Pneumothorax
- Spontaneous Catheter Tip Malposition or Retraction
- Thoracic Duct Injury
- Thromboembolism
- Venous Thrombosis
- Ventricular Thrombosis
- Vessel Erosion
- Risks Normally Associated with Local and General Anesthesia, Surgery, and Post-Operative Recovery

Complicaciones inmediatas (2)

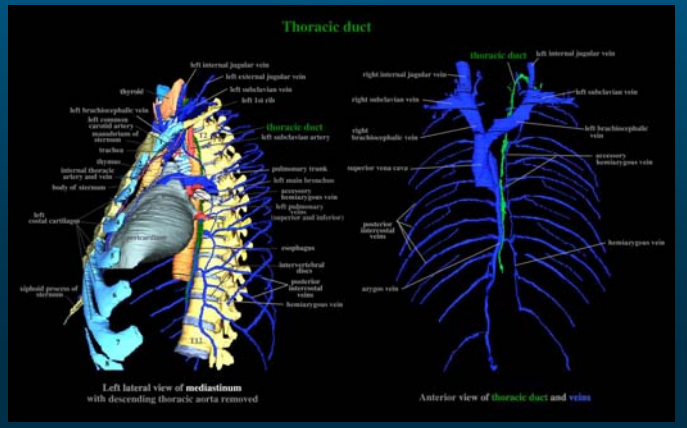
- Embolia gaseosa:
  - Actuación: Soporte cardio-respiratorio
  - Prevención: Trendelembourg+, clamp
- Falsos trayectos:
  - Malformaciones venosas
  - Curvaturas catéter, longitud inadecuada y/o pinzamientos

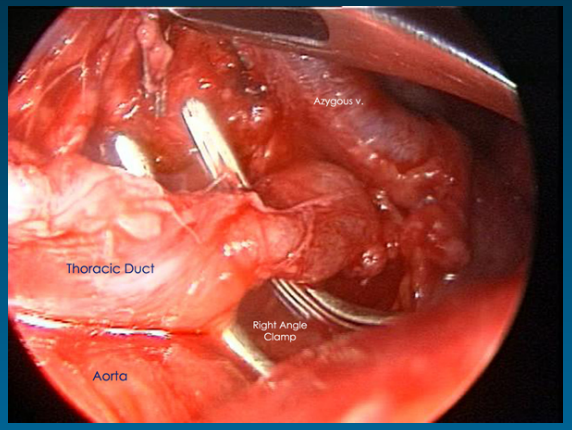
Catéter Canaud desviado a posición craneal por estenosis cava superior

- Disfunción primaria
- Arritmias
- >riesgo estenosis v.centrales

Otras complicaciones +/- inmediatas

- Extracción accidental
- Desconexión, fisura, ruptura
- Hematoma retroperitoneal
- Síndrome Budd-Chiari
- Emigración a red vascular
- Punción conducto torácico (1 caso en nuestra serie)

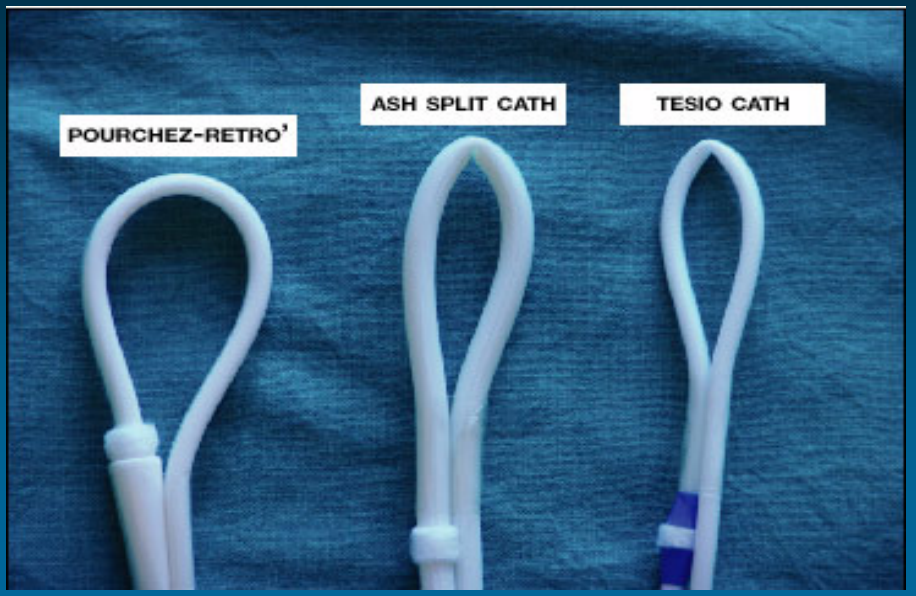


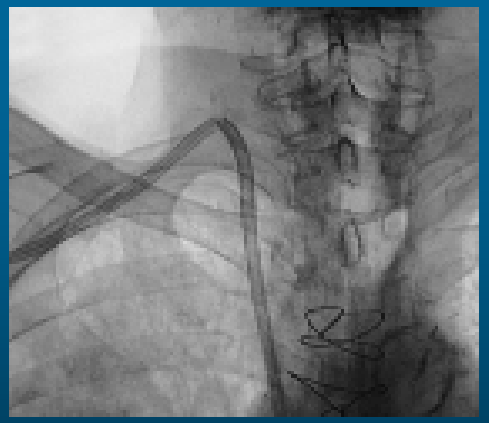


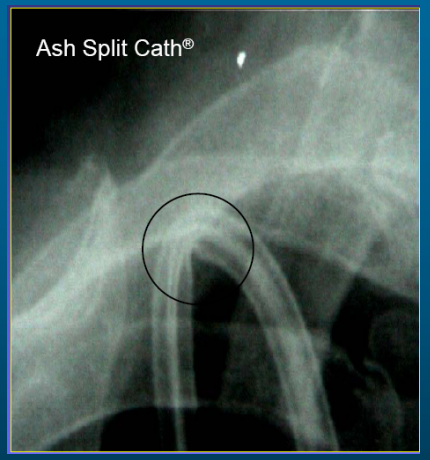
Disfunción del catéter

- Definición:
  - FLUJO inferior 400 ml/min
  - KDOQI: Qb inferior a 300 ml/min cuando el Qb era >350 ml/min con presiónA de -250

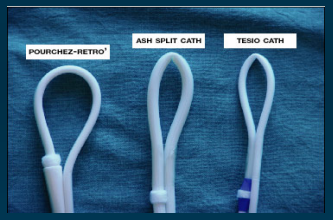
- Disfunciones primarias:
  - DISFUNCION PRIMER USO
  - Acodamiento
  - Malposición
  - Trayecto anómalo (v.azygos..
- Disfunciones secundarias:
  - Trombosis extrinseca
  - Trombosis intrínseca





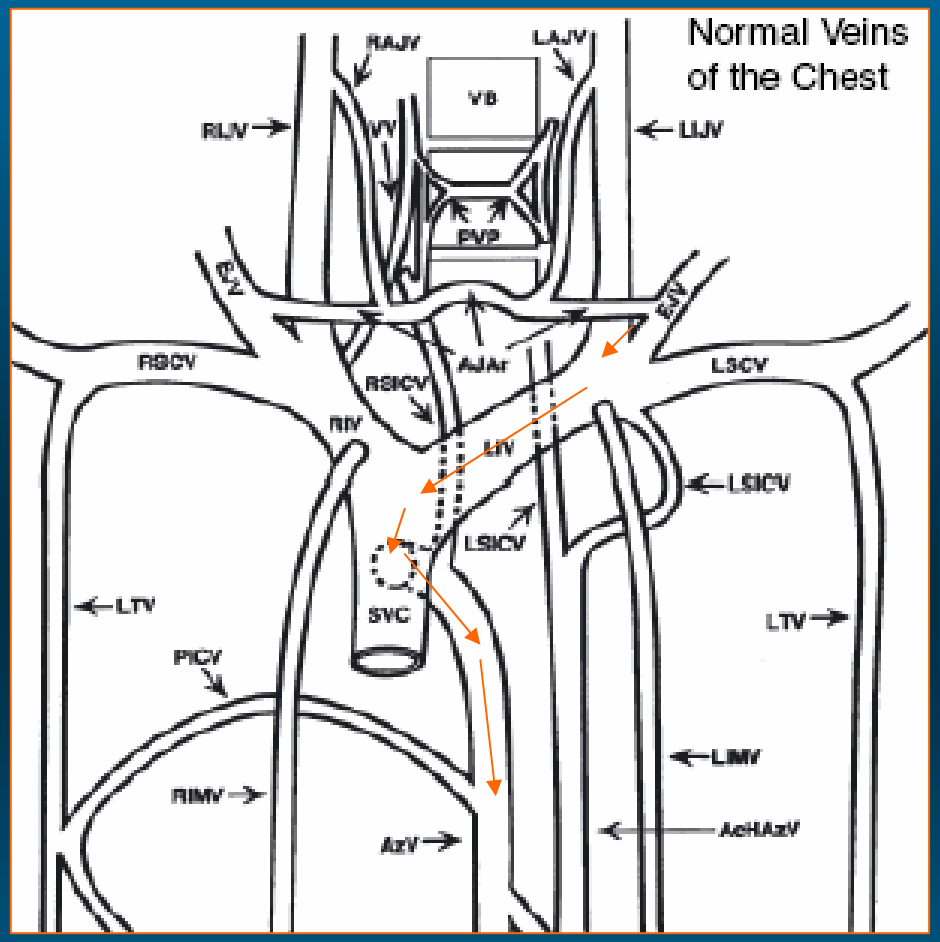


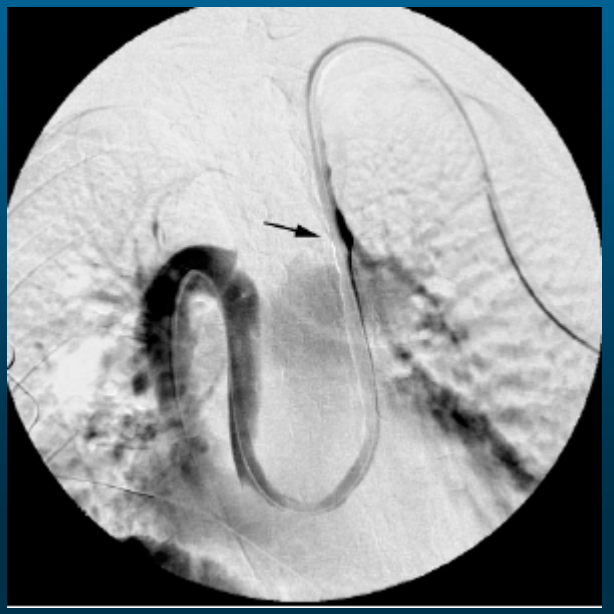
Disfunción del catéter por acodamiento:



- Evitar punciones “distales” a la clavícula
- Evitar angulación/rotación del catéter
- Presencia de banda fibrosa en lugar de la punción venosa
  - Ampliar área “trabajo”
  - Comprobación RX

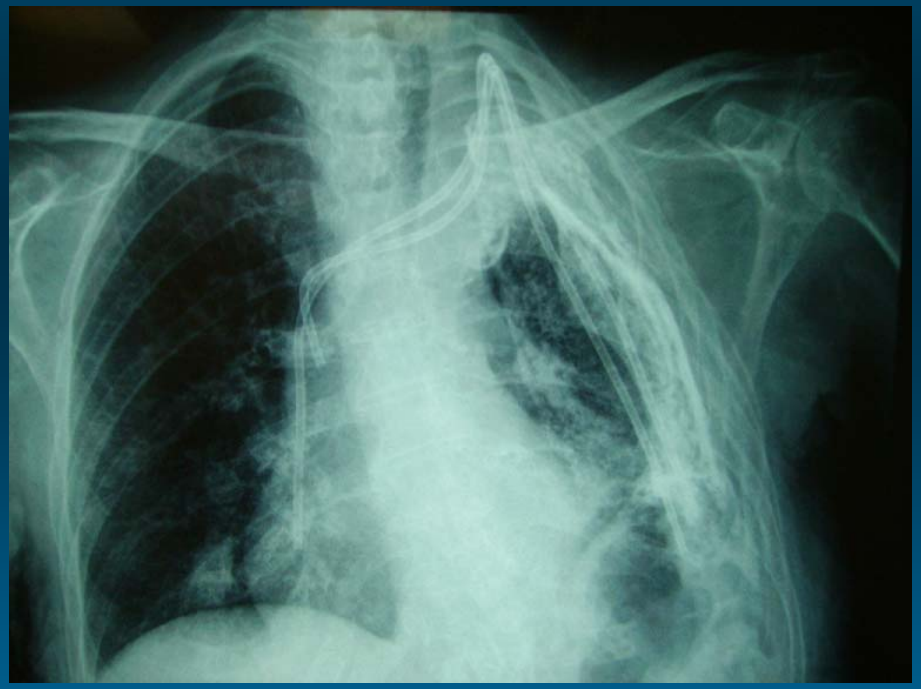
Disfunción del catéter (3)

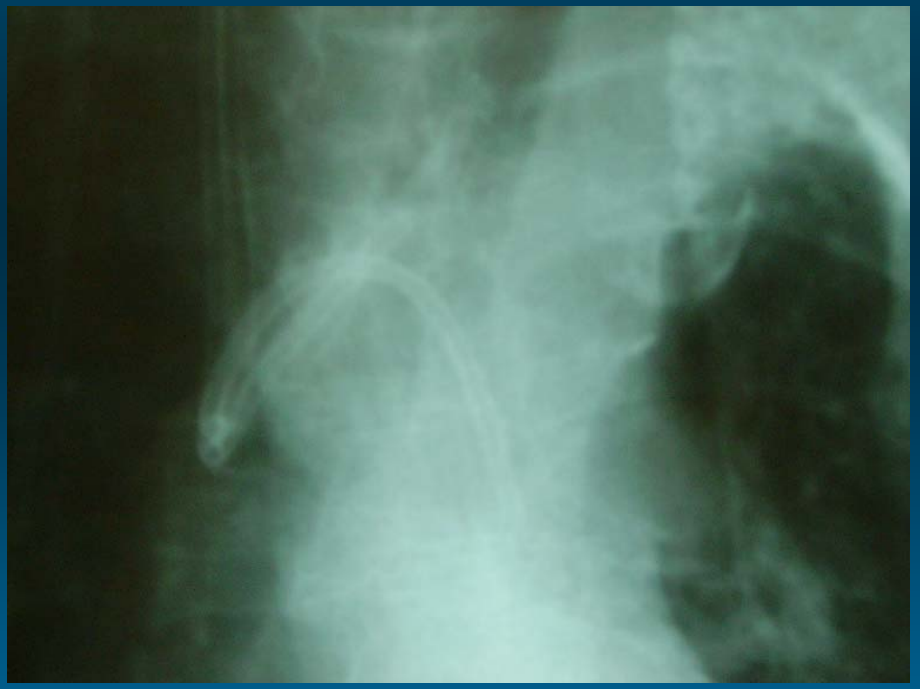




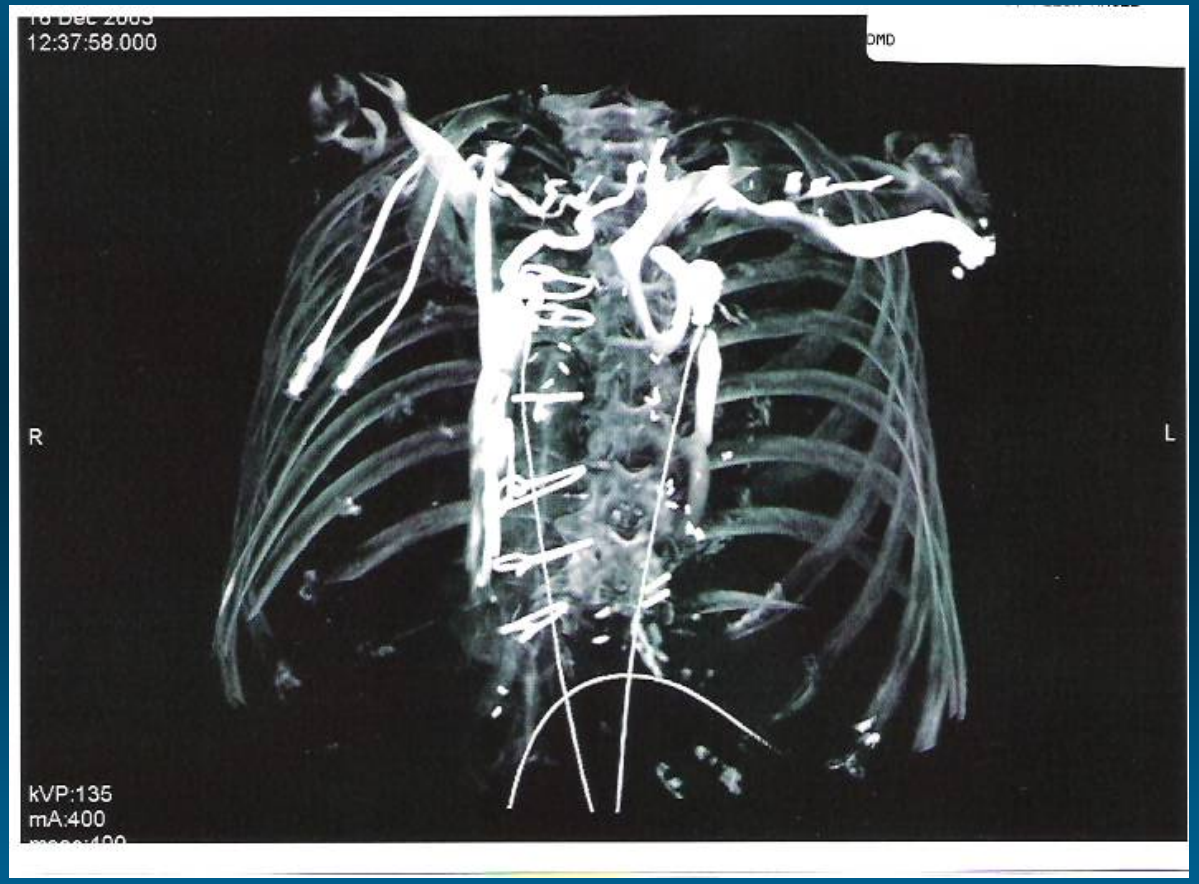
- Disfunciones primarias:
  - Acodamiento
  - Malposición
  - Trayecto anómalo (v.azygos..

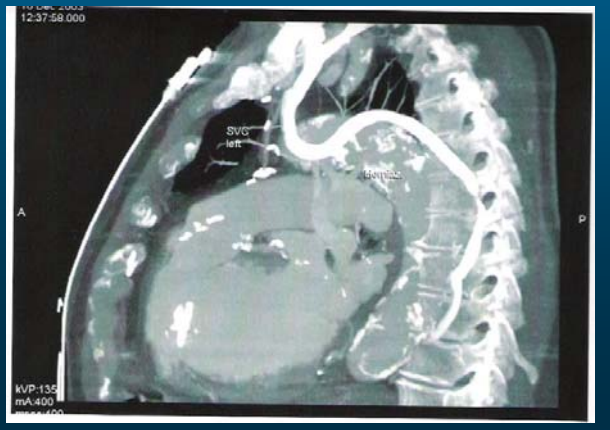
Catéter (1 vía) en vena ázygos

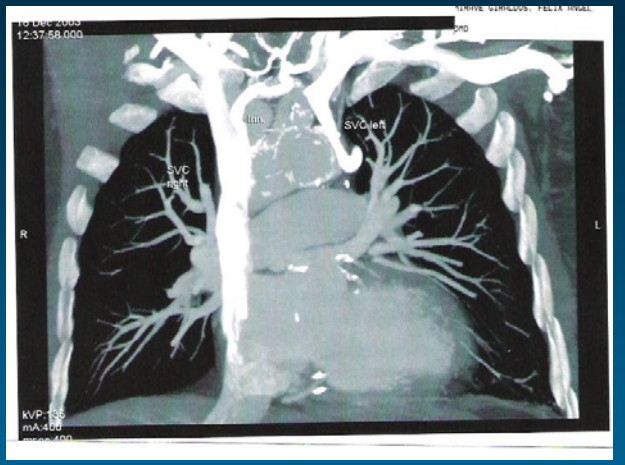




Agenesia tronco innominado







Dos catéteres Canaud en Yugular derecha.

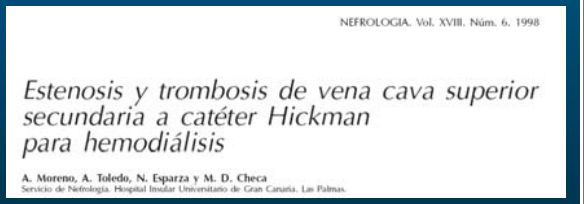
La entrada por yugular izquierda no accedería a cava superior

Disfunciones secundarias

- Hipovolemia

- Trombosis extrínseca
  - Trombosis axilo-subclavia
  - Trombo mural
  - Trombo intra-aurícular

- Trombosis intrínseca
  - Intraluminal
  - Orificios laterales
  - Vaina fibrina…



NEFROLOGIA. Vol. XVIII. Núm. 6. 1998

Estenosis y trombosis de vena cava superior secundaria a catéter Hickman para hemodiálisis

A. Moreno, A. Toledo, N. Esparza y M. D. Checa
Servicio de Nefrología. Hospital Insular Universitario de Gran Canaria. Las Palmas.

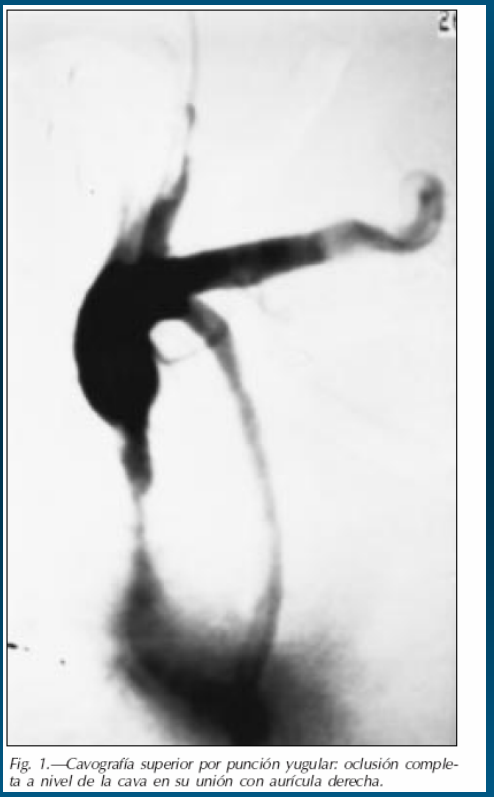
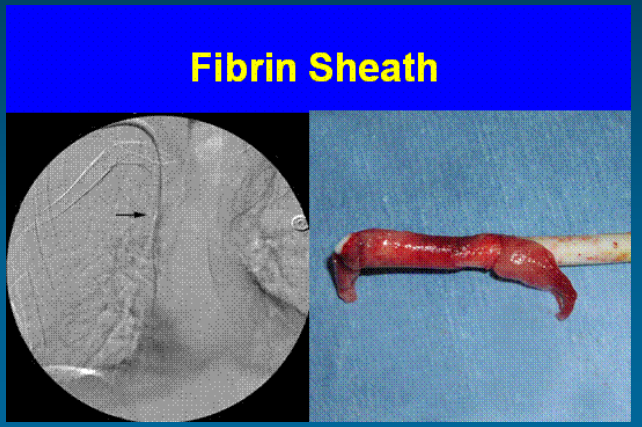


Fig. 1.—Cavografía superior por punción yugular: oclusión completa a nivel de la cava en su unión con aurícula derecha.



Trombosis y estenosis venas centrales

- Factores riesgo:
  - Inflamación, trastornos coagulación (Lupus, déficit ATIII, poliglobulia
  - Antecedentes quirúrgicos (IQ cardíaca..)
  - Catéteres rígidos
  - Tiempo permanencia de catéter
  - Localización (Femoral>subclavia>yugular)

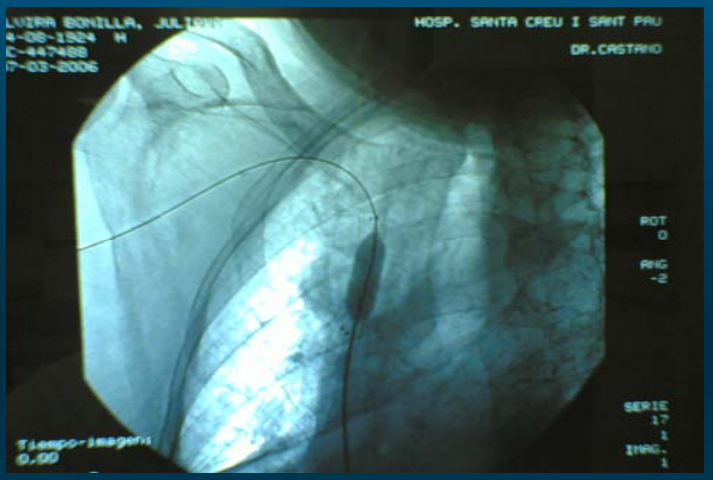
Trombosis y estenosis (3):

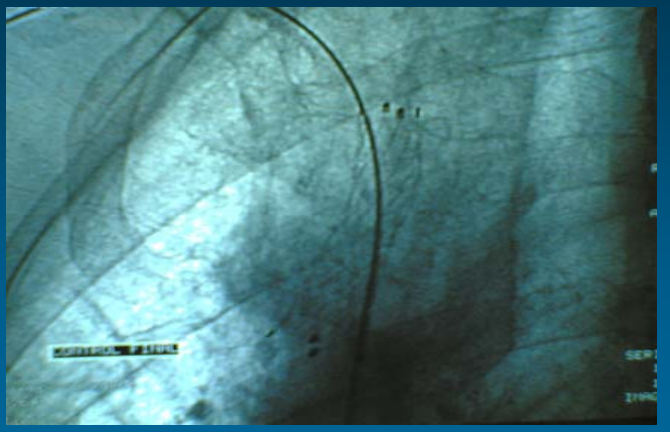
Poco evaluada la trombosis yugular en pacientes HD con catéteres previos

	n	V.Subc (%)	V.Yugular (%)	Tiempo de la exploración
Barret 1988	*36*	50		
Cimochovski 1990	*52*	50	0	1-27 meses
Schillinger 1991	*100*	42	10	
Beenen 1994	*22*	8		6 meses
Hernández 2000	*42*	52		
Jean 2001	*51*		47	

