Percutaneous Coronary Intervention: an Update for the Internist

Michael W. Cammarata, MD, MS
Boca Raton Regional Hospital – Grand Rounds
January, 9 2018
Objectives/Outline

* Background/Introduction
* Patient selection
* Stent Selection
  * Bare Metal
  * DES
  * Bio-resorbable
* Post Stenting Therapy
* Future Directions
Coronary Atherosclerosis
Coronary Atherosclerosis

Angina
Angina pectoris definition:

- a syndrome characterized by paroxysmal, constricting pain below the sternum, most easily precipitated by exertion or excitement and caused by ischemia of the heart muscle, usually due to a coronary artery disease, as arteriosclerosis.
Stable vs Unstable Angina/ACS

**Stable Angina**
- Pathophysiology:
  - Fixed stenosis
  - Stable fibrous plaque
- Clinical Features:
  - Demand-led ischaemia
  - Related to effort
  - Predictable
  - Symptoms over long term
- Risk Assessment:
  - Symptoms on minimal exertion
  - Exercise testing
    - Duration of exercise
    - Degree of ECG changes
    - Abnormal BP response
  - CT coronary angiogram

**Acute Coronary Syndrome**
- Pathophysiology:
  - Dynamic stenosis
  - Ruptured or inflamed plaque
- Clinical Features:
  - