



ADVANCES IN CARDIAC ARRHYTHMIAS and GREAT INNOVATIONS IN CARDIOLOGY

XXIX GIORNATE CARDIOLOGICHE TORINESI

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**TURIN
OCTOBER
27-28,
2017**

Centro Congressi
Unione Industriale
di Torino

Myocardial bridging

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Director Cardiovascular Research Center
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DISCLOSURE

Relevant financial relationship(s) with industry

Itamar Medical: advisory board

Volcano/Philips consultant

Off Label Usage

None

19 year old male with Chest Pain

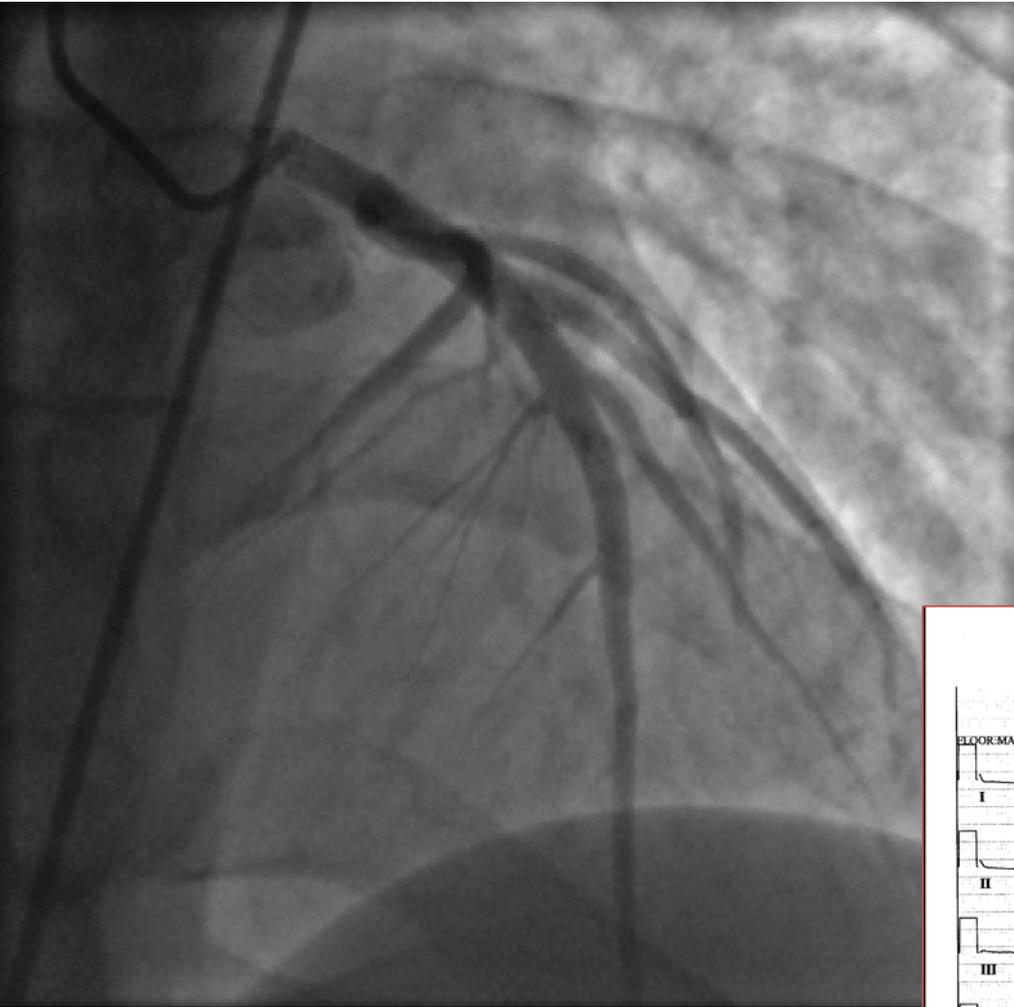
- A 19 college student a member of the rowing varsity team.
- Several episodes of severe chest pain during intense training.
- Admitted to the ER with ECG changes and Tn elevation
- No CAD risk factors.
- Normal physical examination.

19 year old male with Chest Pain

What should be the next step to allow him to go back to his team?

1. Exercise Sestamibi
2. Multi slice CT
3. Coronary angiography
4. Echocardiography
5. The ECG and the Tn are secondary to intense exercise

Coronary angiography



19 year old male with Chest Pain

What should be the next step?

1. FFR in response to IV adenosine
2. Drug eluting stent
3. IVUS or OCT to rule out plaque rupture
4. Conservative therapy
5. Other coronary physiology study

