CONTROVERSES ET ACTUALITÉS EN CHIRURGIE VASCULAIRE

CONTROVERSIES & UPDATES IN VASCULAR SURGERY

JANUARY 23-25 2014

MARRIOTT RIVE GAUCHE & CONFERENCE CENTER PARIS, FRANCE

Difficult Catheter Insertions

Les Insertions de Cathéters Difficiles

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www.cacvs.org

Disclosure

Richard Shoenfeld, MD

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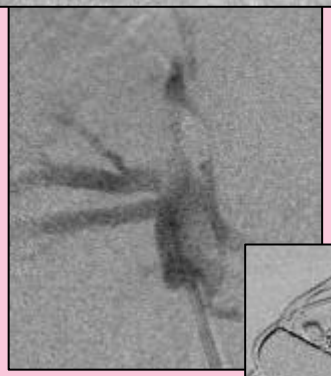
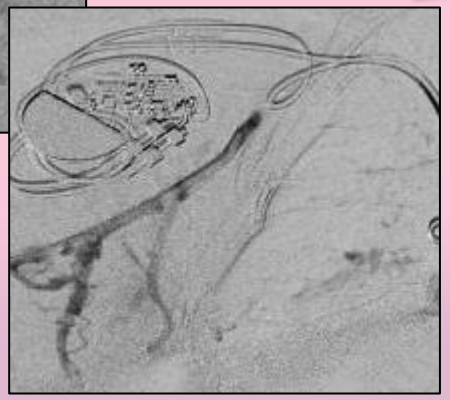
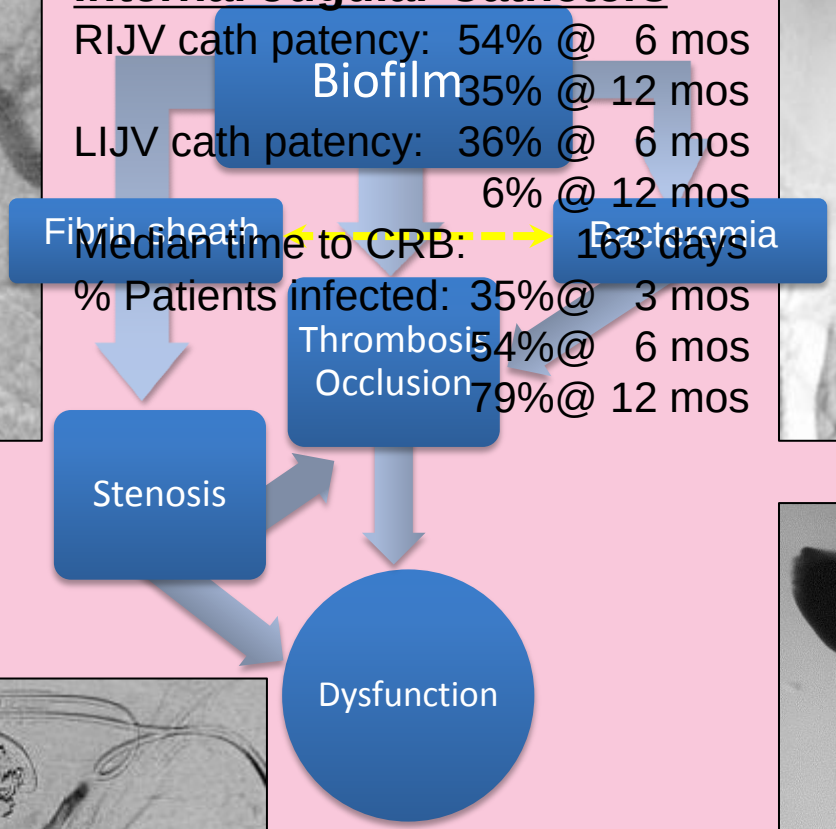
No potential conflict of interest

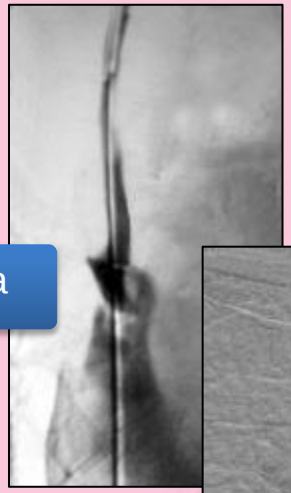




Internal Jugular Catheters

RIJV cath patency: 54% @ 6 mos
35% @ 12 mos
LIJV cath patency: 36% @ 6 mos
6% @ 12 mos
Median time to CRB: 163 days
% Patients infected: 35%@ 3 mos
54%@ 6 mos
79%@ 12 mos





(Shingarev. JVIR 2013)

CVCs do *not* require vascular continuity …

Just access to the RA

Distal CVC in RA or patent large central vein to function well

Clinical Considerations

- Hemodynamic compromise? swollen arm, SVC syndrome
- Retrograde collateral flow through the head?
- Will CVC preclude new AV access?
- How long needed? temporary, chronic, permanent
- Recanalization/stenting of CVO in addition to CVC insertion?

