How to select guide-wires for challenging CTO crossing?

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Disclosure

Speaker name:

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I have the following potential conflicts of interest to report:

☒ Consulting
☐ Employment in industry
☐ Stockholder of a healthcare company
☐ Owner of a healthcare company
☐ Other(s)

☐ I do not have any potential conflict of interest
Guide wire are used to
Reach treatment area
Access lesion
Cross lesions
Deliver and provide support for devices

If you can’t:
Access the lesion
Cross the lesion
Deliver devices to and across the lesion

You can’t treat the patient!
History

1977: Grüntzig performed 1st coronary angioplasty using a guidewire – balloon unit

1982: Simpson reported 1st independently movable flexible tipped guidewire

Guidewire technology has since advanced with a wide selection for different lesions and vessel anatomies.
Benefits of Understanding Guide Wire Design

There are many different guide wires available for use. Appropriate guide wire selection can make it easier to overcome difficult clinical scenarios.

Remember: User experience and familiarity with the guide wire also plays an important role in clinical success!
Questions to Consider

For a select clinical situation…
What guide wire characteristics would be most useful?
Why are those characteristics useful?
What guide wire design features would help provide those characteristics?
### Link between Design Features and Performance Characteristics

<table>
<thead>
<tr>
<th>PERFORMANCE CHARACTERISTICS</th>
<th>DESIGN FEATURES (&quot;BUILDING BLOCKS&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CORE MATERIAL</td>
</tr>
<tr>
<td>Flexibility</td>
<td>X</td>
</tr>
<tr>
<td>Support</td>
<td>X</td>
</tr>
<tr>
<td>Pushability</td>
<td>X</td>
</tr>
<tr>
<td>Trackability</td>
<td>X</td>
</tr>
<tr>
<td>Steering / Torque Response</td>
<td>X</td>
</tr>
</tbody>
</table>

**Guidewire Components** lead to **Technical Characteristics** that affect **Performance Properties**

<table>
<thead>
<tr>
<th></th>
<th>CORE MATERIAL</th>
<th>CORE DIAMETER</th>
<th>CORE TAPER</th>
<th>TIP DESIGN</th>
<th>COVERS &amp; COILS</th>
<th>COATINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tip Shapeability / Reshapeability</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tip Visibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Tactile Feedback</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Core Diameter

- Diameter affects flexibility, support and torque

**Smaller Diameter = More Flexibility**

**Larger Diameter = More Support & Torque**

Core Material

- Affects flexibility, support, steering and tracking

Stainless Steel

Nitinol

High Tensile Strength Stainless Steel

Core Taper / Grind

- Tracking
  Ability of wire body to follow tip around bends
- Degree of support

Coatings

Polymer or plastic
Provide lubricity
Smooth tracking through tortuosity
Radiopacity for visualization
Can be put over coils

Covers

• Affect lubricity and tracking
• Facilitate smooth movement
• Different lengths and location in body of wire
• Types:

**Tip Style**

Affects steering  
Design options

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**Core-to-tip**
- Precise steering and tip control  
- Stiffer to assist with resistant lesions

**Shaping Ribbon**
- Flexible  
- Softer tip, gentle  
- Allows shape retention

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Coils

Affect support, steering, tracking and visibility
Impact dimension of wire
Affect tactile feedback

Sounds like a lot of wires, but easiest way to think about them is to break them into (1) CATEGORIES and (2) PLATFORMS

(1) Main Categories

**Workhorse**
- Access wire
- “Go-to” wires
- Soft tip atraumatic wires

**Specialty**
- CTO wires
- Device delivery wires
Guidewire Selection Strategy: Dependent on procedural steps and complexity

**WORKHORSE**
- Soft, atraumatic tip
- Good tactile feedback
- Versatile
- Durable

**SPECIALTY**
- Tapered tip
- Higher tip load
- Specific, limited use

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**Terumo Stiff Glide**
V18
Command ES

**Connect 250T**
Asahi Treasure/ Astato Victory
Sounds like a lot of wires, but easiest way to think about them is to break them into (1) CATEGORIES and (2) PLATFORMS

(2) Three Platforms

- 0.035”
- 0.014”
- 0.018”

