The Challenge of Vessel Calcification in Different Vascular Beds: What are we dealing with?

J.A. Mustapha, MD, FACC, FSCAI

Director of Cardiovascular Catheterization Laboratories
Director of Endovascular Interventions
Director of Cardiovascular Research
Metro Health Hospital, Wyoming, MI
Clinical Assistant Professor of Medicine
Michigan State University, E. Lansing, MI
Disclosure

- Abbott Vascular - Consultant, Speaker, Medical Advisory Board
- Bard Peripheral Vascular - Research, Consultant, Medical Advisory Board, Speaker, Trainer
- Bayer - Medical Advisory Board
- Biotronik - Research
- Boston Scientific - Speaker, Consultant
- Cardiovascular Systems, Inc. - Research, Consultant, Speaker, Trainer
- Cook Medical - Research, Consulting, Speaker, Trainer
- Cordis - Consultant, Trainer
- Covidien - Consulting, Speaker, Trainer
- Lake Region Medical - Consulting
- Terumo - Consulting, Speaker, Trainer
- Trireme – Research
- Spectranetics – Research, Consulting
Calcium, what are we dealing with?

We are dealing with two major types of vascular calcifications.

Let's take a dive into the basics of vascular calcification.

1. *Intimal* calcification
2. *Medial* calcification
Calcium, what are we dealing with?

How does calcium effect our clinical practice?
It tends to create a hostile interventional atmosphere that includes....

1- when to perform “plaque/calcium modification”
2- plaque excisional therapy
3- plaque “trapping therapy”
4- plaque structural interruption followed with antiproliferative drug implantation
5- surgical EA
To achieve successful revascularization, additional understanding of the current state of peripheral calcium deposit and plaque composition is needed to make the proper diagnostic decisions.
How to best diagnose calcification?
CT / SFA Calcification
SFA-Popliteal, solid intimal calcification, *look for trends.*
BTK from Proximal to Distal along with the transition of Calcification from Intimal (proximal BTK) to Medial (distal BTK),

Transition of calcification:
1. Solid intimal;
2. Layered mixed;
3. Thin medial circumferential

worse Calcium
Visualization of calcium beyond "fluoroscopi"

The prevalence of "Jenali gaps" at the ankle strap is indicative arterial obliteration.
“Jenali gap” A sudden interruption of a calcified arterial integrity With clear defined absence of calcium in the gap Between the two separated calcific segments

Ominous sign of end stage arterial disease. More common in BTK vessels
Obliteration and distortion of the tibial artery

Jenali gap
occluded

patent
mid to distal tibial arterial calcification...pay attention

To the trends and differentiate medial from intimal calcification

Excellent example of the medial wall “helical”

Appearance of calcium deposit

Combined medial & intimal calcium

2D CT

3D reconstructed CT
Calcium medial deposit appears to follow a helical structure as if it is attempting to position itself in a spring-like structure as seen in this 3D reconstructed figure.
Intimal calcification
Medial calcification
Helical structure
Helical Calcification
calcium deposit below the knee. When present, it has somewhat predictable distribution.

The P3-Tibials is notorious for calcium accumulation in both the intimal and medial walls. The intimal calcifications tend to grow bidirectionally into the lumen and the medial wall and beyond.
Medial calcification

Combined medial and intimal calcification
How to view this calcified tibial CTO?

1. Medial calcification
2. Combined medial and intimal calcification
Balloon Angioplasty in Medial Calcification
Balloon angioplasty in combined intimal & medial calcification
Typical example of medial wall calcification and its helical structure
Pop Jenali Gap, *always* an indication of an underline severe calcification
Tibial medial calcification leading into “pre-Jenali gap”
Calcified tibial vessels lose their pliability therefore are prone to fracture
A DOG BONE IS A DOG BONE!!
UNTIL PULVERIZED...
Plaque Modification + PTA
Analysis of a severely calcified vessel
- Where is the medial calcification
- Where is the intimal calcification

- CTO caps
- Deep vs shallow subintimal plain
- Helical calcification
Trans-luminal obliteration can be difficult to cross.
High resolution x-ray of combined medial and intimal calcification of tibial vessels.
When is tibial intervention is effective?

When is tibial intervention is not effective?
A closer look at peripheral arterial arterial calcium
Pure medial calcification vs intimal and plaque rupture with additional calcification
Bifurcations/ carinas and calcium

Plaque shift
Medial Calcification in Tibias: Not always a bad sign
Conclusion

• As of today calcium presents a serious obstacle in the way of delivering therapy.
• Worse in the tibials than above the knee
• No single atherectomy device is able to tx all types of calcium.
• Should NOT stent a non dilatable calcified vessel
• Always pretreat calcified vessels before any additional therapy
• Always post treat calcified vessels post atherectomy
• Medial calcification’s helical structure, not always a bad sign unless combined with intimal calcification. Associated with better initial luminal gain
• Intimal calcification does not allow for the mechanism to happen and add significant resistant followed with severe recoil.
• Jenali gap: always associated with end stage arterial disease and tran- luminal arterial obliteration.
Thank You

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