- Risks versus benefits - little or no backup available!
- Thorough knowledge of collateral drainage, adjacent structures +++
- Choose carefully to avoid damage to arteries, brachial plexus

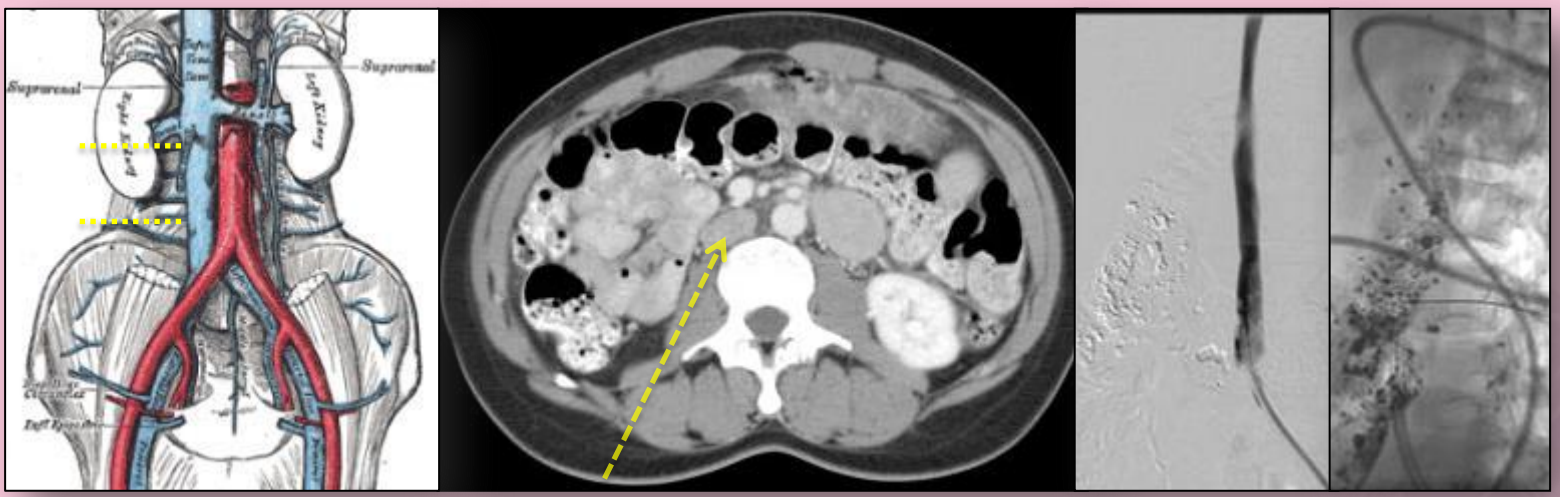
Patent Access Sites

1. Right jugular
2. Left jugular
3. Right femoral*
4. Left femoral*
5. Translumbar
6. Left subclavian*
7. Right subclavian*

Access of Last Resort

8. Transhepatic

Translumbar Access

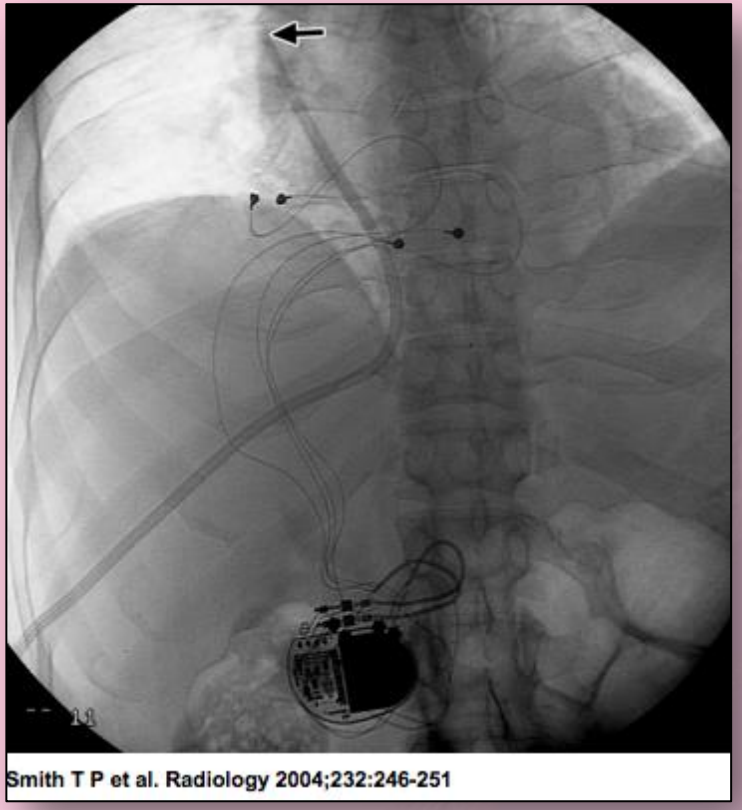


Transhepatic Catheter

Access of last resort

Technique = PTBD

- Tri-axial introducer
  - Accutstick (Boston),
  - Jeffrey set (Cook)
- Puncture RHV or MHV
- Advance wire to IVC
- Catheterize RA or SVC
- Measure distance to RA
- Subcutaneous tunnel
- peel-away + hemostasis valve
- Permacath tip in SVC or RA