Myocardial bridging: FFR in response to IV dobutamine and IC Adenosine



$FFR_{\text{adenosine}} = 0.87$

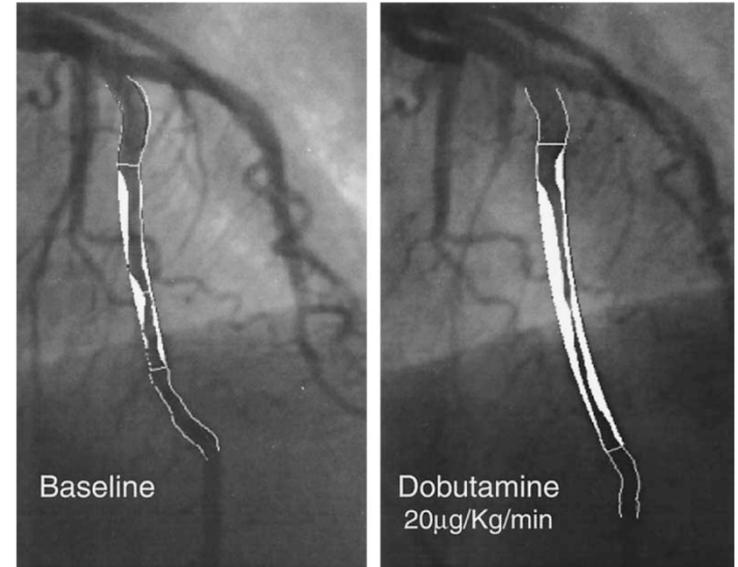
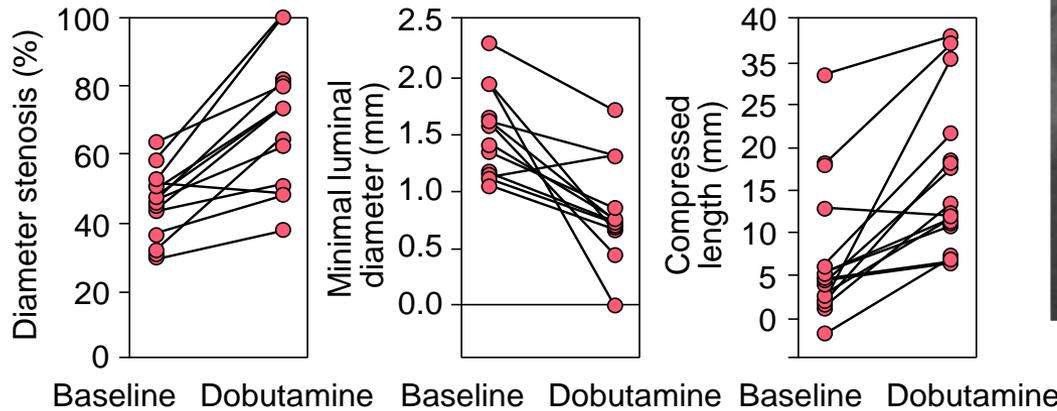
Dobutamine (40 $\mu\text{g}/\text{kg}/\text{min}$)



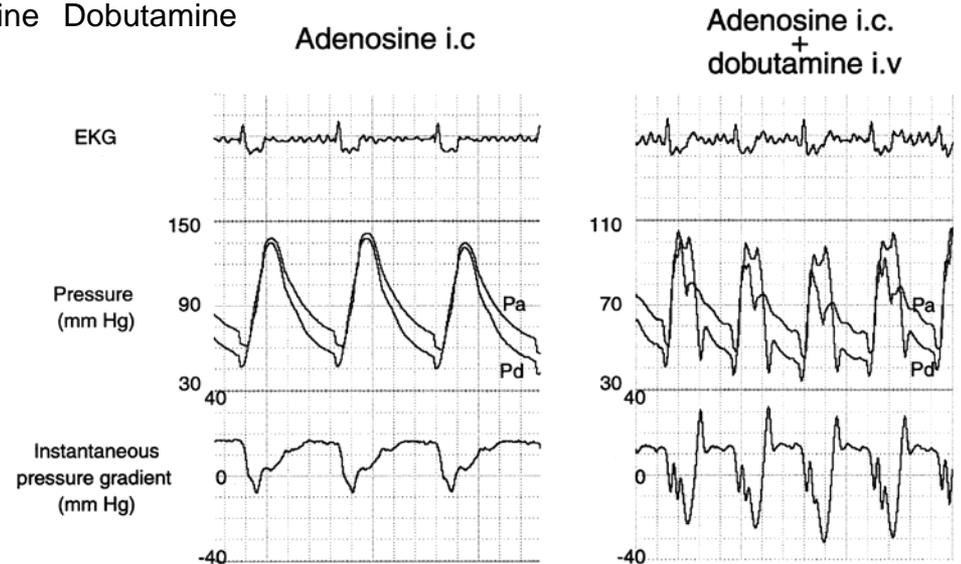
Importance of Diastolic Fractional Flow Reserve and Dobutamine Challenge in Physiologic Assessment of Myocardial Bridging

Javier Escaned, MD, PhD, Jorge Cortés, MD, Alex Flores, MD, PhD, Javier Goicolea, MD, PhD, Fernando Alfonso, MD, PhD, Rosana Hernández, MD, PhD, Antonio Fernández-Ortiz, MD, PhD, Manel Sabaté, MD, PhD, Camino Bañuelos, MD, Carlos Macaya, MD, PhD

Madrid, Spain



Conclusions: Physiologic assessment of MB should include dobutamine challenge. Diastolic FFR appears to be the technique of choice for MB assessment, where as mean FFR should be used with caution.



