Utilizing complementary imaging modalities to guide strategy and optimize outcomes

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Disclosures

Daniel van den heuvel

Consultant to LimFlow SA, Philips
Speaker for LimFlow SA, Philips, Asahi
Pre procedure imaging

CE-MRA/CTA  Dx/ PSV and Continuous waveform
## Complementary Imaging Modalities?

### Imaging modality for peripheral intervention field

<table>
<thead>
<tr>
<th>Modality</th>
<th>Angiography</th>
<th>CTA</th>
<th>IVUS</th>
<th>OCT/OFDI</th>
<th>Angioscopy</th>
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</thead>
<tbody>
<tr>
<td>IMAGE</td>
<td>200</td>
<td>300</td>
<td>80-150</td>
<td>10-20</td>
<td>200</td>
</tr>
<tr>
<td>radiation exposure</td>
<td>+</td>
<td>++</td>
<td>-</td>
<td>+/-</td>
<td>+/-</td>
</tr>
<tr>
<td>contrast media</td>
<td>+</td>
<td>++</td>
<td>-</td>
<td>+/-</td>
<td>+/-</td>
</tr>
<tr>
<td>technique</td>
<td>-</td>
<td>-</td>
<td>Easy</td>
<td>So So</td>
<td>Complex</td>
</tr>
<tr>
<td>calcification</td>
<td>Yes</td>
<td>Yes</td>
<td>Just superficial</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>vessel size</td>
<td>Underestimation</td>
<td>Difficult</td>
<td>Overestimation</td>
<td>Accurate</td>
<td>Difficult</td>
</tr>
<tr>
<td>long axis</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes (AltaView)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>reimbursement</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Masahiko Fujihara MD, Kishiwada Tokushukai Hospital, Osaka, Japan
Intervention lab with Azurion 7C20 FlexArm

St. Antonius hospital Nieuwegein
Why Complementary Imaging Modalities?

- Digital Subtraction Angiography/ Fluoroscopy
- Extra Vascular Ultra-Sound (EVUS)
- Intra Vascular Ultra-Sound (IVUS)
- Optical Coherence Tomography (OCT)
Treatment Algorithm PAD

Wire Crossing

Determine best treatment

Assess treatment outcome

Optimal Result
Wire Crossing

- Vessel wall calcification
- Wire movement
- Wire Location
Wire Crossing

EVUS Assisted recanalization of SFA origin
Determine Best Treatment

Imaging requirements

- Characterize Vessel Wall Calcification
  - Determine Lumen diameter
  - Diagnose large subintimal space
  - Flow Limiting Dissections

- Balloon size, prevent DCB undersizing, achieve maximal luminal gain,
  - Atherectomy
  - Stent type: SNS/ DES/ VMI/ Tack
Assess Treatment Outcome

Geometric and Functional parameters → Recoil Luminal Gain Flow limiting Dissections → Determine Dx waveform and PSV

Easy assessment of Luminal Gain → IVUS?
Balloon Sizing

• Angiography is actually lumenography

• With angiography lumen diameter is underestimated

• An artery consists of a lumen AND a vessel wall
# Vessel Wall Calcifications

<table>
<thead>
<tr>
<th>Calcifications</th>
<th>DSA/QVA</th>
<th>EVUS</th>
<th>IVUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFA/POP</td>
<td>++</td>
<td>+</td>
<td>+++</td>
</tr>
<tr>
<td>Prox. Tibial</td>
<td>++</td>
<td>+</td>
<td>+++</td>
</tr>
<tr>
<td>Dist. Tibial</td>
<td>++</td>
<td>+</td>
<td>+++</td>
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</tbody>
</table>

Vessel wall calcifications histopathology

Significance of Vessel wall calcifications

Vessel Calcification Patterns should Determine Balloon Size Strategy in BTK Angioplasty

IVUS GUIDED TREATMENT STRATEGY

1. avoids balloon under-sizing
2. drives ad-hoc balloon over-sizing
   • beneficial in circumferential calcium (limited vessel damage and ↑ likelihood to maximize lumen gain)
   • to be avoided in spot-calcium (↑ incidence of severe dissections)

Vessel wall calcifications by IVUS

Complementary EVUS

In addition to functional imaging:

• EVUS Assisted Vessel Access

• EVUS Assisted vessel closure

• US guided nerve blocks
Innovative Imaging Modalities

- Perfusion Angiography
- Vessel analysis
- Fiber Optic RealShape (FORS) technology
- Augmented Reality
Summary

- DSA/ Fluoroscopy and EVUS are complementary imaging modalities
- IVUS is the next level imaging tool for vessel assessment
- EVUS remains indispensable for optimizing treatment outcome
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