Smith T P et al. Radiology 2004;232:246-251

Transhepatic Catheter

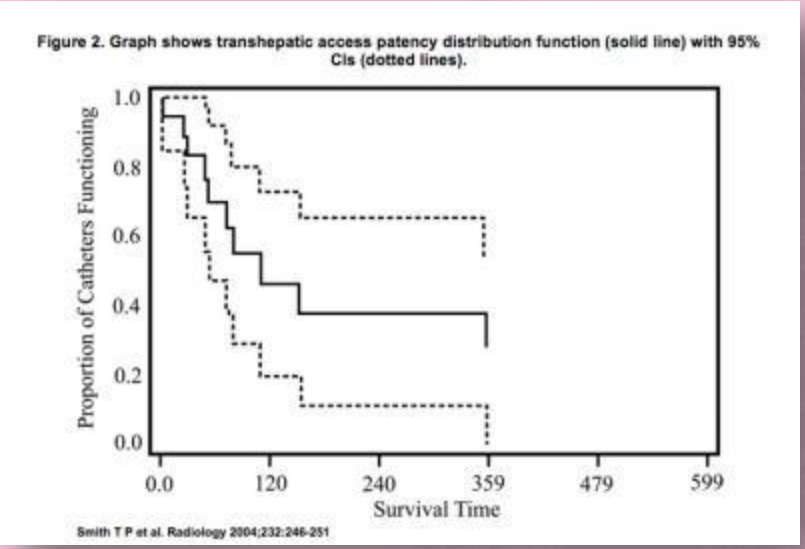
Problems

- Mostly same as other sites
  - Arrhythmias, fibrin sheath, bacteremia, thrombosis
- Manage problems same as other sites
- Respiratory motion-migration from RA, IVC +++
- If flow rate decreases, exclude migration
- Removal requires tract embolization

Transhepatic Catheter

Outcomes

- 21 caths in 16 pts
- No other access, or
- Preserve single remaining site for access
- Technical success 100%
- 21 caths → 30 exchanges
- 5 caths → dislodged
- Failure → thrombosis
- 6 complications (29%),
  1 death



Smith, T. et al. Radiology 232(1): 246-251

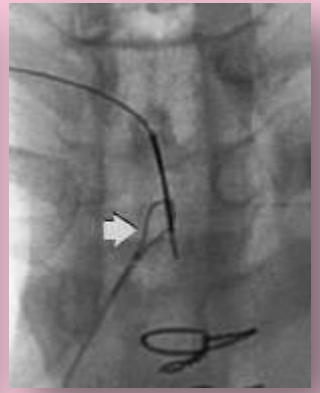
Outcomes

- **Internal jugular**
  - RIJV cath patency 54% @ 6 mos; 35% @ 12 mos.
  - LIJV cath patency 36% @ 6 mos; 6% @ 12 mos.
- **Femoral** (Zaleski. AJR 172)
  - Infection rate 0.24/100 catheter days
  - Primary patency 78% @ 6 mos; 55% @ 12 mos.
  - Secondary patency 95% @ 6 mos; 61% @ 12 mos.
- **Translumbar** (Lund. Am J Kid Dis 25)
  - Infection rate 0.28/100 catheter days
  - Thrombosis rate 0.33/100 catheter days
  - Primary patency 52% @ 6 mos; 17% @ 12 mos.
- **Transhepatic** (Stravopulous. JVIR 14)
  - Infection rate 0.22/100 catheter days
  - Thrombosis rate 0.24/100 catheter days
  - Primary patency 27 days
  - Secondary patency 70 days

Potential Access Sites

- Recanalization/Neocanalization
  - Thrombosed sites
  - Neck, chest venous collaterals
  - Direct mediastinal puncture
  - RF wire recanalization/stenting of CVOs
  - Inside-out CV access

Collateral Vein Access



Vascular and Interventional Radiology

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George X. Zaleski, MD
Jeffrey A. Leef, MD
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Radiologic Placement of Tunneled Hemodialysis Catheters in Occluded Neck, Chest, or Small Thyrocervical Collateral Veins in Central Venous Occlusion[1]

PURPOSE: To evaluate interventional radiologic placement of tunneled hemodialysis catheters in small thyrocervical collateral veins or in occluded veins in the neck or chest in patients with limited venous access.