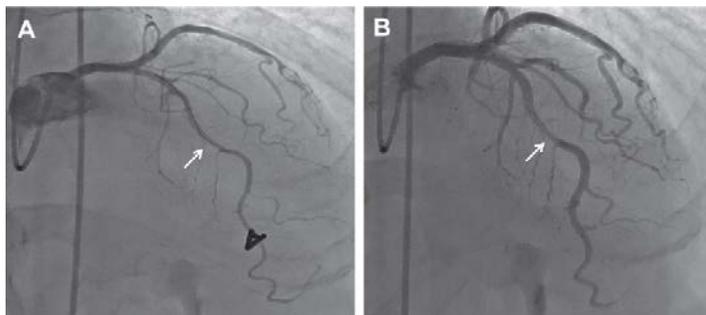
Myocardial Bridging

Contemporary Understanding of Pathophysiology With Implications for Diagnostic and Therapeutic Strategies

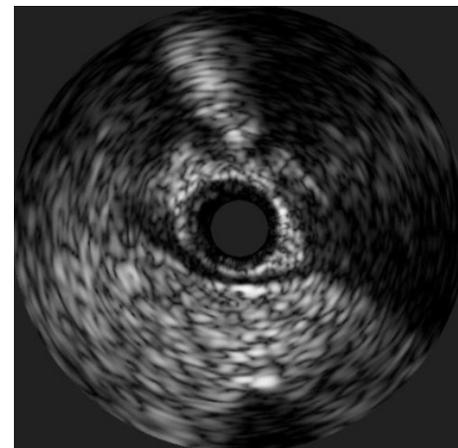
Michel T. Corban, MD,* Olivia Y. Hung, MD, PhD,* Parham Eshtehardi, MD,* Emad Rasoul-Arzumly, MD,* Michael McDaniel, MD,* Girum Mekonnen, MD, MPH,* Lucas H. Timmins, PhD,† Jerre Lutz, MD,* Robert A. Guyton, MD,‡ Habib Samady, MD* Atlanta, Georgia

- Coronary arteries that tunnel through the myocardium are seen in as many as 40% to 80% of cases on autopsy; however, functional myocardial bridging is less commonly observed on angiography (0.5% to 16.0%) and can range from 4 to 80 mm in length
- 67% to 98% occur in the left anterior descending coronary artery (LAD)
- Autopsy and intravascular ultrasound studies have shown that the intramural and distal segments of bridged vessels remain free from atherosclerotic disease while the proximal segment of the vessel is prone to developing atherosclerosis

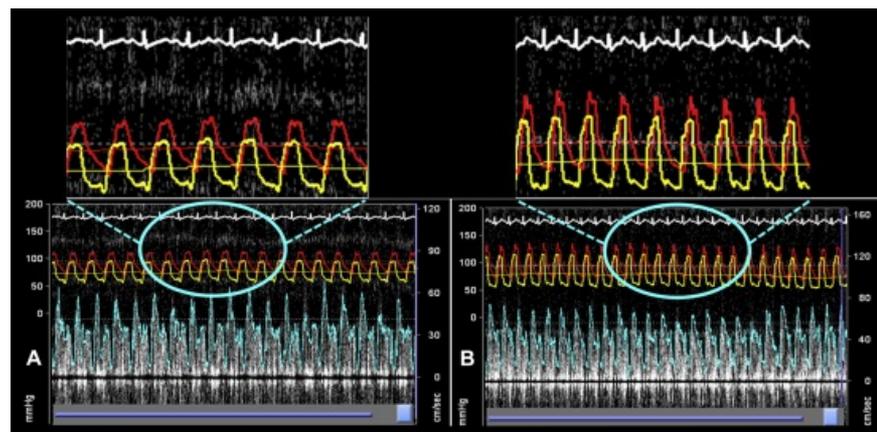
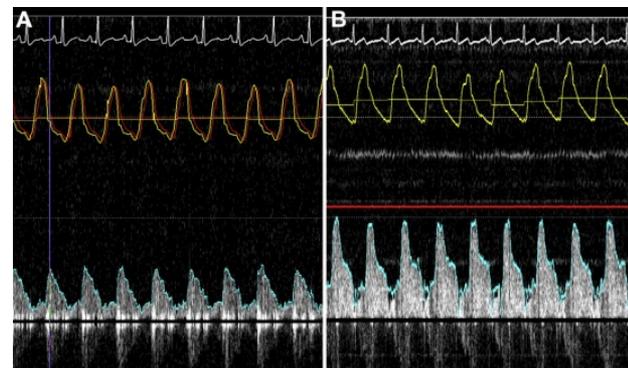
Systolic Narrowing at the Myocardial Bridge Accentuated by Intracoronary Nitroglycerin