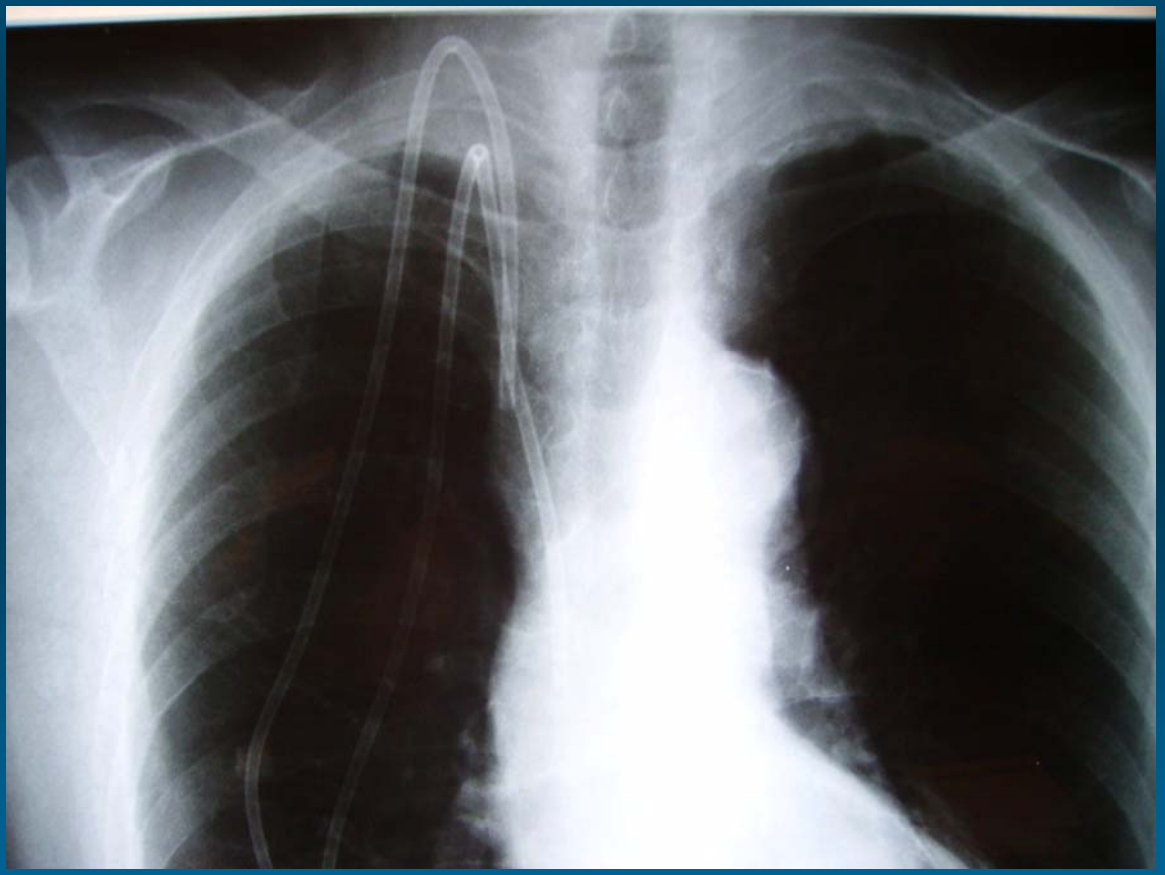
Tratamiento trombosis/estenosis venas centrales

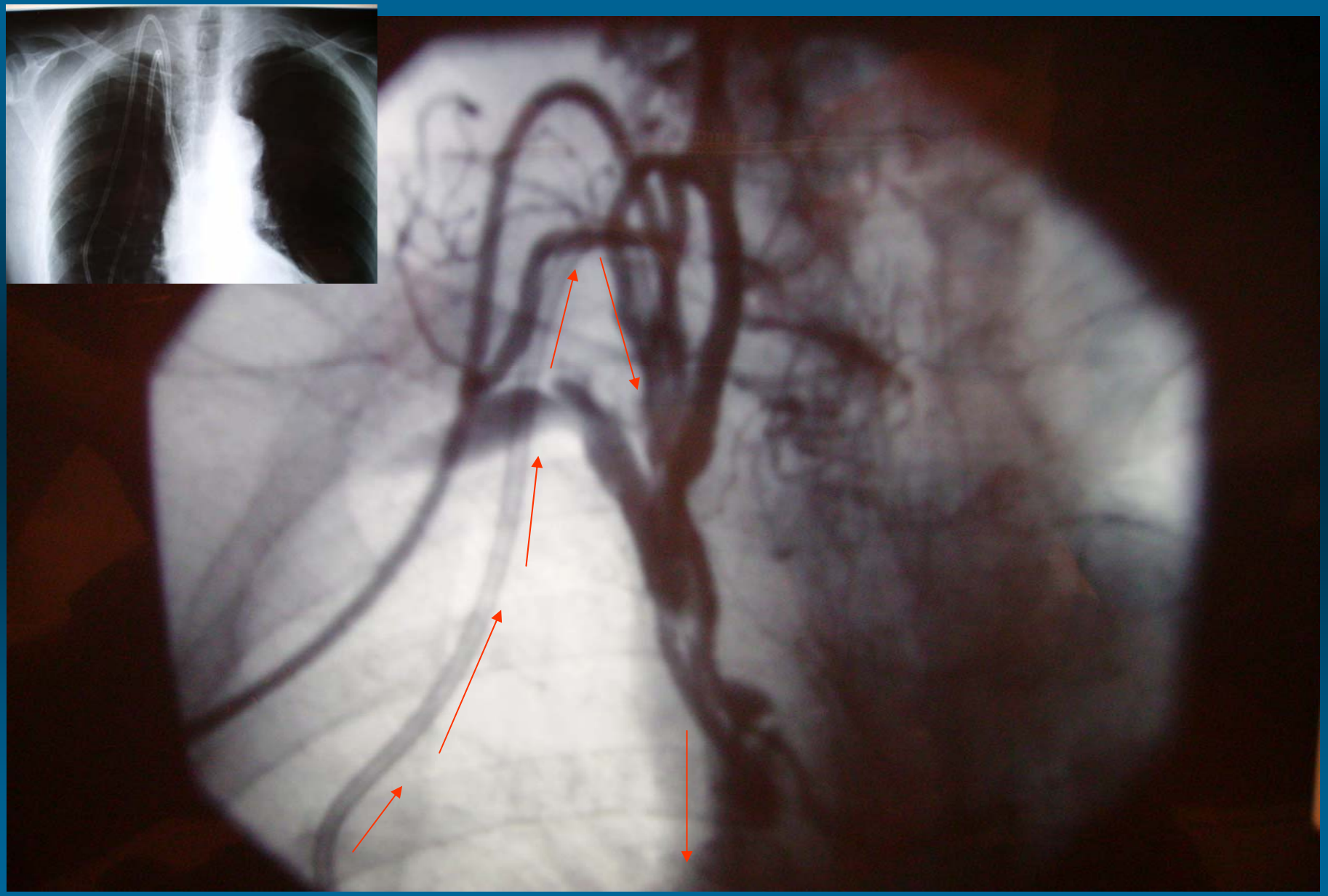
- Angioplastia
- Stent
- Cirugía (by-pass)
- Revaloración FAVI
- Trombolisis (raro)





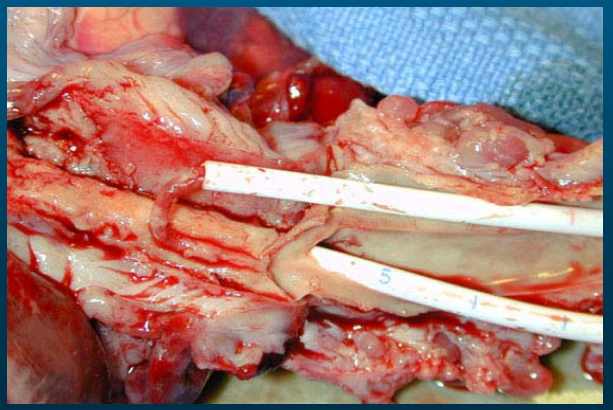
- **Exteriorización 1 vía por tromboestenosis cava superior (ver flebo siguiente diapositiva).**
- **Requirió recambio de la vía permeable por un catéter tunelizado de doble luz**





Trombosis intraluminal (1)

- CAUSAS POSIBLES
  - Cebado inadecuado
  - Eliminación deficiente restos hemáticos tras HD
- MEDIDAS ACTUACION RECOMENDADAS:
  - "Flush" post-utilización…..*
  - Heparina 5% y cebado superior en 0.1- 0.2 cc al continente **
  - Cierre con tapón y clamp de seguridad
  - Recambio con guía, fibrinolíticos
- COEXISTE frecuentemente con Vaina Fibrina
  - *Falk 2003: 24% de 226 catéteres*

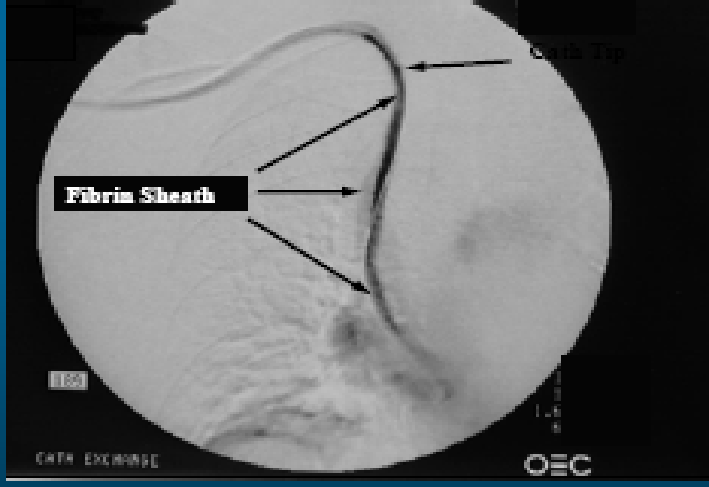


OJO a MEDIDAS ACTUACION RECOMENDADAS PARA EVITAR TROMBOSIS INTRALUMINAL:

- "Flush" post-utilización…..*
  (Aconsejo ver videos www.DuraLockC.com)

- Heparina 5% y cebado superior en 0.1- 0.2 cc al continente **
  (¡¡Peligro emigra cebado !!)

VAINA FIBRINA

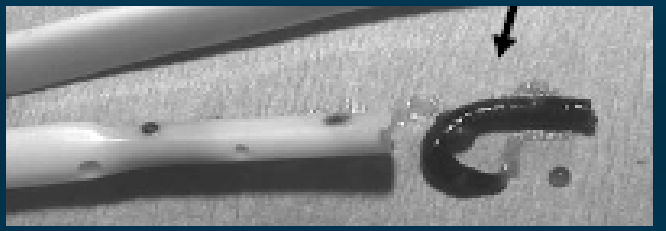


- Epitelio fibroso que ocurre en mayoría de catéteres
- Inicio a las 24-48 horas
- "Maduro": trombo organizado, colágeno, células endoteliales e inflamatorias
- Extensión posible a lo largo de TODO el catéter
- No existen actuaciones preventivas (Antiagregantes ???)
- Dificultan, incluso, la extracción del catéter
- ¿¿ CONTRIBUYE A LA FORMACION ESTENOSIS VENA???

Trombosis intraluminal (2)

F

- Urokinasa: (retirada USA)
  - Variadas estrategias (bolus 250.000 en 4 h…)
  - 70-95% de éxito inmediato
  - 60-70% latencia a los 30 días



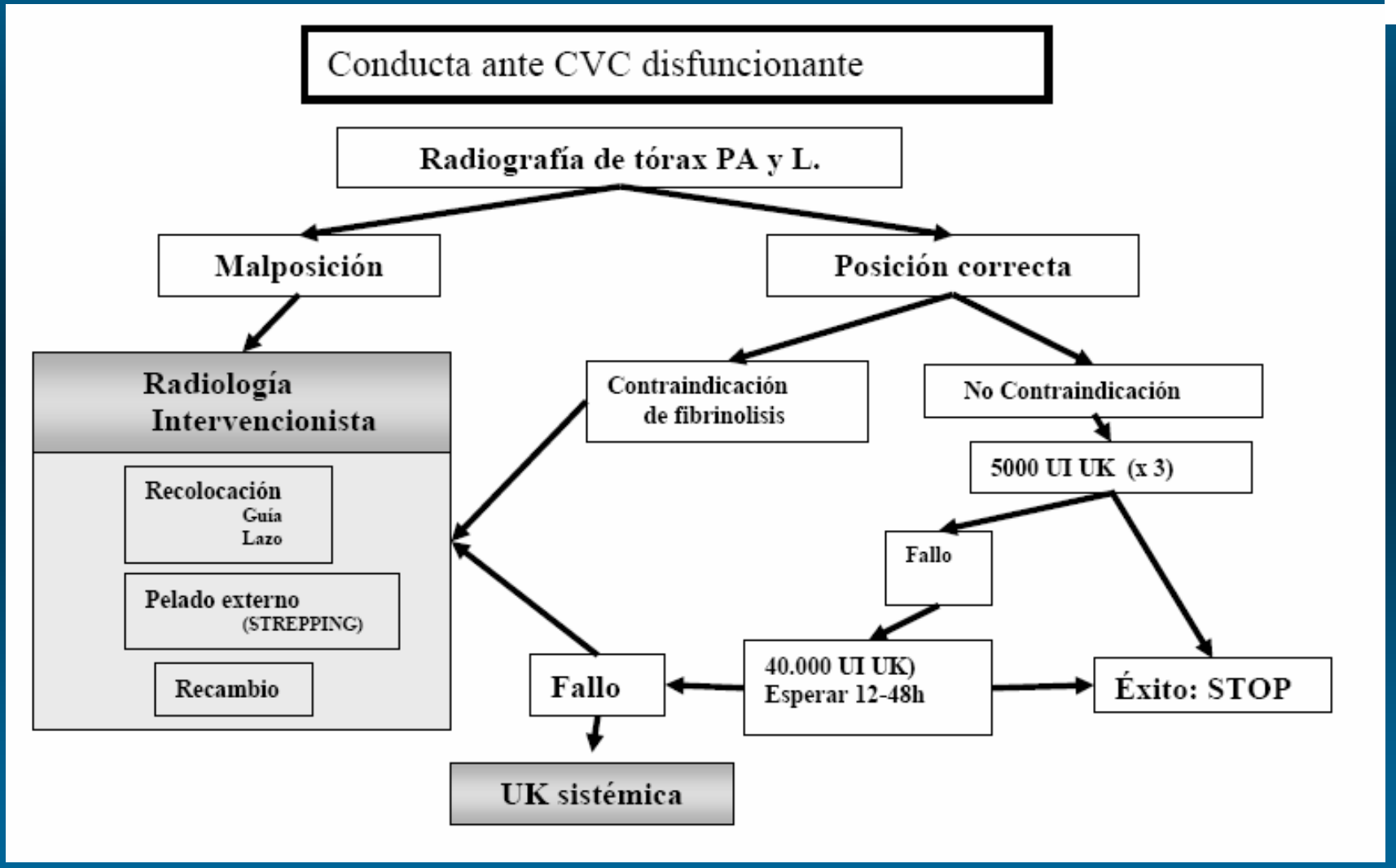
- Estreptokinasa:
  - Potencial antigénico

- Alteplase:
  - Aprobada para IAM , Embolia pulmonar y AVC isq.
  - APROBADA en España para catéteres HD
    - Coste 1 vial 2 mg: 28€
    - No está comercializada ???