MATERIALS AND METHODS: A femoral venous approach was used to recanalize occluded veins or catheterize small collateral veins in 24 patients in whom all major central veins were occluded. A loop snare or catheter was used as a target for antegrade puncture. Metallic stents were deployed if necessary. Once antegrade access was secured, catheters were placed in a conventional fashion.

RESULTS: Technical success was achieved in 22 (88%) of 25 procedures (one patient underwent two procedures). All catheters functioned immediately after placement. There were two procedural complications: a vasovagal episode requiring intravenously administered atropine sulfate and an episode of respiratory distress requiring intubation. There were no instances of pneumothorax, nerve injury, or bleeding complications. Catheter malfunction requiring exchange occurred at a rate of 0.67 per 100 catheter days. Infection requiring catheter removal occurred at a rate of 0.06 per 100 catheter days. Primary patency was 90% at 1 month, 71% at 6 months, and 25% at 12 months. Secondary patency was 100% at 6 months and 70% at 12 months.

CONCLUSION: In patients undergoing hemodialysis in whom conventional venous access sites have been exhausted, interventional radiologic venous recanalization for the placement of permanent catheters is safe and effective. Catheters placed in recanalized veins or small collateral veins have shorter primary patency rates compared with those of conventionally placed catheters, but the former can be maintained for relatively long periods.

Patients with end-stage renal disease typically undergo catheter hemodialysis during the time required for fistula or graft maturation or after other methods of hemodialysis are exhausted. Often, these patients have few or no other dialysis options, so access sites are a limited resource, and the preservation of these sites may be essential for life. When patients requiring indwelling catheters develop central venous occlusions, unconventional routes to the central veins (eg, transhepatic inferior vena cava, hepatic vein, femoral vein) are typically used. These routes are associated with increased morbidity and may be poorly tolerated by some patients. Recently, hemodialysis catheter insertion into occluded neck veins or small thyrocervical collateral veins has been described (1–3). To our knowledge, long-term patency rates and complications of catheters placed in this manner are unknown. The purpose of our study was to evaluate interventional radiologic placement