Intravascular Ultrasound “Half-Moon” Sign



Fingertip Phenomenon During Intracoronary Doppler Measurements

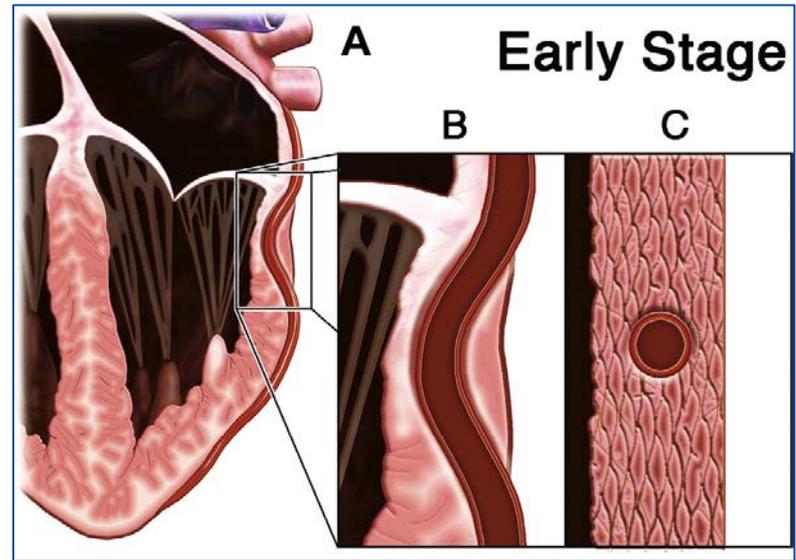


Intracoronary Hemodynamics from a Patient with Myocardial Bridging

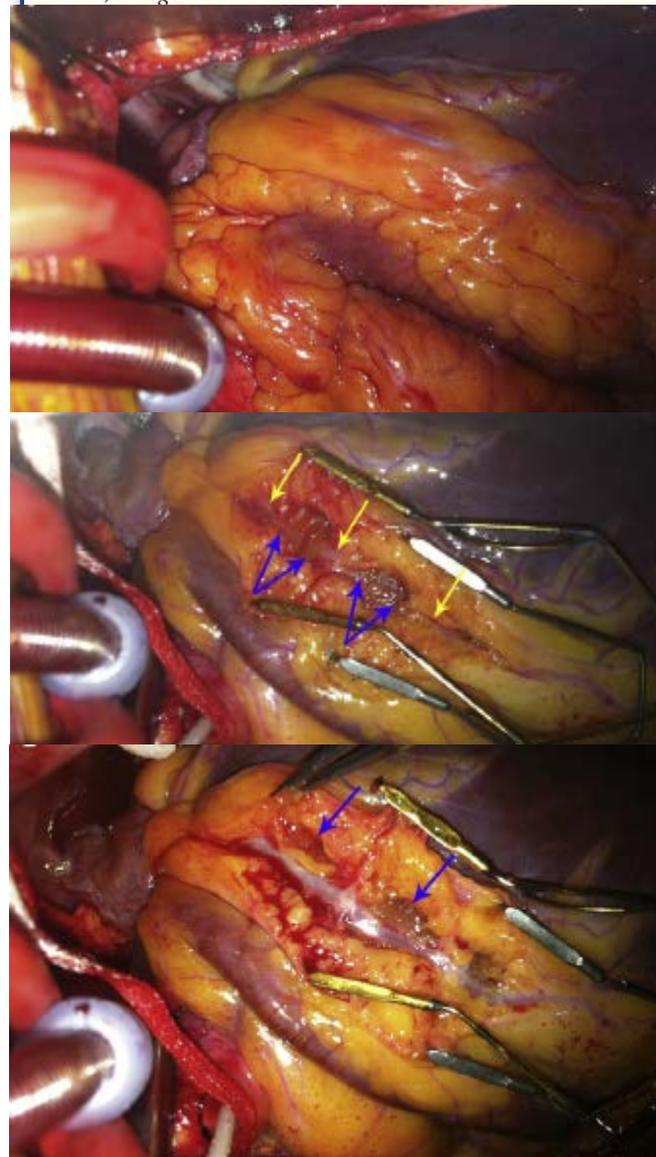
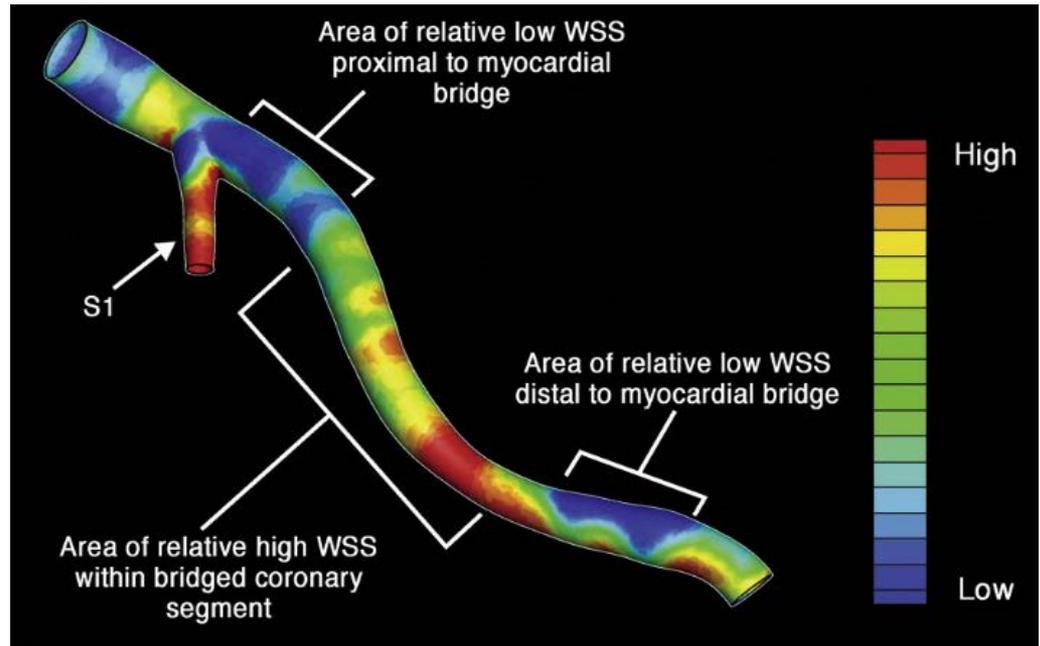
Myocardial Bridging

Contemporary Understanding of Pathophysiology With Implications for Diagnostic and Therapeutic Strategies

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Intracoronary shear stress analysis from a Patient with Myocardial Bridging