Recomendaciones GUIAS SEN

Sociedad Española de Nefrología

Guías de Acceso Vascular en Hemodiálisis



ANEXO 4

PROTOCOLO DE ADMINISTRACION DE FACTOR ACTIVADOR DE PLASMINOGENO.

PREPARACION

1.- Viales de 50 mg.

2.- Reconstruir el enzima en 25 ml, a una concentración de 2 mg/ml.

3.- Preparar alícuotas de 1 ml y conservar a temperatura de -70ºC.

4.- Usar inmediatamente tras la descongelación.

TECNICA DE USO

1.- Aspirar la luz para extraer la heparina.

2.- Inyectar 1 ml (2 mg) en la luz ocluida.

3.- Llenar el remanente con salino.

4.- Esperar 15 min e inyectar 0,3 ml de salino para movilizar el enzima.

5.- Repetir la misma acción tras otros 15 min.

6.- Tras esperar 15 min aspirar el contenido del catéter.

7.- Si tras esta maniobra no se restablece el flujo, se puede repetir de nuevo.

8.- Si no resulta eficaz, es preferible cambiar el catéter.

Sociedad Española de Nefrología

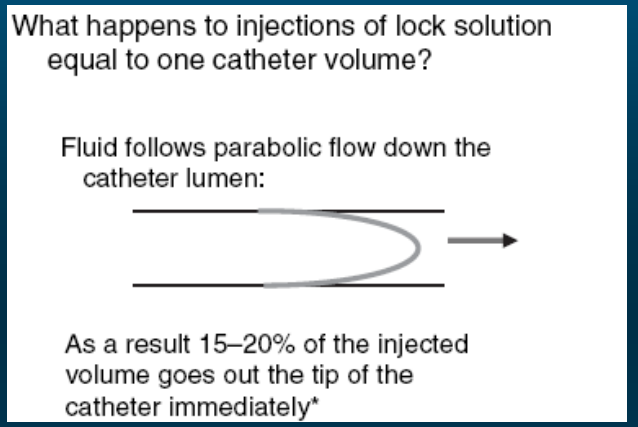
Guías de Acceso Vascular en Hemodiálisis

¿Cuántas veces debe usarse??

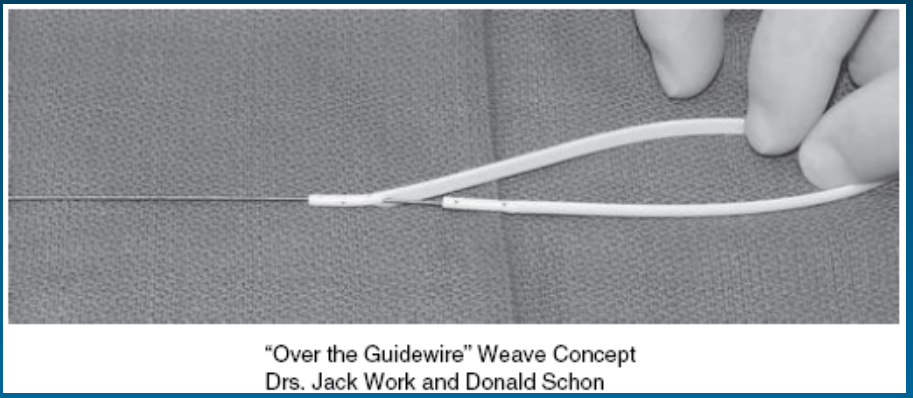
- **2-3 semanas ?**

Tratamiento disfunciones tardías

- Inversión líneas HD
- Actuación “mecánica”:
  - Guía metálica, jeringas, cambios posicionales…
- Trombolisis intraluminal

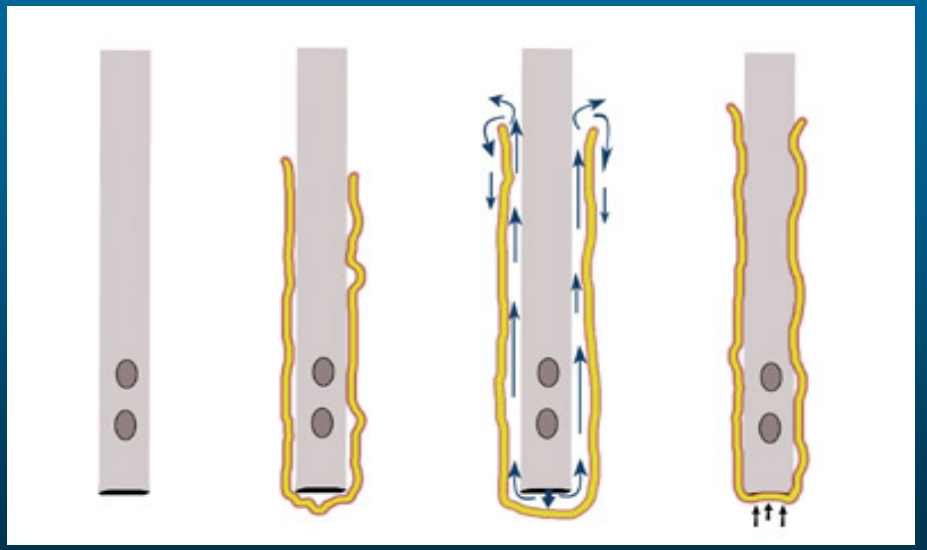


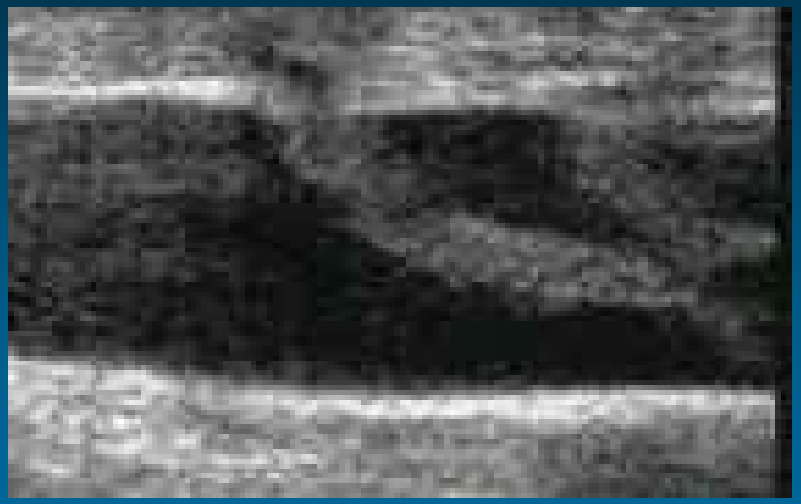
- A largo plazo:
  - Stripping radiológico
  - Recambio catéter

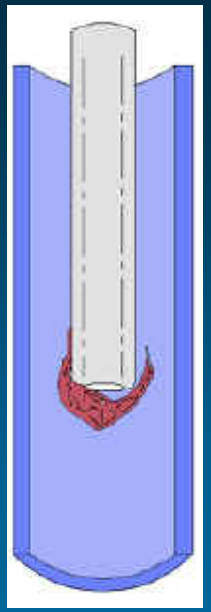


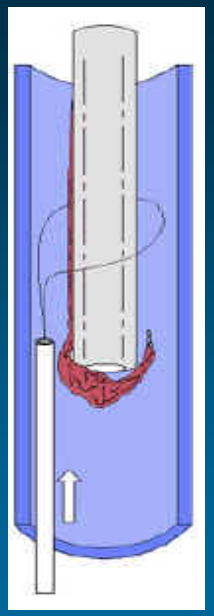
Complications Associated with Instrumentation of the Fibrin Sheath

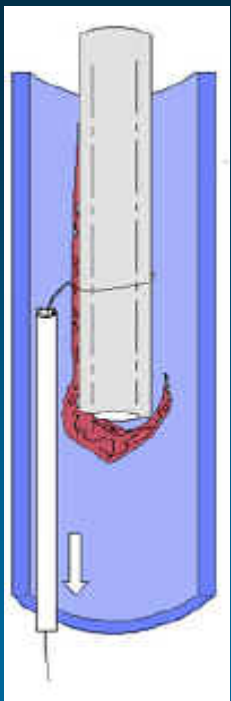
- Fibrin Sheath Stripping
  - Femoral vein hematoma / thrombus formation at puncture site
  - Pulmonary Embolus
  - Precipitate thrombosis of central vein if incomplete stripping
- Disruption of Fibrin Sheath
  - Pulmonary Embolus
  - Air Embolus
  - Dilation of venotomy site
  - Central vein trauma
- Risks associated with conscious sedation

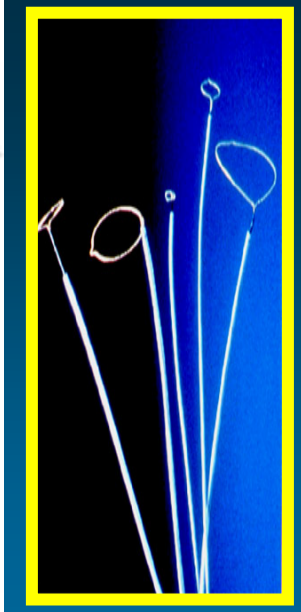












RECAMBIO CATETER 1

Ventajas:

- **Preservar lugar venotomía**
- **Es seguro**
- **Económico vs stripping**
- **Porcentaje éxito > 90%**
- **Mantiene indice infección**

Infección orificio salida catéter yugular derecho.
(Split-Stream @, 1 vía , 2 luces , con cuff.

RECAMBIO CATETER 2

- Localizamos y liberamos cuff en área sin infección
- Introducimos 1 guía vascular
- A su través introducimos las dos luces del nuevo catéter sin precisar dilatador

RECAMBIO CATETER 3

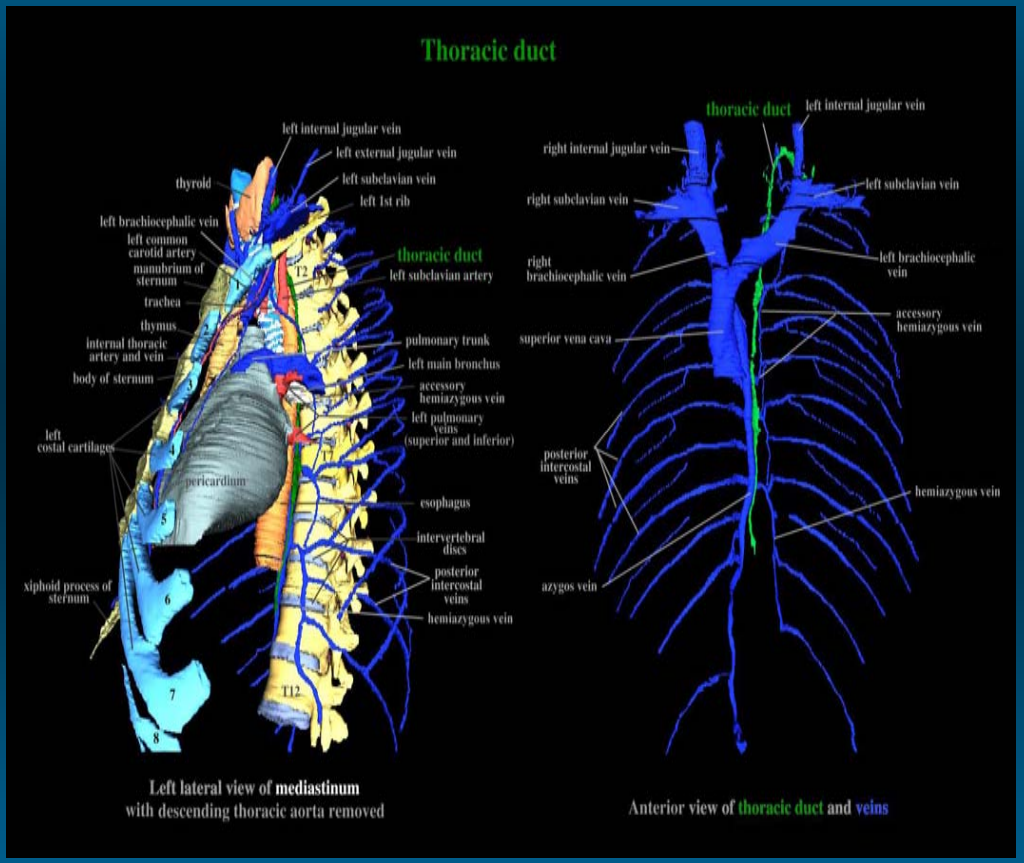
Recambiado por catéter nuevo

RECAMBIO CATETER 4

Retunelizado hacia zona sin infección

Otras complicaciones

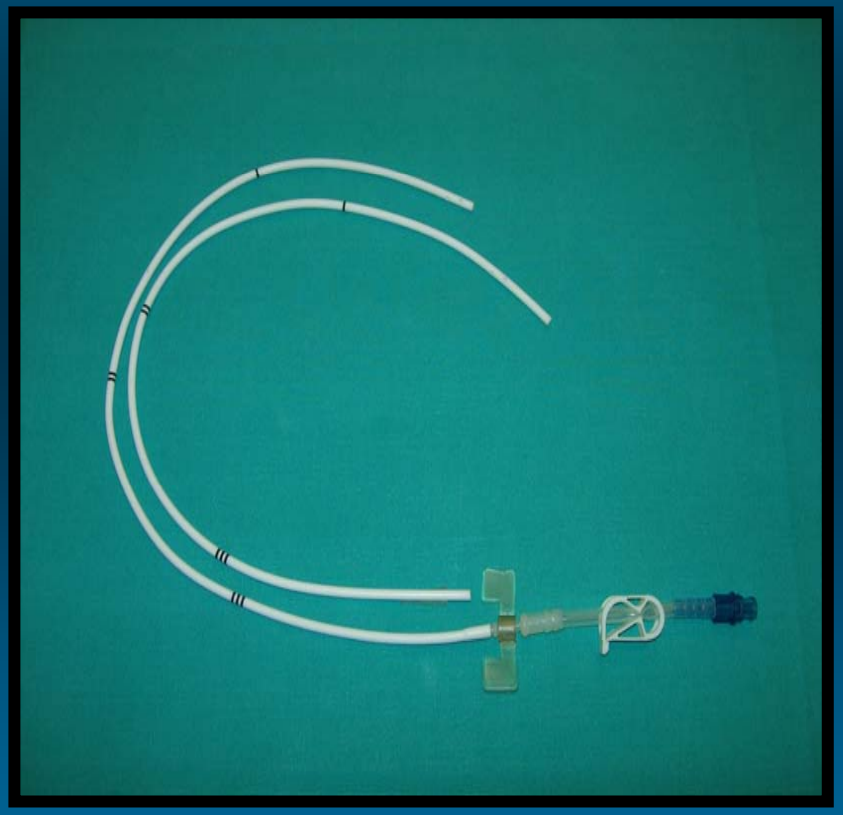
- **Extracción accidental**
- **Desconexión, fisura, ruptura**
- **Hematoma retroperitoneal**
- **Síndrome Budd-Chiari**
- **Ulceraciones piel, deterioro material…**
- **Emigración a red vascular**
- **Atrapamiento Catéter**