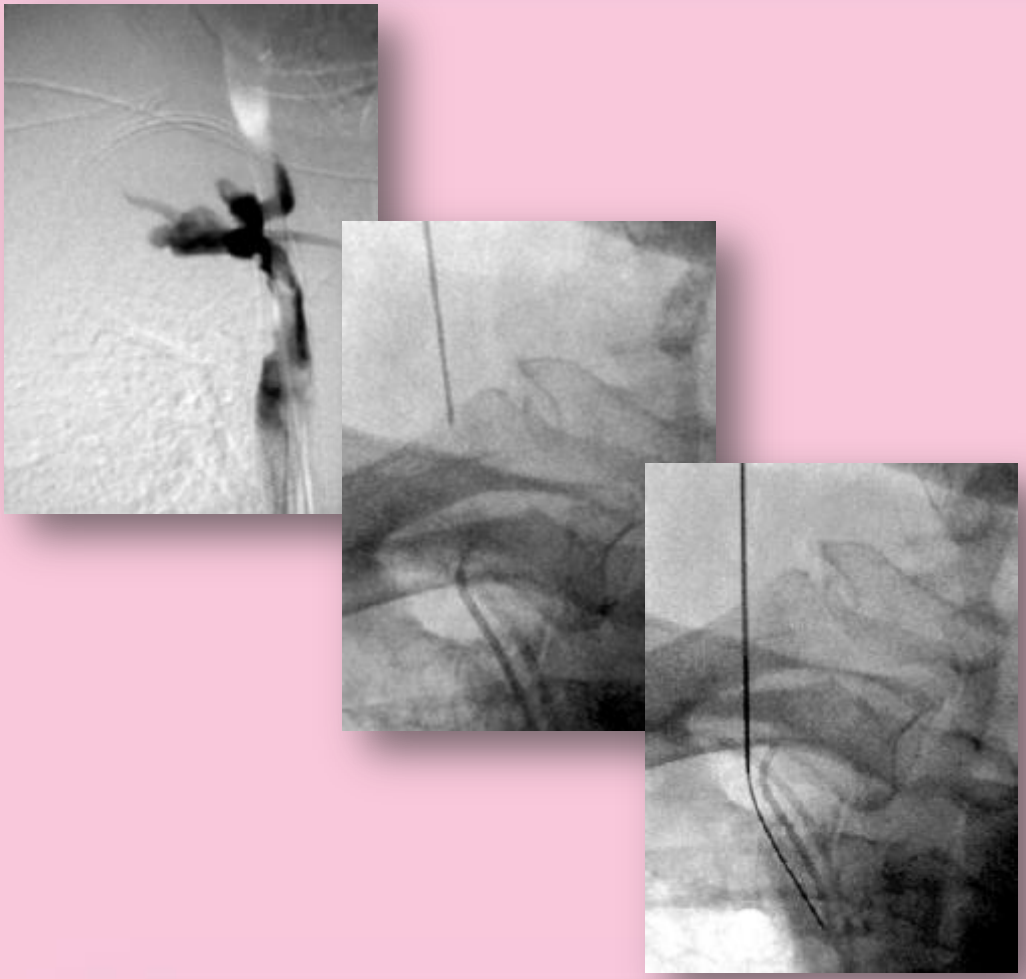
Funaki B et al. Radiology 2001

Collateral Vein Access

- 24 patients, 25 procedures
  - Technical success: 88% (22/25)
  - No pneumothorax, hemorrhage, nerve injury
  - All catheters worked immediately
  - Complications: 2
    - Vasovagal episode
    - Respiratory distress
  - Exchange rate: 0.67/100 catheter days
  - Infection rate: 0.06/100 catheter days
  - Primary patency: 90% @ 1 mo; 71% @ 6 mos; 25% @ 12 mos.
  - Secondary patency: 100% @ 6 mos; 70% @ 12 mos.

Funaki B et al. Radiology 2001

Direct Mediastinal Access



J Vasc Access 2011; 12 (3): 258-261
DOI: 10.5301/JVA.2010.6084

TECHNIQUES IN VASCULAR ACCESS

Mediastinal approach to the placement of tunneled hemodialysis catheters in patients with central vein occlusion in an outpatient access center

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ABSTRACT

Objective: Endovascular therapy for hemodialysis (HD) access is now performed in outpatient centers in a growing number of cities in the US. As patients live longer, we are facing a growing number of patients with central venous occlusion. We report our first three cases of mediastinal tunneled dialysis catheter placement in a clinic setting.

Methods: Between 15 November 2009 and 1 April 2010, three patients with central vein occlusion required tunneled HD catheter placement. Case #1 was a 60-year-old male with left subclavian and innominate vein occlusion from a defibrillator pacemaker and two previous right internal jugular tunneled dialysis catheters with occlusion of the right internal jugular vein. He lost right arm access after two failed arteriovenous fistulas (AVF) and an occluded upper arm AV graft. His last right external jugular catheter was removed for infection. Case #2 was a 72-year-old female with a thrombosed left upper arm and a right basilic vein AV access. She had a history of left leg deep vein thrombosis (DVT) and a vena cava filter. The left and right internal jugular veins were occluded as well as the left subclavian vein after stent placement. She required a tunneled HD catheter after a failed attempt at endovascular salvage of her right basilic AVF. Case #3 was a 78-year-old female who had been on HD for 4 yr. She refused AVF surgery and had four tunneled HD catheters removed for infection. She presented with bilateral internal jugular vein thrombosis and the removal of an infected right subclavian tunneled HD catheter.

The technique: The dialysis catheters were placed using standard C-arm fluoroscopy. We accessed the right femoral vein to pass a fibronolin catheter (Cordis, Inc, Warren, NJ) into the right innominate-subclavian vein junction. Using the catheter as a fluoroscopic target, a micropuncture needle was guided into the right innominate vein and a standard J-guidewire was used to dilate the mediastinal tract and place a new tunneled dialysis catheter.

Results: In all three cases, the tunneled dialysis catheters were placed under local anesthesia with no intravenous sedation. No pneumothorax occurred and all three catheters were used for HD within 24 hr. Two catheters were removed at 3 and 4 months for infection. One catheter continues to function well.

Conclusions: As the lifespan of our dialysis patient population continues to improve, we will see an increasing need to perform complicated access procedures to maintain HD support. These three cases emphasize the value of the transmediastinal technique using basic C-arm fluoroscopy and a limited stock of basic catheters and guidewires.

Key words: Hemodialysis catheter, Central vein occlusion

Accepted: September 12, 2010

INTRODUCTION

The K/DOQI guidelines and the Fistula First initiative have emphasized the importance of arteriovenous (AV) access to reduce the complications of hemodialysis (HD) catheters including central vein occlusion and infection (1, 2). Many patients require tunneled HD catheters as a bridge to AV fistula (AVF) maturation (1). There is also a subset of renal failure patients that require "permanent" HD catheter access who have either exhausted AV access sites, have medical co-morbidities such as advanced age or malignancy with limited lifespan or have elected not to undergo dialysis fistula placement despite their access surgeons' recommendations. With time, the conventional sites for HD catheter placement become occluded and we are faced with the task of providing dialysis access in more exotic locations. The use of a fluoroscopic target to access vessels in the mediastinum has previously been described (3, 4). These authors have performed the catheter placements in a hospital setting. In the US, many HD access practices have moved endovascular procedures to an office setting. We describe our early experience with

Matsuura J. J Vasc Access 2011

Direct Mediastinal Access

36 tunneled CVCs in 4.5 mos.