Personal preference vs. different wire for different purposes?
<table>
<thead>
<tr>
<th>Platform Usage by Anatomy</th>
<th>0.035&quot; PLATFORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ILIAC</td>
<td>Designed to provide highest support and stability</td>
</tr>
<tr>
<td></td>
<td>Compatible with iliac treatment platforms</td>
</tr>
<tr>
<td>SFA</td>
<td>Designed to provide highest support &amp; stability</td>
</tr>
<tr>
<td></td>
<td>Compatible with most SFA balloons/stents</td>
</tr>
<tr>
<td>BTK</td>
<td>Most suitable for small vessels</td>
</tr>
<tr>
<td></td>
<td>Compatible with lowest profile balloons</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0.018&quot; PLATFORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less traumatic</td>
</tr>
<tr>
<td>Well suited to distal SFA/popliteal</td>
</tr>
<tr>
<td>More steerable and flexible</td>
</tr>
<tr>
<td>Supports lower profile devices</td>
</tr>
<tr>
<td>Supports Supera</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0.014&quot; PLATFORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Least support</td>
</tr>
<tr>
<td>May be useful in some situations e.g., re-entry</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0.018&quot; PLATFORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific feature needed, i.e., high support, good device crossing</td>
</tr>
</tbody>
</table>
Example of a Case-Based Wire Selection Strategy

Intraluminal GW-Passage to avoid problems with reentering

Start with 0.018" work-horse GW (V18, Command 18) for intraluminal passage

More drilling than pushing the GW
In case of failure of the work horse GW: CTO-Guidewires are used (high tip load/penetration power)

Tip-bending:

~ 1mm
However, after successfully passing the GW through calcified fempop occlusions, other problems may be encountered with intraluminal GW-passage.
Impossible to follow with a balloon or support-catheter.
Exchange to a 0.014” GW (through channel created by the 0.018” GW) for Ultra-low profile predilatation balloons
Followed by scoring balloon

Semi-compliant balloon with two external wires delivers focused force along the length of the balloon

Vessel preparation for further treatment
Intraluminal Recanalisation of Calcified = Complex Fempop-CTOs

After pre-dilatation and vessel preparation ...

Ultra non-compliant high pressure PTA balloon

DCB

Supera

... on 0.018“ GW platform
Stenosis or Occlusion

Stenosis

Strategy: Avoid dissection
- 0.035 Terumo Standard Glidewire
- 0.018 Abbott Command 18
- 0.018 Boston Scientific V-18

Occlusion

Occlusion Morphology
- Long lesion, fully occluded (either soft or calcified)
- Focal “skip” occlusions; Medial/adventitial calcification with soft core

Strategy: True-luminal
- 0.014 Abbott WINN 200T
- 0.014 Confianza-12
- 0.018 Abbott Connect 250T
- 0.018 Asahi Astato-30
- 0.018 Abbott Connect Flex

Strategy: Subintimal
- 0.035 Terumo Stiff Glidewire
- 0.018 Abbott Command 18
- 0.018 Abbott Connect Flex
- 0.018 Boston Scientific V-18
Low profile tip + high gram tip load = increased penetration power and increased ability to exploit microchannels present in most CTOs

<table>
<thead>
<tr>
<th>Wire</th>
<th>Make</th>
<th>Core</th>
<th>Tip Load</th>
<th>Support</th>
<th>Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Victory®</td>
<td>Boston</td>
<td>Stainless</td>
<td>12, 18, 30gm</td>
<td>++</td>
<td>++/+++</td>
</tr>
<tr>
<td>HT Connect®</td>
<td>Abbott</td>
<td>Stainless</td>
<td>4gm</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>HT Connect® Flex</td>
<td>Abbott</td>
<td>Stainless</td>
<td>12gm</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>HT Connect® 250T</td>
<td>Abbott</td>
<td>Stainless</td>
<td>30gm</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Astato® 30</td>
<td>Asahi</td>
<td>Stainless</td>
<td>30gm</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Treasure® 12</td>
<td>Asahi</td>
<td>Stainless</td>
<td>12gm</td>
<td>++</td>
<td>++</td>
</tr>
</tbody>
</table>

Larger number of “specialty wires” in the 0.018” platform
Summary & Conclusions

• Guide wire selection depends on lesion, location, and strategy.
• An increasing array of available wires has increased our ability to cross lesions and delivery therapy.
• Understanding wire construction leads to an increased understanding of a specific wire’s performance properties, and helps us choose the proper wire for the specific goal.