Extracciones accidentales C.Tunelizados Canaud en últimos años en nuestra serie

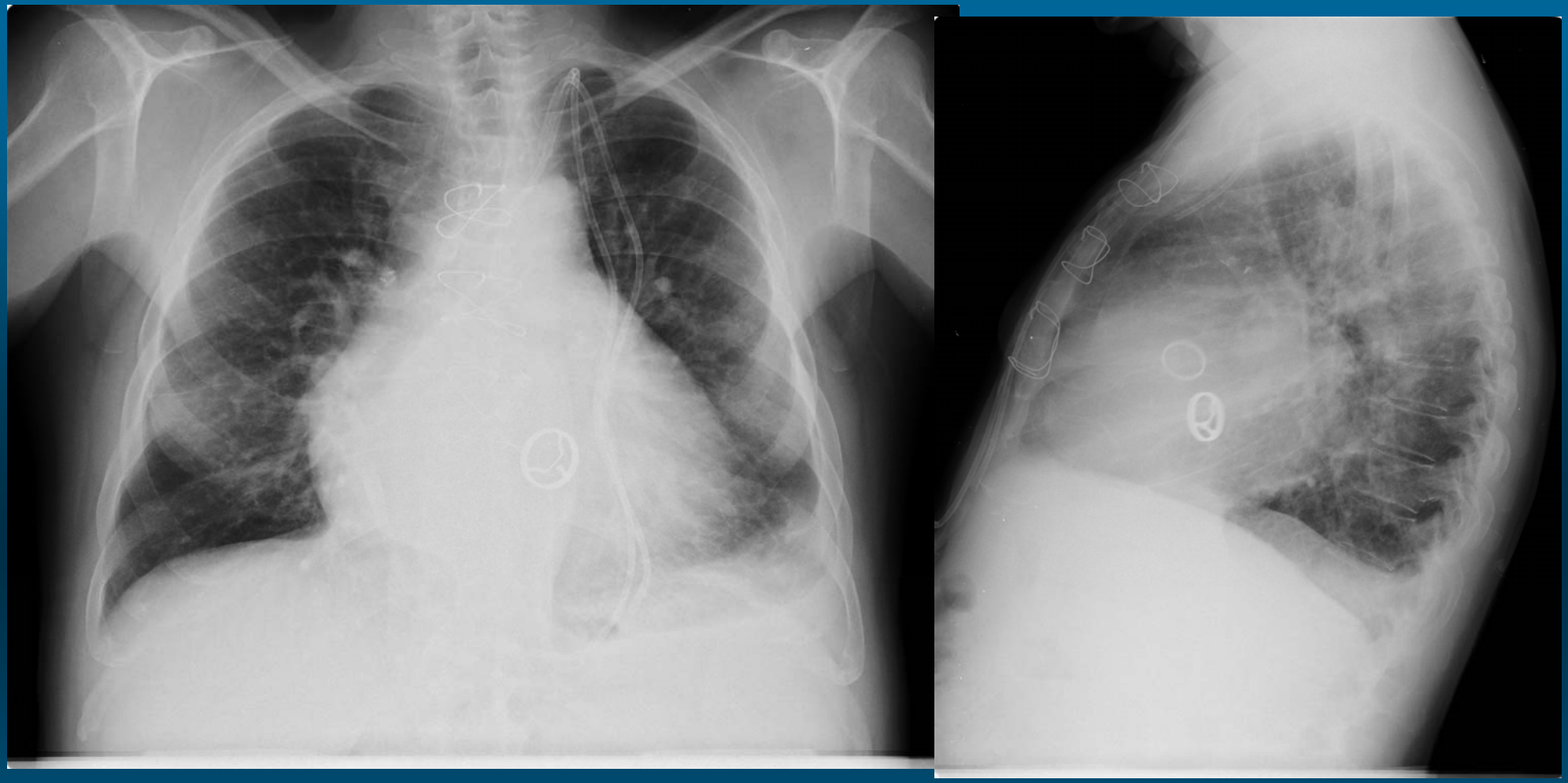
2002	6
2003	5
2004	4
2005	5
2006	5
2007	14
2008	12

CATÉTER CANAUD



Motivos extracciones accidentales de este modelo:

- No cuff
- No sujeción adecuada puntos externos
- Deterioro conexiones externas tras años de permanencia.
- Trombo-estenosis venas centrales
- Personal sanitario de menos experiencia.



Paciente con catéter casi exteriorizado que se logró reintroducir con maniobra manual simple y posterior recambio con guía vascular sin perder los puntos de entrada yugular I

Otras complicaciones

- **Extracción accidental**
- **Desconexión, fisura, ruptura**
- **Hematoma retroperitoneal**
- **Síndrome Budd-Chiari**
- **Ulceraciones piel, deterioro material…**
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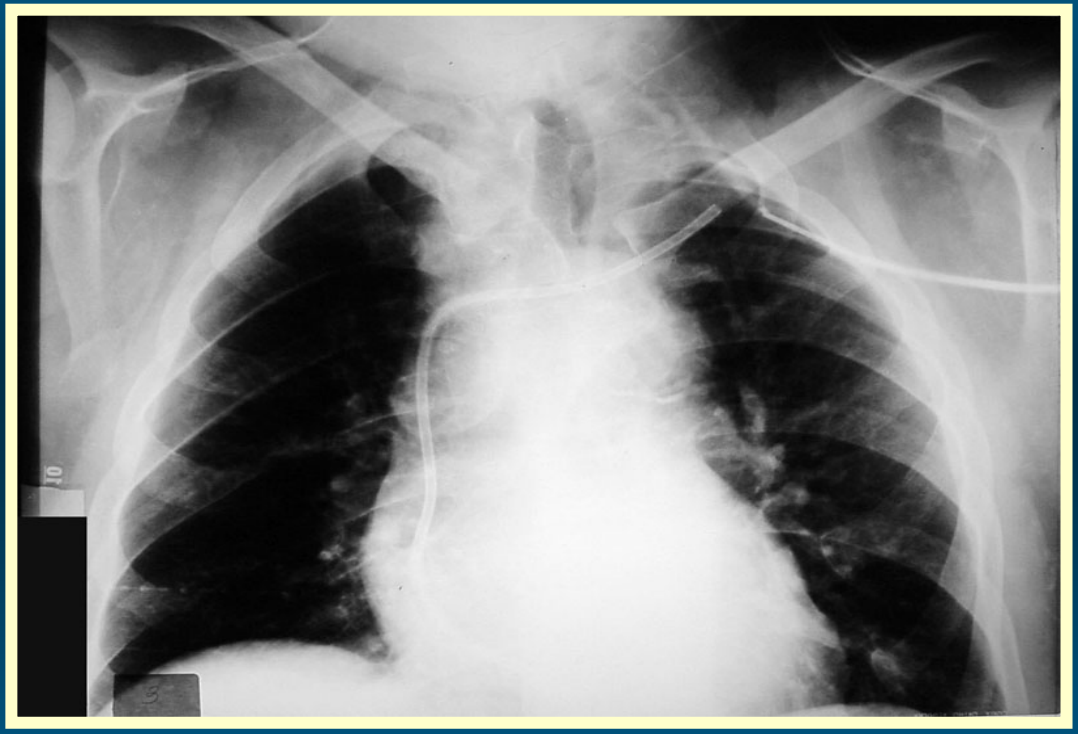
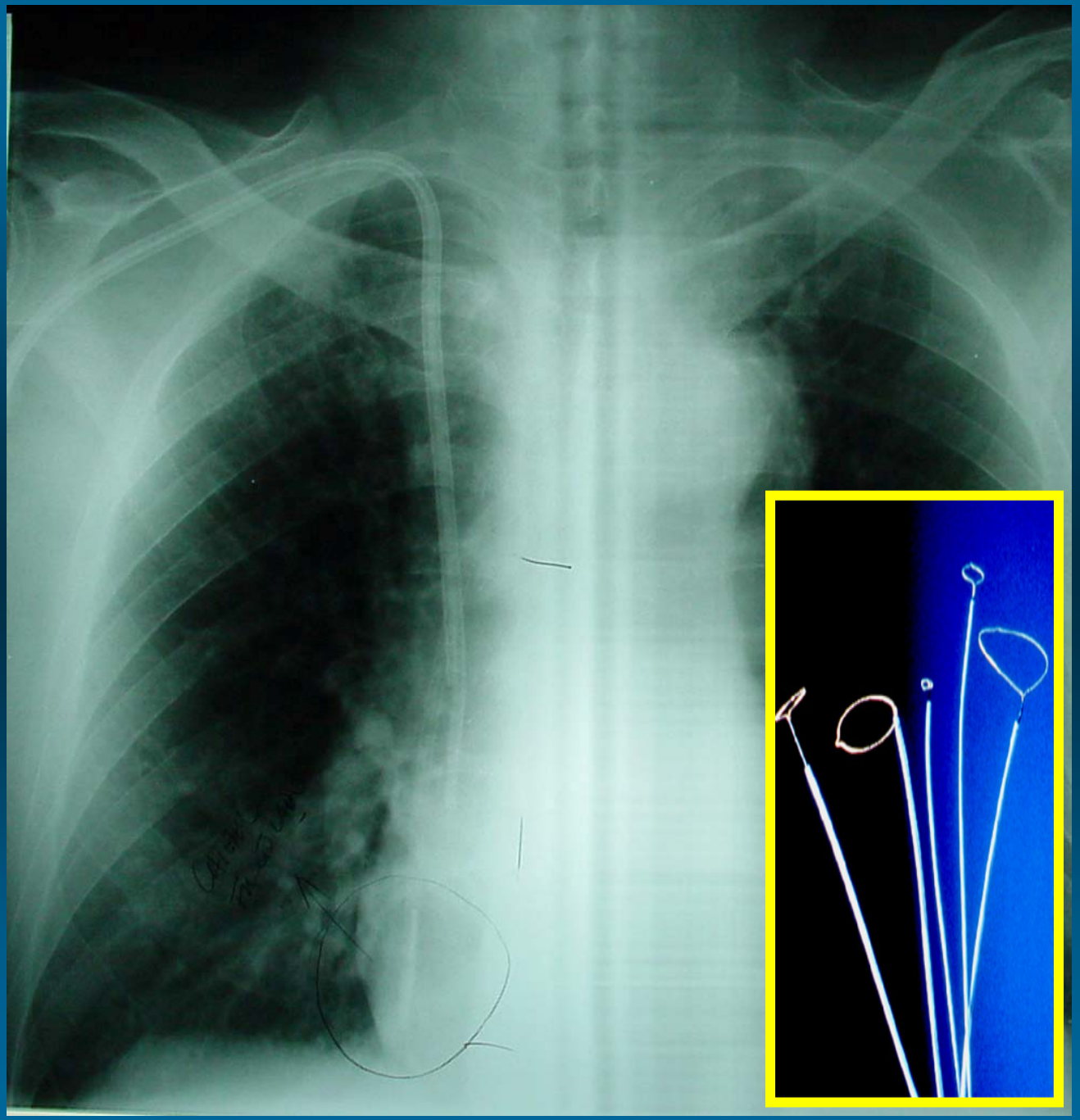




•Paciente que acude por extracción “accidental” catéter no tunelizado.

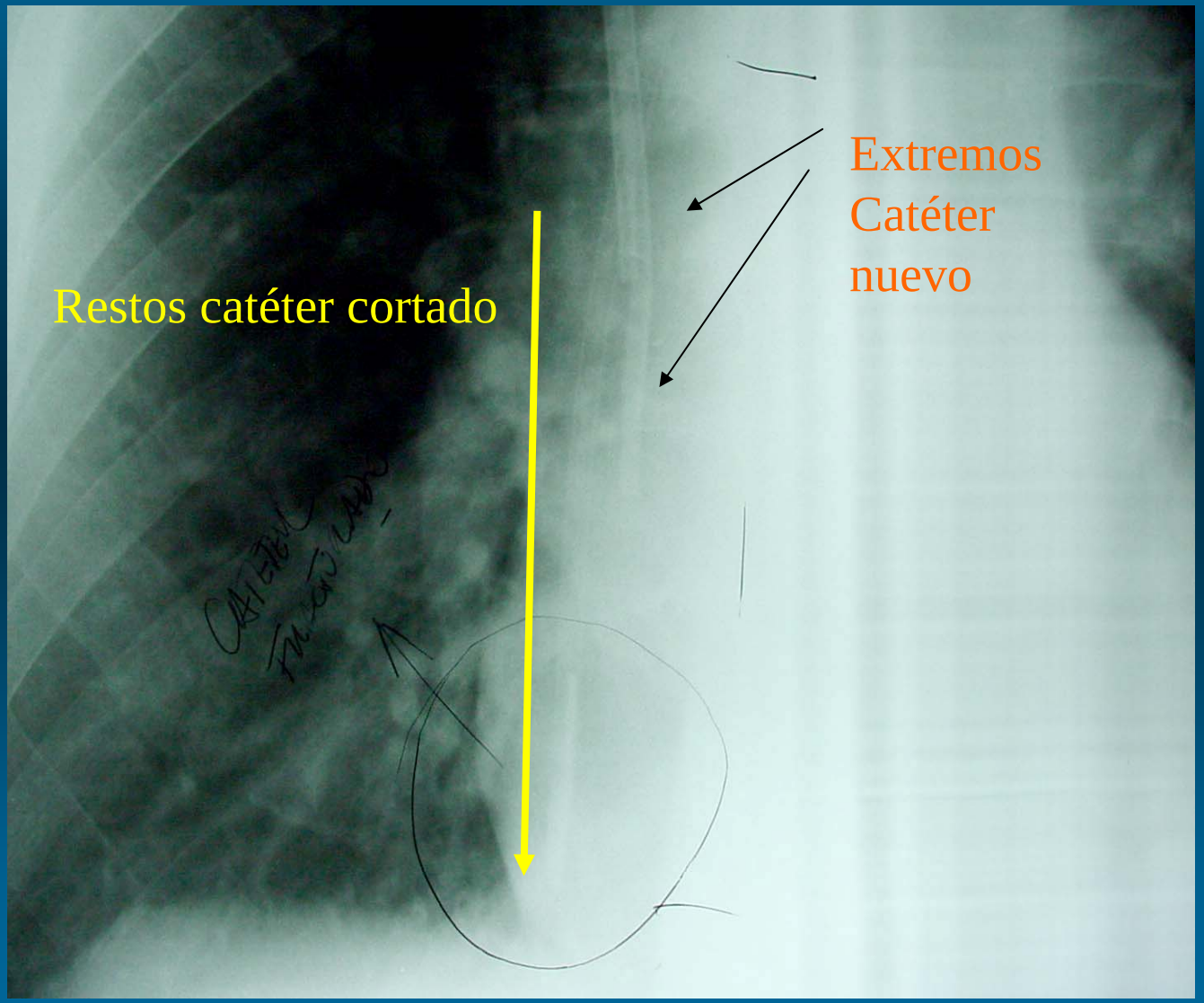
•Se coloca catéter tunelizado con cuff

•En la comprobación RX se aprecian 3 luces distales ???