3 direct mediastinal catheters:

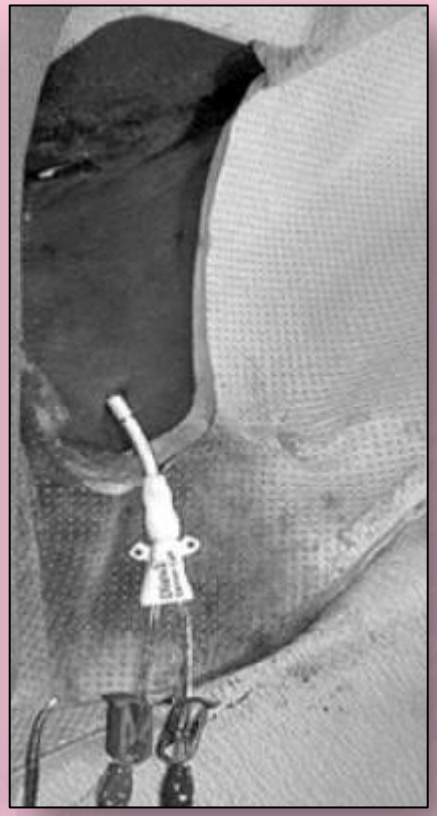
100% success

0% complications

1 cath working > 3 mos.

2 caths removed for infection

at 3, 4 mos (prior cath infection)



Matsuura J. J Vasc Access 2011

RF Wire Recanalization of CVOs

CLINICAL STUDY

Radiofrequency Wire for the Recanalization of Central Vein Occlusions that Have Failed Conventional Endovascular Techniques

Marcelo Guimaraes, MD, Claudio Schonholz, MD, Christopher Hannegan MD, Michael Bret Anderson, MD, June Shi, RN, and Bayne Selby Jr, MD

ABSTRACT

Purpose: To report the technique and acute technical results associated with the PowerWire Radiofrequency (RF) Guidewire used to recanalize central vein occlusions (CVOs) after the failure of conventional endovascular techniques.

Materials and Methods: A retrospective study was conducted from January 2008 to December 2011, which identified all patients with CVOs who underwent treatment with a novel RF guide wire. Forty-two symptomatic patients (with swollen arm or superior vena cava [SVC] syndrome) underwent RF wire recanalization of 43 CVOs, which were then implanted with stents. The distribution of CVOs in central veins was as follows: six subclavian, 29 brachiocephalic, and eight SVC. All patients had a history of central venous catheter placement. Patients were monitored with regular clinical evaluations and central venography after treatment.

Results: All 42 patients had successful recanalization of CVOs facilitated by the RF wire technique. There was one complication, which was not directly related to the RF wire: one case of cardiac tamponade attributed to balloon angioplasty after stent placement. Forty of 42 patients (93.2%) had patent stents and were asymptomatic at 6 and 9 months after treatment.

Conclusions: The present results suggest that the RF wire technique is a safe and efficient alternative in the recanalization of symptomatic and chronic CVOs when conventional endovascular techniques have failed.

ABBREVIATIONS

CVO = central vein occlusion, LAO = left anterior oblique, RAO = right anterior oblique, RF = radiofrequency, SVC = superior vena cava

Incidences of central vein occlusions (CVOs) related to central venous catheters have been reported to be approximately 5%–30% (1,2). Some CVOs will cause symptoms such as swollen arms and superior vena cava (SVC) syndrome, which may justify treatment. Regardless of whether it is benign or malignant, a CVO may be treated by conventional endovascular techniques.

The endovascular treatment of CVOs with use of percutaneous transluminal angioplasty and stents has been shown to be safe and effective, but these techniques are only possible when the lesion can be successfully crossed (3,4). The literature suggests that as many as 24% of CVOs cannot be recanalized with standard techniques (5). These patients have few alternatives to living with their symptoms, undergoing access ligation, or having a surgical bypass procedure. There has been some interest in the use of sharp recanalization techniques for lesions resistant to standard crossing techniques, but concern has been raised about the high degree of risk associated with these procedures (6–9). In these cases, the radiofrequency (RF) wire technique may provide an opportunity for CVO recanalization with a minimally invasive technique. Studies have shown the ability of the technology to recanalize occlusions in the peripheral vessels (9) and in the bile duct (10). More recently, small case series have confirmed the effectiveness of the RF wire in the recanalization of malignant and benign CVOs (11,12).

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From the SIR 2012 Annual Meeting

None of the authors have identified a conflict of interest.