Imaging Versus Anatomic Assessment of Myocardial Bridging by Intravascular Ultrasound: Impact of Arterial Compression on Proximal Atherosclerotic Plaque

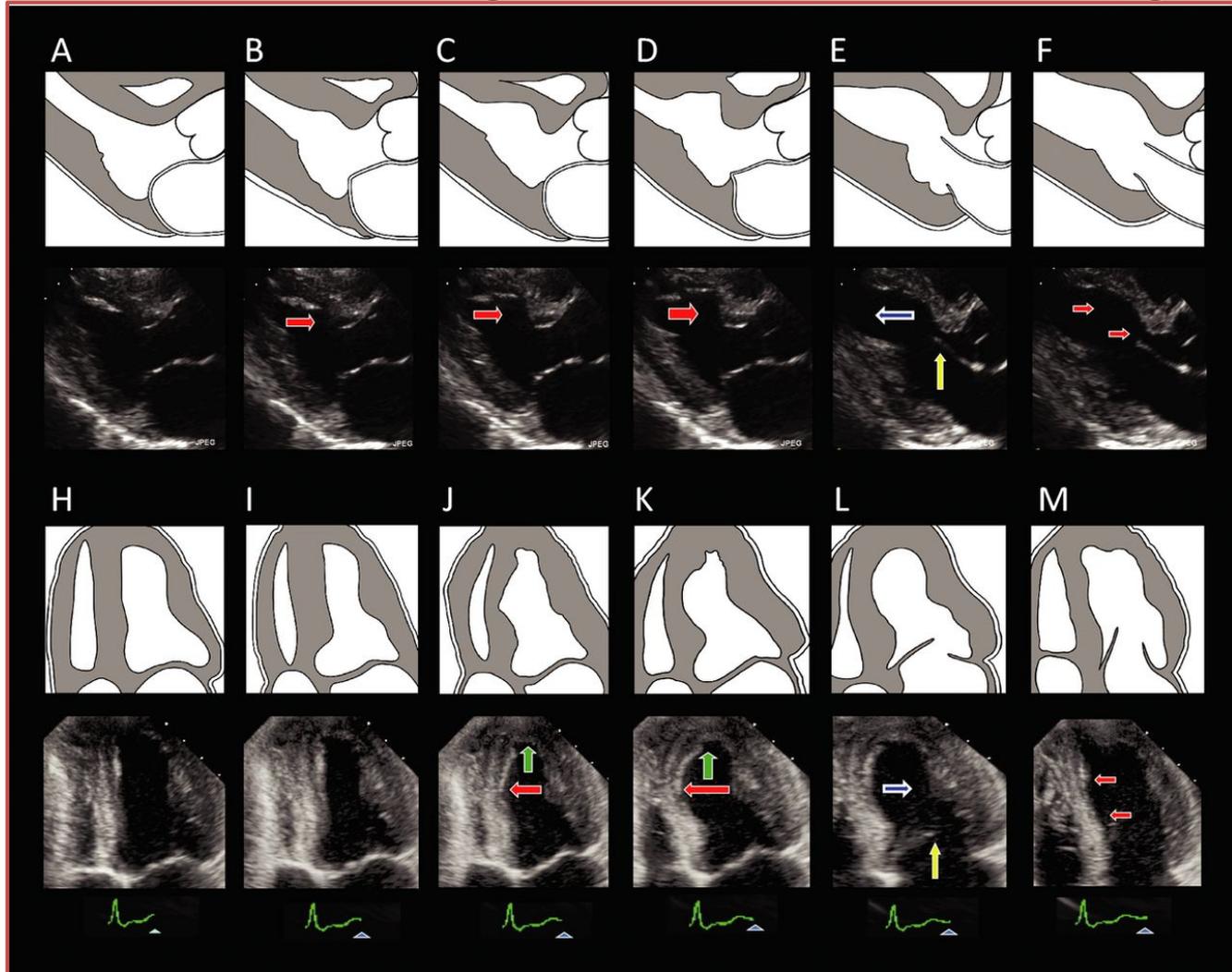
Yoshinori Yamada, MD, PhD; Jennifer A. Tremmel, MD, MS; Shigemitsu Tanaka, MD; Shin Lin, MD, PhD, MHS; Yuhei Kobayashi, MD; Brooke Hollak, RN, BAHA; Paul G. Yock, MD; Peter J. Fitzgerald, MD, PhD; Ingela Schnittger, MD; Yasuhiro Honda, MD

100 patients with angina but no significant obstructive coronary artery disease who had an intravascular ultrasound– detected MB in the left anterior descending artery

The correlation between arterial compression and Max proximal plaque in younger adults with ≤ 1 coronary risk factor.