•Reinterrogado el paciente, admite haber cortado el catéter previo

•Extracción del resto catéter a través de vena femoral con guías especiales

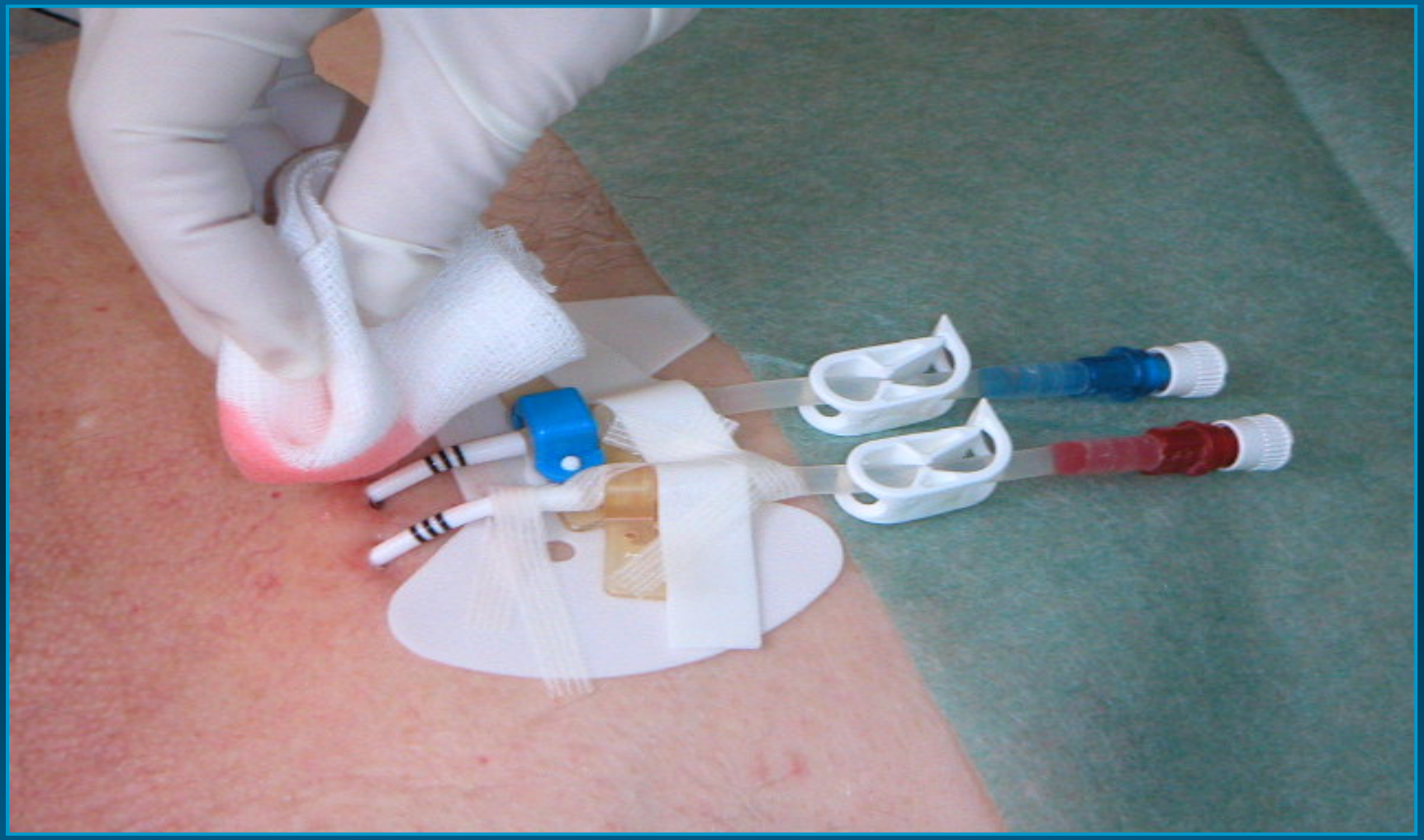
Caso anterior: Ampliación imagen



Otras complicaciones

- Extracción accidental
- Desconexión, fisura, ruptura
- Hematoma retroperitoneal
- Síndrome Budd-Chiari
- Ulceraciones piel, deterioro material…
- Emigración a red vascular
- Atrapamiento catéter

Material	Incompatible chemicals
Polyurethane	Alcohols including isopropyl alcohol and ointments containing polyethylene glycol (PEG) such as mupirocin ointment and crème and povidone–iodine ointment. Povidone–iodine solution is OK. Possible deterioration with chlorhexidine
Silicone	Tincture of Iodine. Potential degradation by povidone–iodine solution over long times. Degradation in some patients with ointments
Carbothane	None known



IMPORTANTE : Conocer información producto

MEDCOMP
1499 Delp Drive
Harleysville, PA 19438, USA
Telephone: 215-256-4201
Fax: 215-256-9191

COMPATIBILITY OF PRODUCTS WITH SITE-CARE AGENTS

This chart indicates the compatibility of our products with commonly used site care formulations. It is neither an all inclusive nor exclusionary listing.

Catheter Name	Material	Chlorhexidine Gluconate 2% and 4%	Iodines	70/30% alcohol	Hydrogen Peroxide	Antimicrobial Ointments and Creams (Mupirocin, Polymyxin)	Silver sulfadiazene cream 1%	<0.057% sodium hypochlorite
Duo-Flow	Polyurethane	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Soft-Line	Polyurethane	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Femoral	Polyurethane	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Subclavian	Polyurethane	Yes	Yes	Yes	Yes	Yes	Yes	Yes
C.A.V.H	Polypropylene	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Split Cath (Ash)	Polyurethane	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Split Stream	Polyurethane	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bioflex Tesio	Polyurethane	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tesio	Silicone	Yes	**No**	Yes	**No**	Yes	Yes	**No**
Ultra-Flow	Polyurethane	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hemo-Flow	Polyurethane	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hemo-Cath	Silicone	Yes	**No**	Yes	**No**	Yes	Yes	**No**
Peritoneal	Silicone	Yes	**No**	Yes	**No**	Yes	Yes	**No**
Vascu PICC	Silicone	Yes	**No**	Yes	**No**	Yes	Yes	**No**
Bio-Cath	Silicone	Yes	**No**	Yes	**No**	Yes	Yes	**No**
Vascu PICC	Polyurethane	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Multi-Cath	Polyurethane	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tri-Flow	Polyurethane	Yes	Yes	Yes	Yes	Yes	Yes	Yes

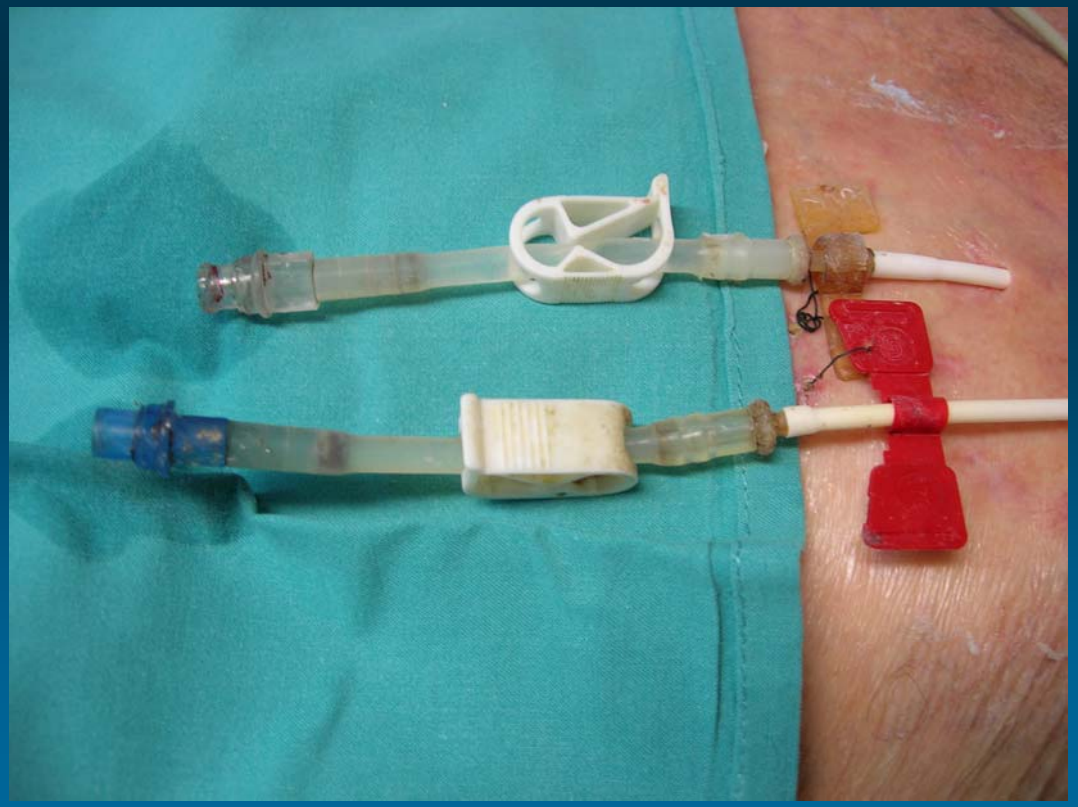
Please contact the Compliance Department with any specific questions concerning site care compatibility.

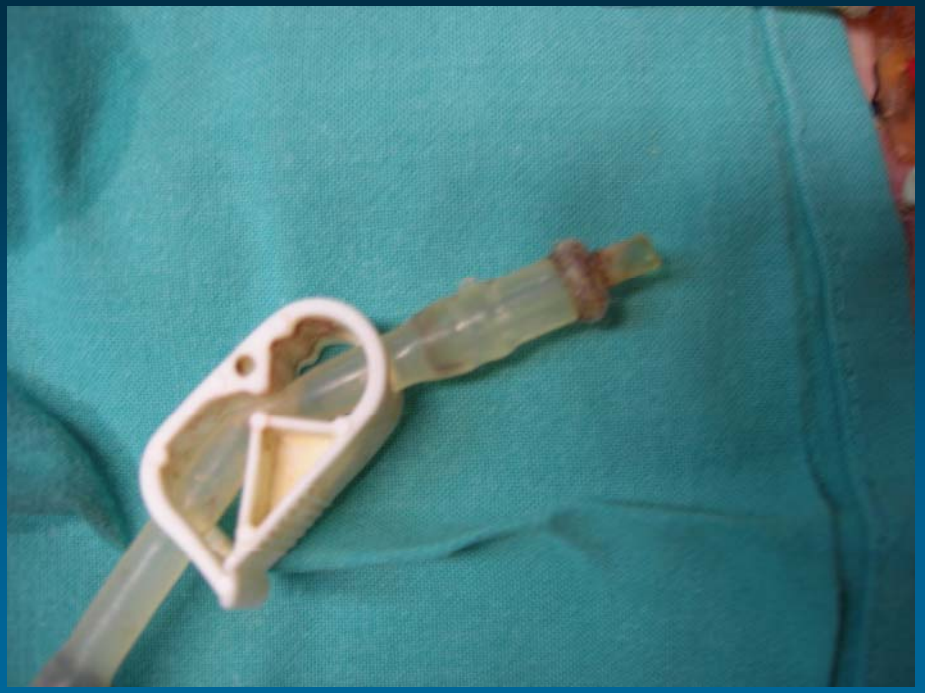
CR #7922

PN 40120 (Rev. C 4/04)

EVITAR DETERIORO CONEXIONES DISTALES:

- Aplicar productos limpieza y desinfección adecuados
- Existen “Kits” de reparación de diversos modelos
- Personal instruído





