Stuck dialysis catheters

ANZSIN 2013
Michael Lam & Kendal Redmond
NT

- 39 yr old CI Maori - ESKD 2° to cortical necrosis
- HD August 2002
- R IJ tunneled Tesio catheter  Oct 2002
- Failed L RC AVF Feb 2004
- Failed revision Aug 2006
- Successful L BC AVF formation Sep 2007
Catheter removal

• Feb 2008 – Failed radiological removal
• Feb 2008 – Failed attempt by nephrologist
  – Calcified tissue adherent to line
NT

- Feb 2008 – Failed line snare by radiologist
• April 2008 - MRI
NT

• Jun 2008 – TL infection

• Not eligible for transplant with chronic line sepsis

• Sep 2008 – Further attempt at removal
  – Pus along track
  – Granulation of arterial cuff
  – Line surface calcified
  – Line accidentally cut
Stuck catheter - Pathology

- NDT 1996;11:1363
- Tesio catheter 3 yr *in situ*
- Post mortem findings
  - Fixed to SVC & RA
  - Reactive tissue
  - Calcification
  - Small irregular shaped bodies
  - Thickened vein wall
Stuck catheter - Histology

- **Vena Cava**
  - Endothelial denudation, inflammatory infiltrate & thrombi
  - Smooth muscle proliferation

- **Catheter**
  - Cellular
    - Smooth muscle
    - Endothelial cells
    - Cellular infiltrate
    - New vessel formation
  - Non cellular
    - Thrombus
    - Collagen
  - Fibrin sheath extension intraluminally

NDT 1996;11:1363, Vesely T, Veith Symposium
Management of stuck catheter

- Traction
- Internalization of catheter
- Laser sheath
- Mechanical dilator sheath
- Snares (+ guidewires)
- Sheath
- Endoluminal balloon dilatation
- Open thoracotomy
Management of stuck catheters

• Traction
  – vascular tear
  – retained fragments

• Internalization
  – ± excision of external portion
  – Dissection to venous entry point
  – Purse string suture around catheter tied firmly as catheter transected
  – Risks: Sepsis, Thrombosis
Laser sheath

- Designed for pacing wires
- Long flexible sheath
- Multiple optical fibres
- UV
- 100 microns penetration
Laser Sheath

- Seminars in Dialysis 2009;22:688
- 3 case reports
- Successful removals
- Internal diameter 12.5 French
Mechanical dilator sheath

Evolution Device

- Pacing wire removal
- Flexible plastic sheath
- Distal threaded metal tip
- Attached handle allows sheath rotation
- Threaded metal end bores through adhesions
Snares

- Snare + Introducer sheath (JVIR 1994)
  - Femoral approach snare to catheter tip
  - Dissection to venous entry point
  - Passage of introducer sheath over catheter with traction of tip
Snares

• Double snares (Cardiovasc IR 2007)
  – Internal jugular & femoral sheaths
  – IJ snare passed around catheter tip
  – Femoral snare secured to catheter tip
  – Internal sheath withdrawn
  – IJ snare pulled up to strip catheter
Guidewire/Sheath

- Dissection of cuff
- 2\textsuperscript{nd} dissection at venous entry
- Catheter transected
- Guidewire passed through catheter
- Catheter securely tied to guidewire
- Introducer sheath pass over catheter

J Vasc Access 2010;11:59
Endoluminal balloon dilatation

- Dissection to venotomy site
- Transection of catheter
- Guidewire introduction
- 5mm X 4cm balloon angioplasty catheter insertion at thoracic inlet
  - Dilatation and repeat with 4 cm advances
- 6 mm X 4 cm catheter in other lumen
  - Dilatation and repeat with 4 cm advances

J vasc Access 2011;12:381
Endoluminal balloon dilatation
Endoluminal balloon dilatation
Precautions

• Procedure only in Hospital setting
• Sedation & analgesia
• Close cardiac monitoring
• Superior venocavogram prior to procedure
• Include a femoral sheath approach
• CT scan if suspicion of mediastinal or intrapericardial haemorrhage
Back to the case

• Nov 2009 Joint Vasc surgery/Cardiology intervention
  – R Neck cut down to jugular vein
  – Simultaneous R femoral access
    • Both tips cannulated – Pus exuding
    • Guidewires passed through & through
  – Evolution Device
    • Superior approach
    • 1\textsuperscript{st} catheter breakage of segment
    • 2\textsuperscript{nd} catheter – further dissection
• Nov 2009
  – Sudden drop in BP and haemothorax
  – CPR commenced
• Immediately taken to cardiothoracic theatre
  – R Int Jugular V torn from Subclavian
  – Large tear on SVC
  – Plastic sheath around catheter not intravascular & avulsed
  – Catheter attached to torn vessel wall
NT

• Venous repair
  – Bypass required
  – Haemothorax drained
  – Goretx graft from R subclavian to SVC
  – R IJ V not reconnected
  – Ongoing haemorrhage

• Concerns regarding brain damage during entire episode
NT

- Irreversible brain injury
- RIP 12/2/2009
Conclusions 1

• Early permanent vascular access
• AVOID long-term tunneled catheters!!!
• Replacement of tunneled line
  – Time for replacement
  – Site of insertion
  – Need for guideline
• Significant risks of removal of stuck catheters
Conclusions 2

• Technology for removal of pacing wires transferable
• Promise of endoluminal dilatation
• Role of improved biotechnology
END