Stress Echocardiography

‘transient late-systolic to early-diastolic buckling of the septum **with** apical sparing on exercise echocardiography’

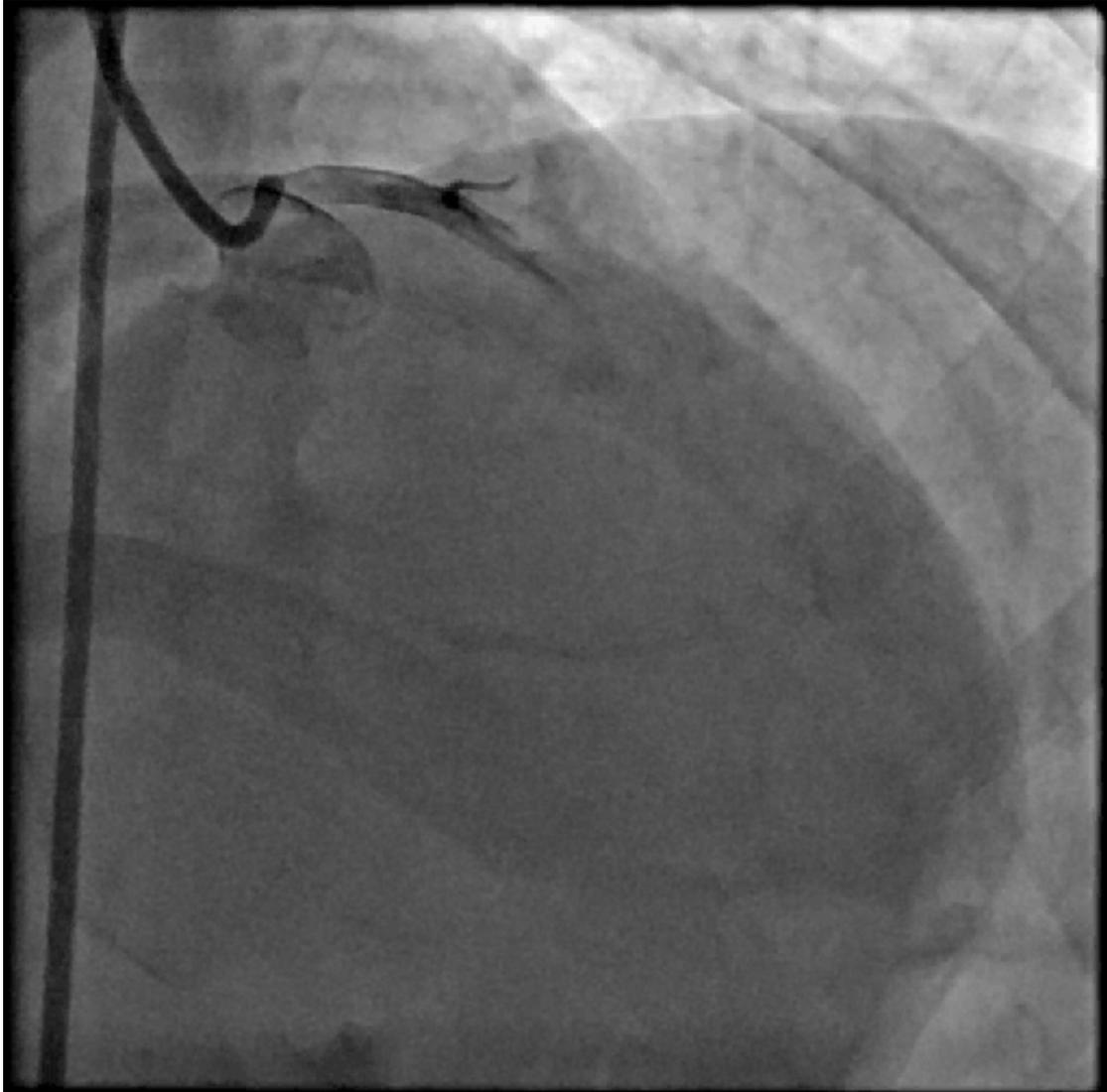


Schwarz Type	Criteria	Objective Signs of Ischemia	Treatment
A	Incidental finding on angiography	-	None
B	Ischemia on stress test	+	BB or CCB
C	Altered intracoronary hemodynamics (quantitative coronary angiography/coronary flow reserve/Doppler)	+/-	BB or CCB and/or revascularization

59 year old female with Chest Pain

- Progressive exertional chest pain in the past several months.
- CAD risk factors: post menopausal, hypertension, hyperlipidemia.
- Normal physical examination.
- Exercise Echo: Septal wall motion abnormality with apical sparing

Myocardial bridging



FFR to IC
adenosine : 0.90

FFR to IV
dobutamine with IC
adenosine: 0.87

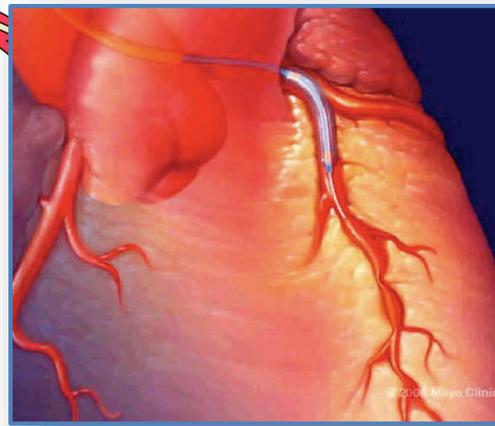
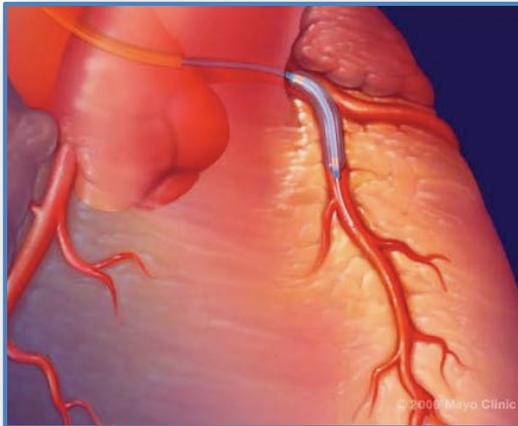
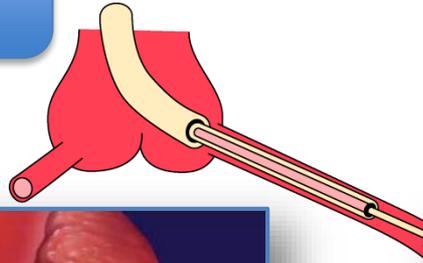
59 year old female with Chest Pain

What should be the next step?