Psoriasis

Carcinoma basocelular

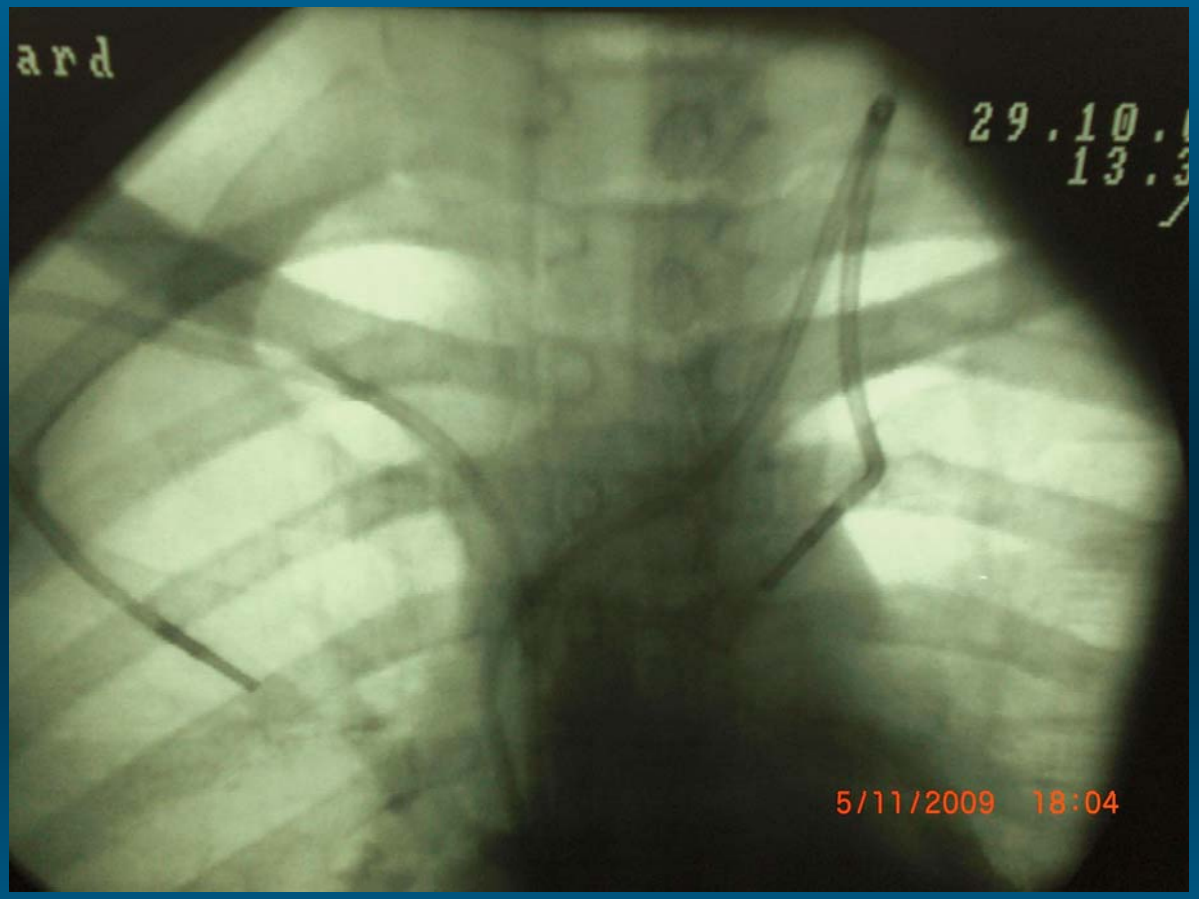
Otras complicaciones

- Extracción accidental
- Desconexión, fisura, ruptura
- Hematoma retroperitoneal
- Síndrome Budd-Chiari
- Ulceraciones piel, deterioro material…
- Emigración a red vascular
- **Atrapamiento catéter**

Catéter de 5 años permanencia

- Tunelitis de una vía.
- Se plantea recambio
- Al intentar extraer por punto inserción yugular, fragmentación del catéter por atrapamiento intravascular
- Obliga a retirada por vía femoral

1b



Catéter de 5 años permanencia
(caso previo)

•No es posible acceder por las vías yugulares

•Colocación de una segunda vía a través de subclavia derecha.

•Extremidades superiores agotadas para FAV autólogas.

Complicaciones CEBADO

POST DIALYSIS

1. To maintain patency between treatments a heparin lock must be created in each lumen of the catheter.
2. Inject 5000 units of heparin per mL. of saline (or a concentration approved by your institution) into each lumen in amounts equal to the priming volume of each lumen. To ensure that each lumen is totally filled, inject quickly and clamp extension while under positive pressure. Attach a sterile cap to each clamping extension.
WARNING: The heparin solution must be aspirated out of both lumens immediately prior to using the catheter to prevent systemic heparinization of the patient.

Nephrol Dial Transplant (2001) 16: 2072–2074

Technical Note

Risk of heparin lock-related bleeding when using indwelling venous catheter in haemodialysis

Hüseyin Karaaslan, Pierre Peyronnet, Daniel Benevent, Christian Lagarde, Michel Rince and Claude Leroux-Robert

Service de Néphrologie, CHU Dupuytren, Avenue Martin Luther King, Limoges, France

Nephrol Dial Transplant (2007) 22: 471–476
doi:10.1093/ndt/gfl606
Advance Access publication 25 October 2006

Original Article

Sodium citrate 4% locking solution for central venous dialysis catheters—an effective, more cost-efficient alternative to heparin

Linda Grudzinski[1], Patricia Quinan[1], Sophie Kwok[1] and Andreas Pierratos[1,2]

[1]Department of Nephrology, Humber River Regional Hospital and [2]Department of Medicine, University of Toronto, Toronto, Ontario, Canada

OJO PRE Y POST CIRUGIAS

Technical Note

Transplantat

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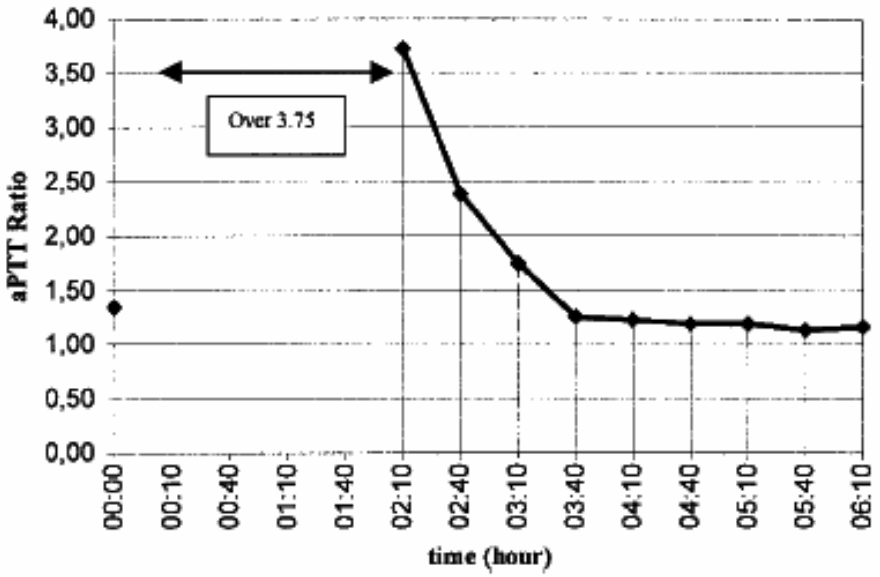

Fig. 1. aPTT changes after a 2 ml heparin locking over a 6-h period in one patient.

Table 2. Estimated volumes of arterial and venous catheters and the aPTT ratio before and after heparin locking according to estimated volumes

Patients	Arterial lumen volume (ml)	Venous lumen volume (ml)	aPTT* ratio before heparin locking	aPTT* ratio after heparin locking
1	1.2	1.2	2.17	3.09
2	1.2	1.2	0.96	2.88
3	ND	ND	ND	ND
4	1.2	1.2	1.52	2.55
5	1.3	1.2	1.82	3.26
6	1.2	1.5	1.40	2.58
7	1.1	1.3	1.29	1.68
8	1.4	1.5	1.20	1.36
9	1.2	1.4	1.05	1.08
10	1.3	1.1	1.39	2.51
11	1.1	1.3	1.46	3.49
12	1.4	1.4	1.36	2.20
13	1.1	1.2	1.20	1.44
14	1.1	1.2	1.34	2.18
15	1.3	1.2	1.24	3.17
16	1.0	1.2	1.06	1.89
17	1.4	1.4	1.67	> 3.75
18	1.1	1.2	0.94	2.99
19	1.1	1.0	1.46	2.05
20	1.3	1.2	1.76	3.21

*aPTT is expressed as the ratio of the patient's activated partial thromboplastin time (aPTT) to the mean control aPTT.
ND, not done.

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NDT
Nephrology Dialysis Transplantation

Sodium citrate 4% locking solution for central venous dialysis catheters—an effective, more cost-efficient alternative to heparin

Linda Grudzinski[1], Patricia Quinan[1], Sophie Kwok[1] and Andreas Pierratos[1,2]

[1]Department of Nephrology, Humber River Regional Hospital and [2]Department of Medicine, University of Toronto, Toronto, Ontario, Canada

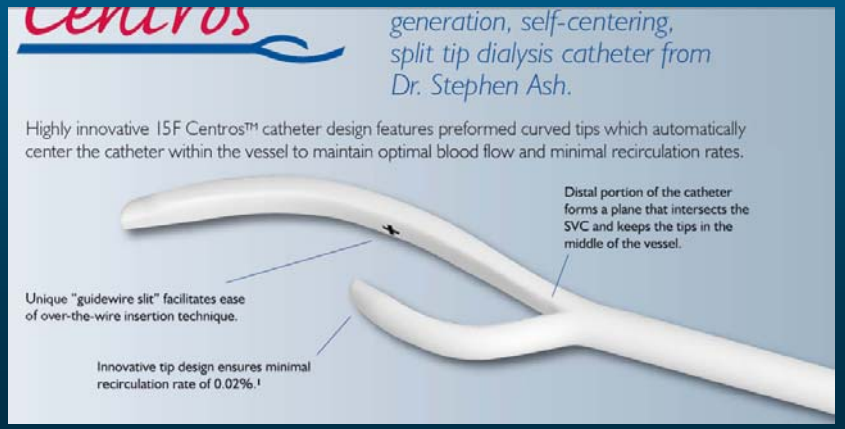
Table 3. Rates of catheter exchange, bacteraemia and rt-PA treatments during the heparin and citrate years

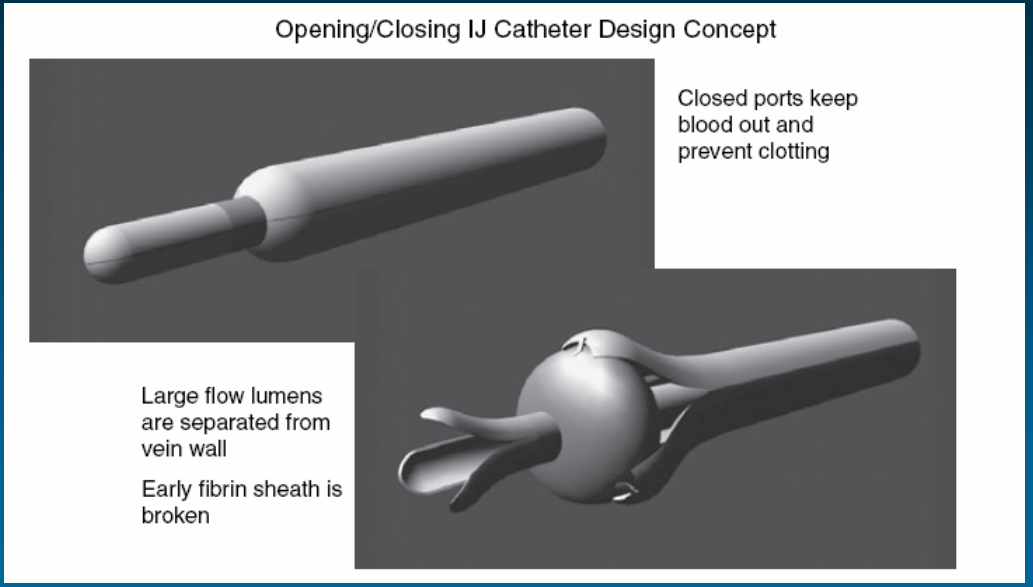
Parameter	Heparin		Citrate		*P*
	No	No/1000 catheter days	No	No/1000 catheter days	
Catheter exchanges	56	1.81	70	1.88	0.89
Treatments with rt-PA*	127	4.10	120	3.23	0.07
Bacteraemias	24	0.77	35	0.94	0.36

- Estudio retrospectivo
- 3 años experiencia Citrato 4%
- Coste 1/6 inferior a heparina
- Eficacia similar Heparina
- Evita riesgo heparinización sistémica

Problemas futuros ??

- Nuevos catéteres
- Localizaciones “exóticas”:
  - Cava inferior
  - Intracardíaca
  - Transhepática
  - Intra-arterial
  - A través de Areas trombosadas…
- Punciones femorales repetidas diarias para HD





Nephrol Dial Transplant (1999) 14: 2015–2016

Nephrology Dialysis Transplantation

Case Report

Successful prolonged use of an intracardiac catheter for dialysis

Olivier Chavanon[1], Jocelyne Maurizi-Balzan[2], Nicolas Chavanis[1], Bertrand Morel[2] and Dominique Blin[1]

[1]Department of Cardiac Surgery, and [2]Nephrology, Grenoble University Hospital, Grenoble, France

Case

A 43-year-old patient, treated with haemodialysis since the age of 36 for chronic renal failure due to diabetes mellitus, and with a history of uraemic pericarditis for the past 3 years was followed because of progressive constrictive pericarditis. He had recurrent infection of the permanent vascular catheters due to *Staphycoccus aureus* chronic cutaneous infection. *Staphylococcus aureus* and *Escherichia coli* bacteriaemia frequently occurred with thrombosis of the catheters (Table 1).