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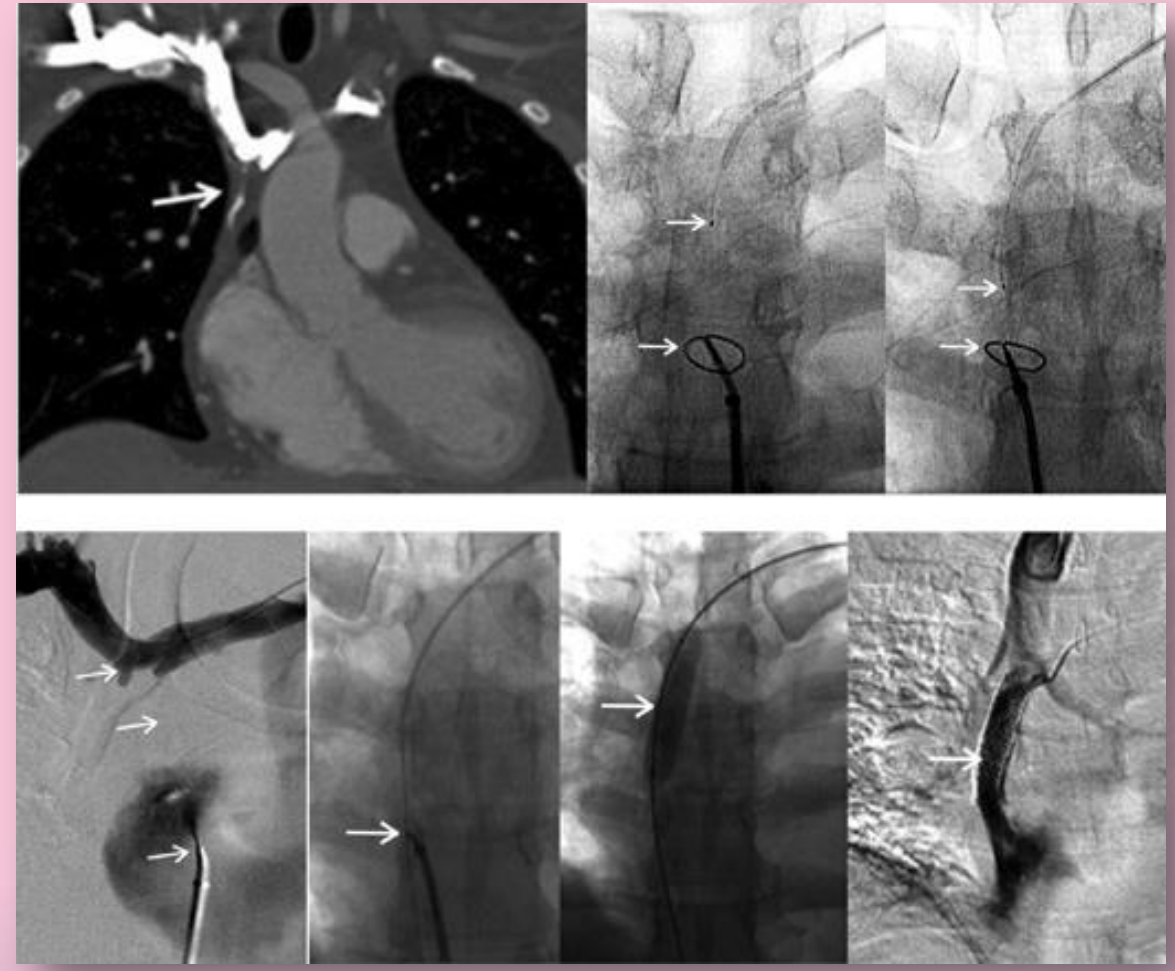
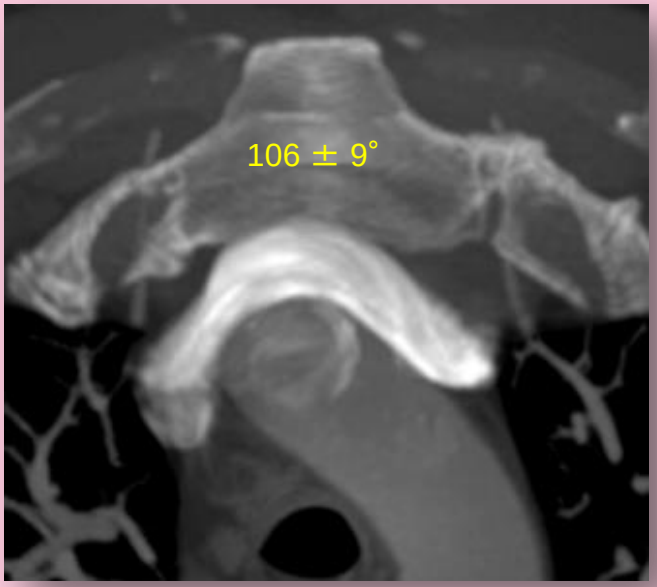
Guimaraes M. J Vasc Interv Radiol 2012

