Appropriate Device Selection for Endovascular Procedures

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## Disclosures

### Speaker’s Bureau:
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- Medtronic
- Volcano

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Guiding Principles

• The choice of peripheral interventional equipment is dependent on the location and disease being treated.

• Before embarking on the intervention, develop a complete strategy and mentally rehearse the procedure from start to finish.

• The strategy should be safe, efficient and cost-effective.

• Make sure all the equipment you need is available.

• Determine your comfort level with the procedure and the equipment.
Aorto-Common Iliac Artery Disease

• Sheath selection
  ▪ 6 or 7 Fr size x 23-25 cms in length
  ▪ radio-opaque distal marker helpful

• Guidewires
  ▪ access with .035” straight tip, non-hydrophilic guidewire
  ▪ if extreme tortuosity and/or critical disease, place sheath in femoral artery and cross with .014”, 018” or .035” steerable hydrophilic guidewire
  ▪ exchange for extra-support wire (.035”) prior to stenting
Aorto-Common Iliac Artery Disease

- **Catheters**
  - may need support catheter to negotiate, especially tortuous, diffuse disease or CTO
    - 4 or 5 F catheters (e.g. Glidewire, RIM, AR1, IMA, MP)
- **Balloons**
  - use 40 mm long balloons
  - under-size to pre-dilate (6 mms)
  - .035” wire-based catheters
  - if diffuse subtotal disease, cross with .014 or .018” wire and compatible under-sized balloon to pre-dilate
Aorto-Common Iliac Artery Disease

• Stents
  ▪ balloon expandable (covered or uncovered)
    ▪ ostial
    ▪ covered - CTO, thrombus
  ▪ self expanding, uncovered
    ▪ tortuous common iliac arteries
    ▪ common iliac arteries with varying diameter
  ▪ self expanding covered
    ▪ aneurysmal disease
External Iliac Artery

- **Access**
  - more proximal and focal disease – retrograde
  - distal external iliac artery – either retrograde or contra-lateral
  - 6 F sheath with RO distal marker
  - contra-lateral sheath – flexible, kink resistant
External Iliac Artery Disease

- Wire - .035” wire – non hydrophilic
- Balloon angioplasty – 5 or 6 mm x 40-80 mms
- Stents
  - self-expanding, uncovered slotted tubular nitinol
  - balloon expandable for focal proximal disease or if access to internal iliac a. is anticipated
  - disease location & potential for stent elongation determines access site
Renal & Mesenteric Artery Intervention

- 6 Fr sheath & guide catheter
  - short renal guide – RDC, RDC1, HS, IMA – active support
  - renal guide sheath – passive support
- .014” atraumatic soft, steerable, non-hydrophilic guidewire
Renal & Mesenteric Artery Intervention

- Use distal protection based on anatomy and risk
- Pre-dilate conservatively if critical ostial disease (4 mm .014” based catheter)
- Stent with 5-6 mm x 12-15 mm BE uncovered
  - confirm position pre stent in multiple oblique views
- IVUS for post-stent evaluation and for angioplasty result for ISR
- Consider covered stent for ISR
Femoro-Popliteal Disease

- 6 or 7 Fr sheath
  - contra-lateral
    - 6 or 7 Fr flexible sheath crossed with extra support .035” guidewire
  - ante-grade (short 6 or 7 Fr sheath, flexible)
    - distal CTO with concomitant infra-pop disease
Femoro-Popliteal Disease

- Wires
  - focal or diffuse, critical disease
    - .014 or .018” wire to pre-treat (PTA, atherectomy)
  - CTO
    - .014”, .018” & .035” extra support and hydrophilic wires
Femoro-Popliteal Disease

• Atherectomy (6 or 7 Fr sheath)
  ▪ focal or diffuse
    ▪ excisional, rotational, laser, orbital
  ▪ calcified
    ▪ rotational, orbital, excisional, laser

• Balloon angioplasty
  ▪ intermediate to long lengths
    • POBA, focal force, cutting, nitinol caged, DEB

• Stents
  ▪ SE bare or DES stents, uncovered, covered
Femoro-Popliteal Disease CTO’s

• Access
  - contra-lateral for proximal-mid CTO
  - antegrade for distal and/or infra-popliteal a. disease
  - popliteal if failed antegrade approach
  - trans-pedal if failed antegrade or popliteal approach

• 6 Fr sheath initially then 7 Fr if atherectomy
  - rotational, excisional, orbital, laser
Femoro-Popliteal Disease CTO’s

- 4-5 fr support catheter (straight or angled)
- Stepped wire approach (0.014”, 0.018”, 0.035” hydrophilic)
- Long balloon to predilate (pre or post atherectomy)
- Post atherectomy devices
  - POBA, scored balloon, focal force balloon
  - DEB
  - SES (bare, drug eluting or covered)
    - If helical SES, use caution when stenting proximal/ostial from contralateral approach (avoid jailing profunda)
Intraluminal Crossing: Relative Device Sizes

Wildcat

Crosser™ Frontrunner®

TruePath™
Wire enters subintimal space but fails to re-enter true lumen

Use a Re-entry Device
To provide direction and to puncture back into the true lumen allowing a wire to re-enter

Change Support to the Wire Tip
A change in catheter shape may provide backup support

Try Different Wire Types
Smaller wires, stiffer tips, different torque control
Subintimal Crossing

- Traverse the occluded region by creating a new channel between the intimal and medial layers of vessel wall
- Re-entry into the true lumen occurs distal to the occluded region
- Also known as PIER (percutaneous intentional extraluminal recanalization)
Re-Entry Devices

