THE SCIENCE OF IVL &
THE IMPORTANCE OF VESSEL COMPLIANCE

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DISCLOSURES

- I do not have any potential conflicts of interest to report

X I have the following potential conflicts of interest to report:

- Consulting: Cook, Shockwave
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)
What can tackle calcium?

Do these options change vessel compliance?

| POBA | Specialty Balloons | Atherectomy |
Why does compliance matter?

Compliance allows equipment passage

Compliance in non-diseased arteries is *primarily determined* by the elastic content of the adventitia.

Compliance in severely diseased arteries is *primarily determined* by the fibrotic/calcific content of the plaque.

• Images courtesy of Optima Education
Why does compliance matter?

Plaque compliance is correlated with disease severity

For a given quantity of pressure, the volume of compliant vessels changes more than lower compliant vessels

- Complex peripheral vascular disease with concentric and nodular calcification
- Fibroatheroma with fibrotic layers
- Atheroma with lipid pools
- Normal vessel

Images courtesy of Optima Education
Why does compliance matter?
Plaque compliance is correlated with disease severity.

Calcific plaque impairs vascular distensibility

Complex peripheral vascular disease with concentric and nodular calcification
Fibroatheroma with fibrotic layers
Atheroma with lipid pools
Normal vessel

INCREASING COMPLIANCE

• Images courtesy of Optima Education
IVL Mechanism of Action
Intravascular Lithotripsy

**Pre-IVL Treatment***
- Deliver catheter and inflate to low pressure

**Post-IVL Treatment***
- Generate sonic pressure waves using lithotripsy
- Crack calcium
- Safely expand the vessel

**IVL**
- Each pulse delivers an effective pressure of ~50 atm
- Balloon maintained at a low inflation pressure
- Fractures both superficial and deep calcium

*Micro-CT scan analysis: R. Virmani, CV Path Institute
IVL impacting on calcium

Bench Model

Cad Lab Experience
Real calcium

Video courtesy of the Thinline Academy
IVL Result

**Calcium Challenges**

- **Microfractures in superficial calcium**
- **Microfractures in deep calcium**
- **Linear and transversal safely fractures**
- **Not embolic risk**
Case example

rAAA

• 78y male with sudden abdominal pain
Case example
rAAA

- 78y male with sudden abdominal pain
Case example
rAAA
Case example

rAAA
Case example

rAAA
Conclusion

IVL is safe and effective

Also in large vessels with severe calcification

Minimal complications

Change compliance, change the game
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