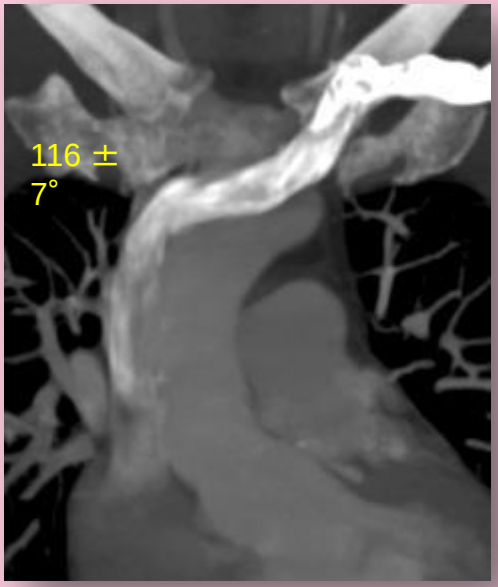
RF Wire Recanalization of CVOs



Guimaraes M. J Vasc Interv Radiol 2012

Multiplanar CT, DSA of Central Veins





Salik R. J Vasc Interv Radiol 2006

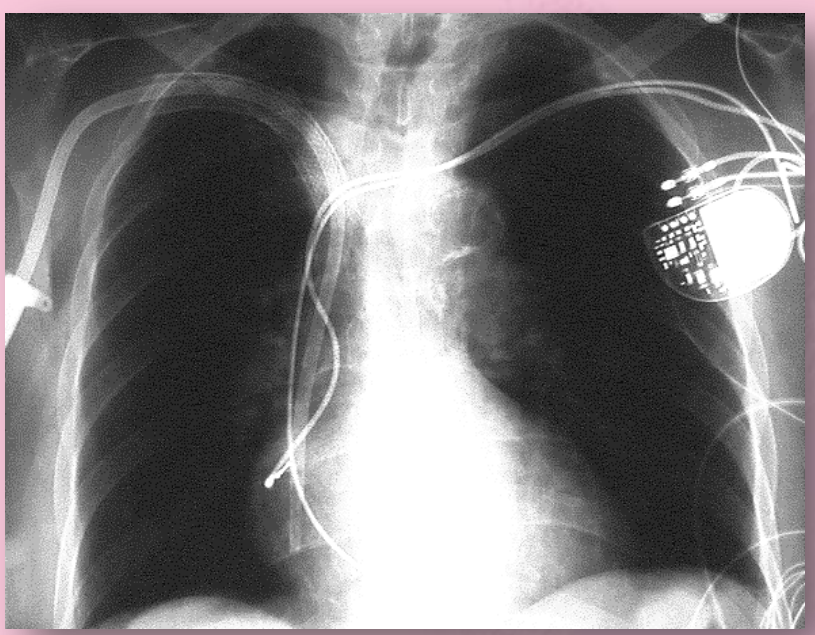
RF Wire Recanalization of CVOs

- 42 symptomatic pts (all had prior CVCs)
  - Swollen arm, SVC syndrome
  - CVO: 6 subclavian, 29 brachiocephalic, 8 SVC
  - RF wire recanalization of 43 CVOs, then stents
- Results
  - 100% technical success
  - 1 complication (pericardial tamponnade; unrelated?)
  - 40/42 (95.2%) pts – patent stents, asymptomatic at 6, 9 mos. post-treatment.
  - Safe, effective technique when conventional recanalization fails.

Guimaraes M. J Vasc Interv Radiol 2012

Total Occlusions

Define the anatomy!
Guide wire, catheter
Support sheath
Angioplasty balloon
Power Wire
Angioplasty
(Stent)
Implant catheter



Inside-out central venous access

Surfacer™ inside-out access catheter system

Ebner A. Endovascular Today; June 2013

Inside-out central venous access

Surfacer™ inside-out access catheter system

- Safety and feasibility study
- 12 patients (27-63 yrs old)
- ≥ 2 occluded U.E. venous access points + SVC occlusion
- 100% technical success
- Av. procedure time: 32.8 ± 16.9 mins.
- No procedure-related complications
- All permacaths in place and functional ≥ 14 days

Ebner A. Endovascular Today; June 2013


10.00mm/

Conclusion

New and innovative endovascular recanalization techniques and devices are allowing us to expand the frontiers of end-stage vascular access.

When possible, exotic central catheter insertions should serve as a pretext/bridge to recanalization/reconstruction of CVOs to reclaim lost opportunities for permanent AV access and to preserve venous capital.

Les progrès dans les techniques de recanalisation et le matériel endovasculaires nous incitent à pousser les frontières chez les patients en fin de parcours de leurs abords d'hémodialyse.

Si possible, l'insertion de cathéters centraux exotiques doit servir de pont vers la recanalisation et reconstruction des occlusions dans les veines centrales pour recycler les abords abandonnés et préserver le capital veineux.