Table 1. Chronology of vascular access

Date	Access	Used for	Events
91/09	Peritoneal dialysis	14 months	Adhesion
92/11	R Internal Jug DL Canaud	11 months	Infection
92/11	FAV Radio-Radiale Droite	9 months	Thrombosis on venous stenosis
93/10	R Femoral Shaldon	14 days	
93/10	L Internal Jug DL Canaud	7 months	
94/06	R Femoral Shaldon		Temporary measure
94/06	R Sub-claviar DL Canaud	6 months	Infection
95/01	R Femoral Shaldon	3 days	Temporary measure
95/01	L Internal Jug DL Canaud	11 months	Infection
95/12	R Femoral DL Canaud	4 months	Thrombosis of R femoral vein
96/02	Intracardiac DL Canaud Sternotomy	4 months	Infection
96/06	R Femoral ML Canaud	11 months	Thrombosis
97/05	Intracardiac ML Canaud Subxiphoid approach	3 months	Not sufficient dialysis
97/08	Intracardiac Hémo-cath® R thoracotomy	12 months	Infection (97/12) Rupture
98/08	L Femoral Shaldon	10 days	For acute dialysis
98/08	L Femoral ML Canaud	1 month	Removed because intracardiac patent
98/09	Intracardiac Hémo-cath® (guidewire)	15 days	Infection
98/09	L Femoral Shaldon		Removed because transplantation
98/10	Kidney Transplantation		

AVF: arterio-venous fistula; DL: dual-lumen; ML: mono-lumen; R: right; L: left.

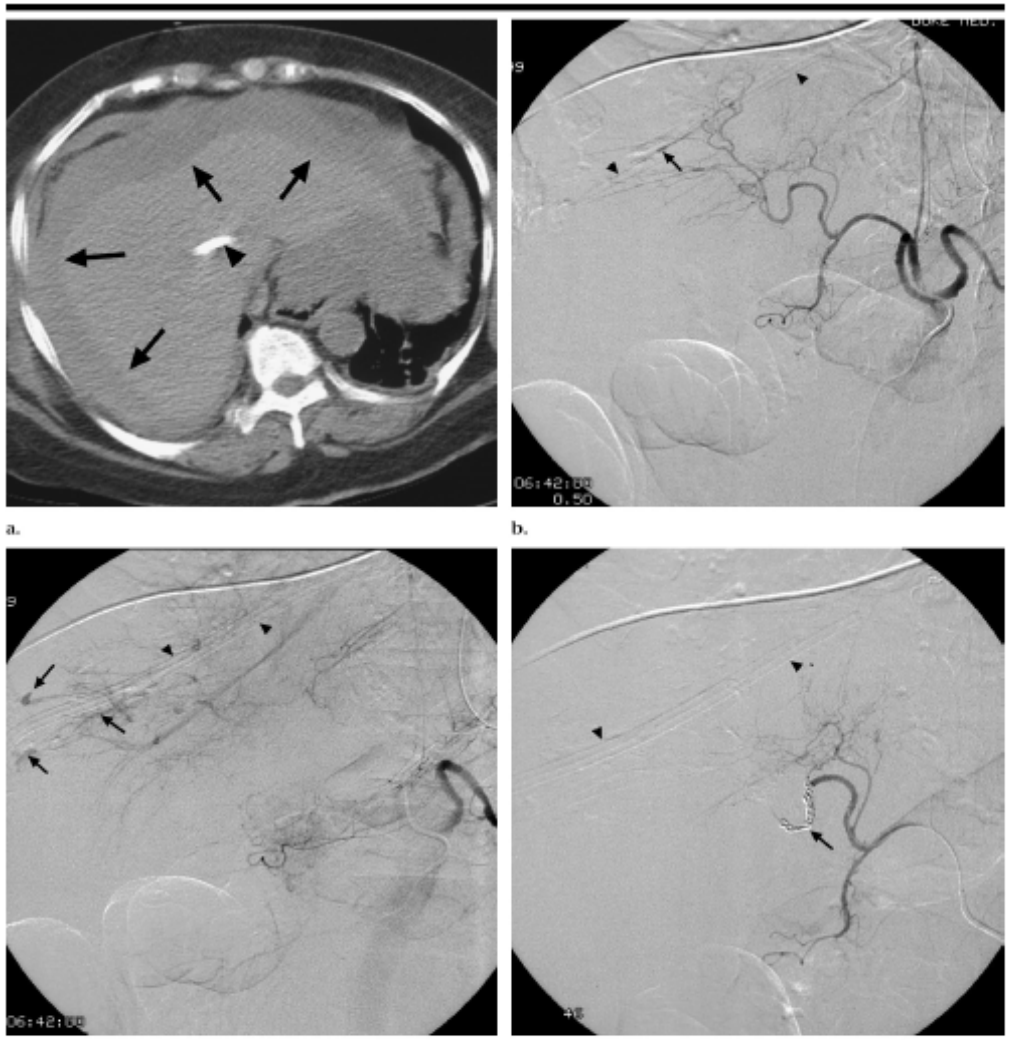
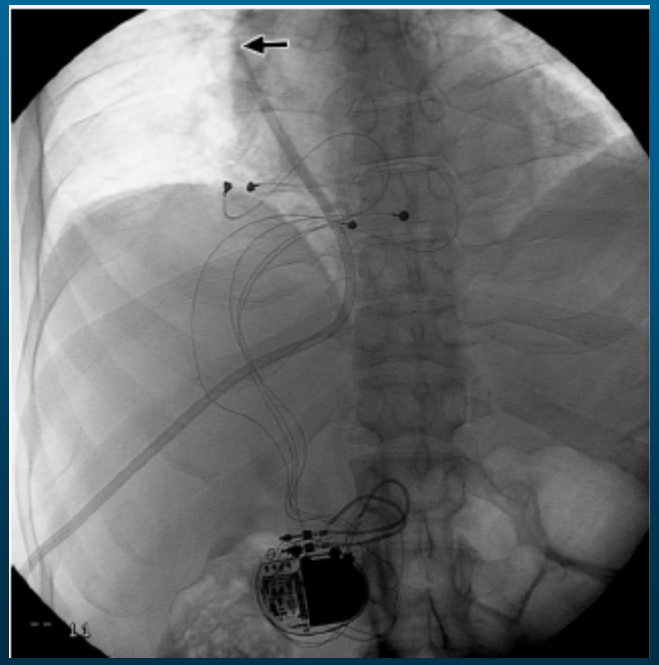


Figure 3. Images in a 66-year-old woman with hypertension-induced renal failure who underwent transhepatic dialysis catheter placement because of no remaining peripheral access sites. (a) Transverse CT scan obtained approximately 7 hours after catheter placement demonstrates massive intraperitoneal hemorrhage (arrows). A portion of the transhepatic catheter is visualized (arrowhead). (b) Frontal view of the early phase of a selective hepatic arteriogram. The transhepatic catheter is seen as a subtraction artifact (arrowheads). Early extravasation (arrow) is visualized along the catheter from branches of the right hepatic artery. (c) Frontal view of a later phase of a selective hepatic arteriogram. The dialysis catheter (arrowheads) is again seen as a subtraction artifact. Contrast material extravasation (arrows) along the course of the catheter, which indicates bleeding, is better visualized on this image. (d) Frontal view of a selective hepatic arteriogram obtained after embolization of the right hepatic artery with coils (arrow). No contrast material extravasation is visualized along the catheter course (arrowheads). Despite intensive medical therapy, the patient died the following day.



Vascular and Interventional Radiology

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Transhepatic Catheter Access for Hemodialysis[1]

PURPOSE: To retrospectively review the authors' experience regarding the safety and functionality of transhepatic hemodialysis catheters.

MATERIALS AND METHODS: Sixteen patients (seven men and nine women aged 21–77 years; mean age, 51.6 years) underwent placement of 21 transhepatic hemodialysis catheters. Transhepatic catheters were placed in the absence of an available peripheral venous site (11 patients) or for preservation of a single remaining venous site to achieve permanent vascular access. Safety was assessed by means of complications encountered, and catheter functionality was assessed by means of total access site service interval. Catheter patency was described by using a Kaplan-Meier survival curve, and number of catheter days were compared according to patient sex by using a two-sample *t* test.

Nephrol Dial Transplant (2003) 18: 830–832
DOI: 10.1093/ndt/gfg025

Nephrology
Dialysis
Transplantation

Case Report

Use of an intra-aortic Tesio catheter as vascular access for haemodialysis

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Fig. 1. Superior vena cava phlebography showing extended thrombosis of the superior vena cava circle with multiple collateral veins in the thoracic region.

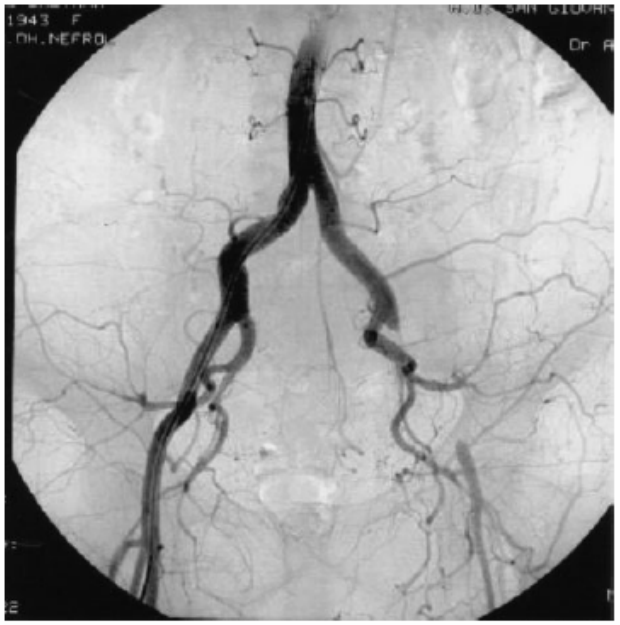

Fig. 3. Angiography after 6 months through the aortic Tesio catheter: no thrombotic complications and no stenosis of aorta or right femoral-iliac artery axis were observed. A thrombosis of the external left iliac artery, caused by repeated arterial puncture to allow HD before Tesio catheter implantation, is visualized.

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NDT
Nephrology Dialysis Transplantation

Case Report

Iliac cuffed tunnelled catheters for chronic haemodialysis vascular access

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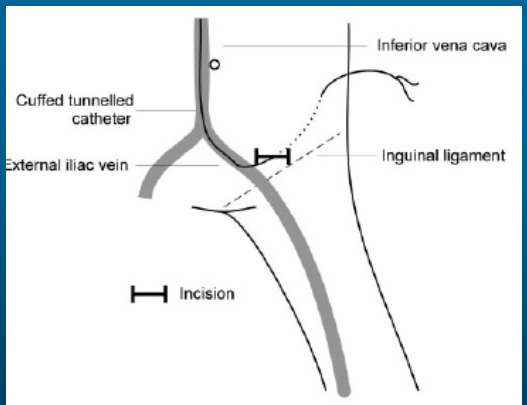
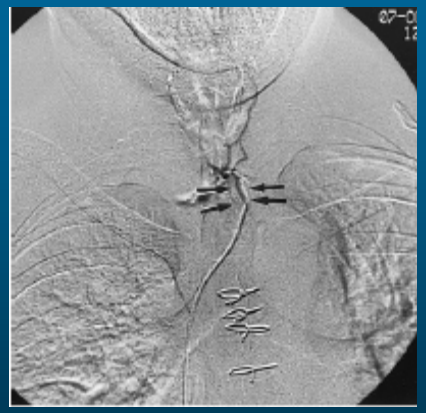
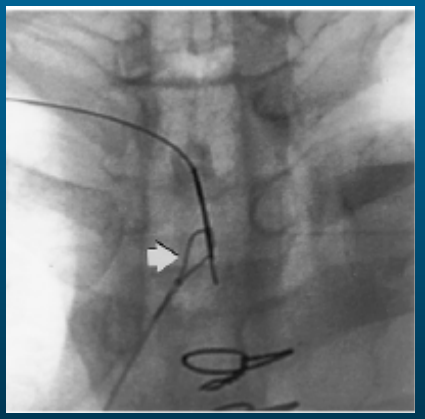


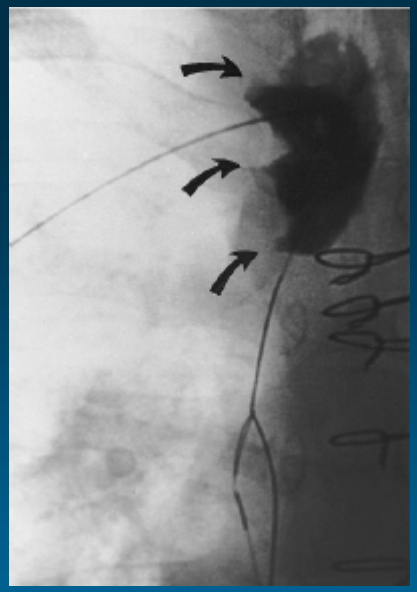
Fig. 2. Schematic diagram depicting the placement of a cuffed tunnelled catheter in the left external iliac vein. One incision is necessary to facilitate tunnelling of the catheter.

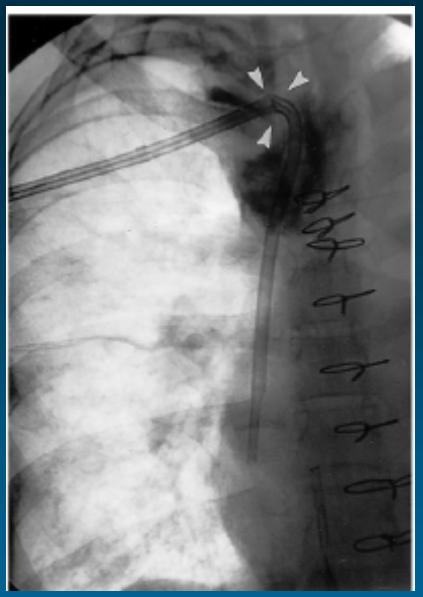
Fig. 1. Digital-subtraction angiography visualizing total occlusion of the right subclavian and near-total thrombosis of the anonymous vein in patient D.

Fig. 3. Photograph showing patient F during dialysis, 6 weeks after the procedure. The scar of the incision (∗) is barely visible.









Radiologic Placement of Tunneled Hemodialysis Catheters in Occluded Neck, Chest, or Small Thyrocervical Collateral Veins in Central Venous Occlusion[1]

Conclusiones

- Todas las complicaciones, precoces y tardías, asociadas a una via central para HD obligan con frecuencia a una actuación prioritaria y multidisciplinar .

- Acceso vascular definitivo propuesto en pacientes muy determinados (<5%)… tiene una incidencia y prevalencia en nuestro medio más elevada de lo deseable.

- Mejor profilaxis : Evitar catéteres…..