1. CT angio
2. Drug eluting stent
3. IVUS or OCT to rule out plaque rapture
4. Conservative therapy
5. Other coronary physiology study

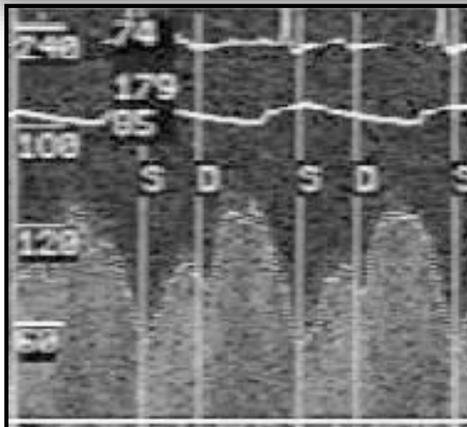
Coronary Endothelial Function Protocol

Diagnostic angiography

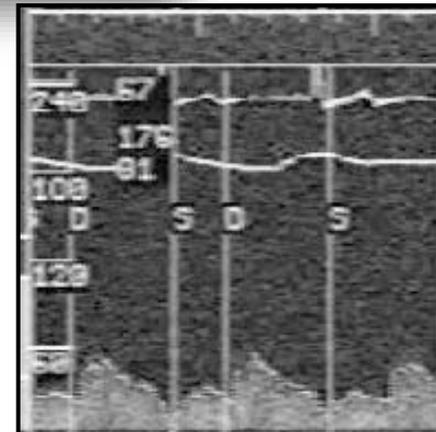


Acetylcholine
(endothelium
dependent
vasodilator)