- Options after multiple failures for CTOs with standard wires and approaches
- Consider for:
  - aorto-iliac disease
  - SFA-popliteal
- Can lead to completion of otherwise failed recanalization process
- Options
  - Pioneer (Volcano) – IVUS guided orientation
  - Outback – marker orientation
  - Off Road (BSC)
Re-entry Devices to Enter True Lumen

Pioneer Catheter (Medtronic)

Outback® LTD® Re-entry Catheter (Cordis)

OffRoad™ Re-entry Catheter System (Boston Scientific)
Femoro-Popliteal Disease - ISR

- Access similar to de novo disease
- 6-7 Fr sheath
- Consider atherectomy first (off label)
  - .014” support wire
  - excisional, laser, rotational
  - angioplasty
- Provisional or secondary restent
  - uncovered bare nitinol SES
  - covered SES
Femoro-Popliteal Disease

• Distal protection
  ▪ consider if anatomy of landing zone appropriate
  ▪ especially complex or high risk intervention
    • atherectomy
    • acute ischemia with thrombus
    • diffuse disease, critical limb ischemia
    • single vessel run off
Infra-Popliteal Artery Disease

- **Access**
  - contralateral – focal proximal disease (6 or & Fr)
  - antegrade – CLI with diffuse disease (6 or 7 Fr)
  - tibial – CLI with diffuse disease
    - micro-puncture, sheathless .014, .018” system
    - or 3.2 – 4 F sheath

- **Wires**
  - diffuse, non-CTO
    - .014” steerable, non-hydrophilic wire
  - CTO
    - .018” hydrophilic or .014” ES wire
Infra-Popliteal Artery Disease

• Balloons
  ▪ .014” or .018” wire-based balloons
  ▪ POBA, cutting, caged or focal force
    • proximal – 3.0-4.0 mms (30-40 mms)
    • mid to distal – 2.5-3.0 mms (100-150 mms)
    • pedal 2.0 mms
  ▪ long balloon inflations (3-5 mins)
  ▪ DEB – currently investigational in USA
Infra-Popliteal Artery Disease

- Atherectomy
  - consider for long diffuse, calcific disease
    - excisional, rotational, laser, orbital
    - long balloon inflations post atherectomy
      - POBA, focal force, scored, DEB
- Primary or provisional stents
  - BE DES for proximal disease
  - SES for distal popliteal
Subclavian Artery Disease

- **Access**
  - trans-femoral with 80-90 cm 6 or 7 Fr sheath
  - brachial or radial for flush CTOs

- **Wire**
  - .014”, .018” for critical subtotal disease
  - .035” steerable, supportive straight tip non-hydrophilic

- **Balloon**
  - 5-6 mm x 20-40 mm pre-dilatation if calcified, critical or angulated
Subclavian Artery Disease

- **Stent**
  - confirm position in multiple views
  - cross pre-dilated lesion with sheath/dilator and then stent
  - BE uncovered 6-7 mm x 15-24 mm for ostial and proximal
  - 20-30 mm slotted tubular SES for disease involving superior aspect (spare vertebral and/or IMA)
  - conservative post dilation, especially if calcified
  - QCA or IVUS guided post dilation strategy
Vertebral Artery Disease

- **Access**
  - trans-femoral with 6 Fr MP or JR4 guide or 80-90 cm sheath
- **Wire**
  - .014”, .018” non-hydrophilic soft-tip guidewire
- **Distal protection** – optional
- **Pre-dilate** with 4-5 mm x 20-30 mm balloon
- **Stent**
  - 5-6 mm x 12-15 mm BE .014” – based stent
Carotid Artery Disease

- **Access**
  - trans-femoral
    - 6 or 7 Fr 80-90 cm sheath
    - 8 Fr JR4, IMA or guide catheter
- **Wire**
  - .014” DEP system
- **Pre-dilate with 4 x 30-40 mm balloon**
- **Stent**
  - 7 x 10 x 30-40 mm carotid SES
- **Post dilate with 5-6 x 30-40 mm balloon**
Dealing with Thrombus Treatment Options

• Mechanical
  ▪ 6 Fr guide catheter for direct aspiration
    • over .035” long wire
    • Y-connector
    • 35 -50 cc syringe to manually aspirate
  ▪ laser atherectomy
  ▪ rotational atherectomy with dynamic aspiration (Jetstream)
  ▪ Angiojet
Dealing with Thrombus

- Adjunct pharmacology
  - iv heparin, lytic (tPA, rPA), 2b/3a inhibitors
  - A lytic therapy or 2b/3a inhibitors
  - perfusion catheters
  - 2b/3a inhibitors with local instillation (ClearWay)
Troubleshooting - Perforation

• High risk perforations:
  ▪ aorto-iliac
  ▪ renal-mesenteric
  ▪ subclavian
  ▪ external iliac
  ▪ infra-popliteal

• Have highly compliant occlusive balloon and large sheath for aorta (14 Fr) with extra supportive .035”
Troubleshooting - Perforation

• Long (>15 min) inflations to stabilize
• Covered appropriate sized BE stents for:
  ▪ aorto-iliac
  ▪ renal, mesenteric
  ▪ subclavian
• Covered SE stents for
  ▪ external iliac
  ▪ femoro-popliteal
• Best approach is to avoid by conservative sizing
Summary

• Multiple devices and approaches are available.
• Have a complete strategy with essential inventory.
• The strategy should be safe, efficient and cost-effective.
• Know your limits and the properties of devices.
• Be ready to improvise.
Thank You
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