CHARACTERIZATION OF ATERECTOMY CTO SAMPLES IN CORRELATION WITH CLINICAL OUTCOMES

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Disclosures

Speaker name: Jon George, MD

I have the following potential conflicts of interest to report:

- Consulting
  - Avinger
  - Medtronic
Objectives

1) Investigate atherectomy tissue collected from CTOs crossed via the true lumen as diagnosed using OCT

2) Delineate risk factors that correlate with clinical outcomes
HIPACT CTO Registry / VISION CTO Cohort

HIPACT CTO REGISTRY
SINGLE CENTER, ALL COMERS, CTOs

OCELOT OCT-GUIDED CROSSING CTO LESIONS (N=19 PATIENTS, DE NOVO 10, IRS 9, ONE LESION PER PATIENT) → TURBOHAWK FLUOROSCOPY-GUIDED ATERECTOMY (N=19 PATIENTS, DE NOVO 10, IRS 9, ONE LESION PER PATIENT) → FOLLOW-UP AT 3, 6, 12, OR 18 MONTHS

VISION CTO COHORT
MULTI-CENTER, CTO COHORT, IDE CLINICAL TRIAL

OCELOT OCT-GUIDED CROSSING CTO LESIONS (N=39 PATIENTS, 40 LESIONS, ALL WERE DONE DE NOVO) → PANTHERIS OCT-GUIDED ATERECTOMY (N=39 PATIENTS, 40 LESIONS, ALL WERE DONE DE NOVO) → FOLLOW-UP AT 6 MONTHS
HIPACT / TURBOHAWK: CTO Lesions Demographics & Histology Analysis (N=19)

Tissue Analysis

CTO Lesions Demographics & Histology Analysis (N=19)

OCELOT OCT-GUIDED CROSSING CTO LESIONS (N=19)

TURBOHAWK FLUOROSCOPY-GUIDED AHERECTOMY (N=19)

Follow-up at 3, 6, 12, or 18 months

Histopathological quantification

Atherectomy specimen histologic components

Adventitial area: 15.9%
Thrombosis: 12.2%
Lesion length: 150mm

HIPACT %TLR

7/10 DE-NOVO CTO
8/9 ISR CTO

70%
89%

20% 40% 60% 80% 100%
Lesions Tissue Composition HIPACT CTO

Lesion Length

% Adventitial Resection

% Thrombosis

Compiled CTO-TLR Risk Scoring

Lesion and Tissue Analysis delineated 3 major correlates with clinical outcomes.
VISION / PANTHERIS:
CTO Lesions Demographics & Histology Analysis (N=32)

- **OCELOT**
  - OCT-GUIDED CROSSING
  - CTO LESIONS (N=32)

- **PANTHERIS**
  - OCT-GUIDED ATHERECTOMY (N=32)

- FOLLOW-UP AT 6 MONTHS

**Tissue Analysis**

- **External Elastic Lamina**
- **SMC Plaque**

**Atherectomy Specimen Histologic Components**

- **Adventitial Area**: 0.82%
- **Thrombosis**: 8.8%
- **Lesion Length**: 79mm

**Histopathological Quantification**

**Vision CTO %TLR**

- 2/32 CTO Lesions
- 6.5%

- 20% 40% 60% 80% 100%
Lesions Tissue Composition VISION CTO

Lesion Length

% Adventitial Resection

% Thrombosis

Compiled CTO-TLR Risk Scoring

Lesion and tissue analysis delineated 3 major correlatives with clinical outcomes.
Comparative Predictive Scoring Model based on Lesions Histopathology

CTO RISK SCORING

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<th>CTO RISK SCORING</th>
<th>VISION SCORE</th>
<th>HIPACT SCORE</th>
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<td></td>
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<td>% ADVENTITIA</td>
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CLINICAL TLR

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<td>6.5%</td>
<td>78.9%</td>
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Lesion and tissue analysis predictive scoring model for clinical outcomes
Key Points

1. Non-Image guided atherectomy results in greater adventitial resection
2. Image guided revascularization reduces EEL disruption, resulting in reduced adventitial content
3. Lesion and tissue analysis delineated 3 major correlatives with clinical outcomes:
   • Lesion length
   • Adventitial resection
   • % Thrombosis
4. Predictive scoring based on lesion analysis may improve treatment
Thank You !
Methods

• **Fixation**: The excised tissue fragments were fixed with 10% neutral buffered formalin, and weight in mg.

• **Processing**: Routine histological processing, sectioning, and staining with hematoxylin and eosin (H&E), Masson’s trichrome, and elastic van Gieson (EVG) stains.

• **Slide Scan**: The stained slides were scanned and converted into digital images using a slider scanner (ScanScope CS, Aperio).

• **Area Measurement**: EVG stained slides were used to draw boundaries around different tissue components such as intimal plaque, media, adventitia to measure their area with ScanScope analysis tools. Summary of all individual component area was the total section area.

• **Scoring**: LL- in cm+ %Adventitial resection + % Thrombus
Adventitial Component Quantification
(% adventitial area = adventitia area / total tissue section area)

- Pantheris excised more tissue per cm lesion length than that of Turbohawk (13.46mg vs 6.29mg)
- Much higher % adventitial area in Turbohawk specimen was seen (15.86% vs 0.82%)
- Less tissue specimens from Pantheris procedure detected adventitial component (42.5% vs 100%)
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