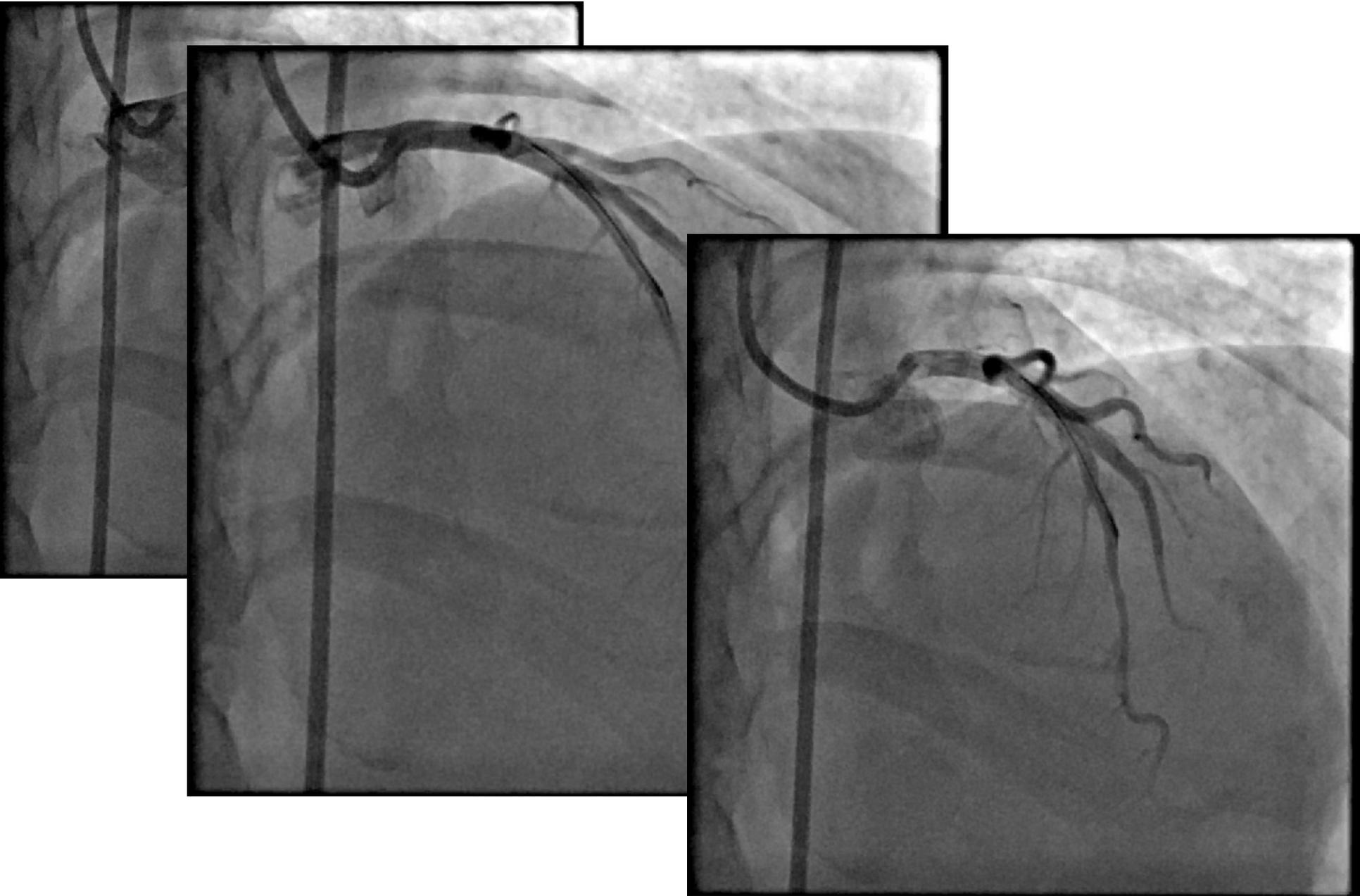
Epicardial



Microcirculation



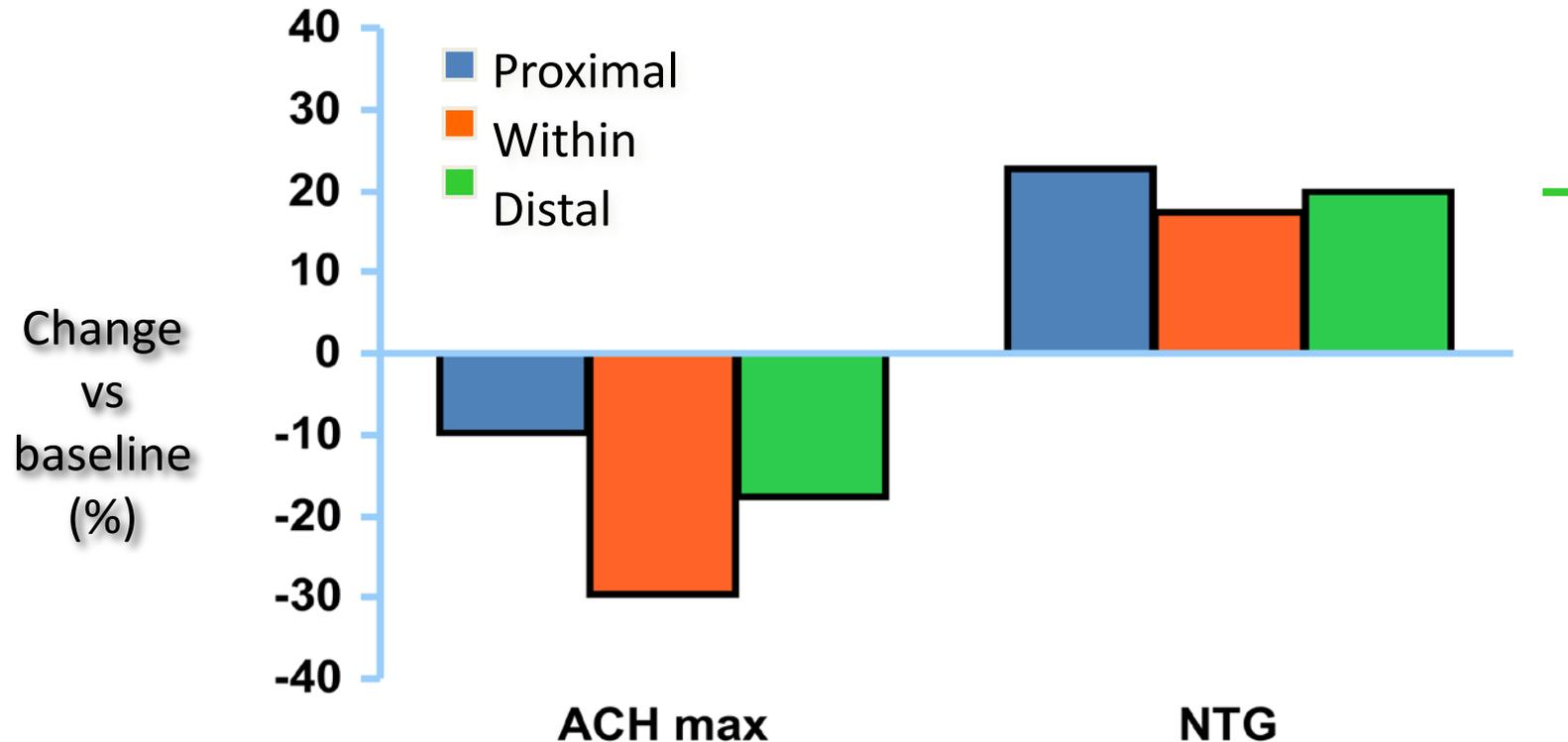
Myocardial bridging and endothelial function



Clinical research

Myocardial bridging is associated with alteration in coronary vasoreactivity

Joerg Herrmann, Stuart T. Higano, Ryan J. Lenon, Charanjit S. Rihal, Amir Lerman*



59 year old female with Chest Pain

What should be the next step?

1. Drug eluting stent
2. IVUS or OCT to rule out plaque rupture
3. Conservative therapy: CCB
4. NTG and beta blockers
5. Surgical intervention

Myocardial bridging: Surgical experience at Mayo

- 63 patients 1996 to 2017 mean age of 48 years
- Unroofing was complicated by entry into the RV in three patients. Mean stay in the hospital 5 days
- No hospital mortality and no CV mortality on 30 days
- During follow-up (median 31 months, 95% CI 18-52 months), there were no cardiac-related deaths and 75% reported no chest pain.

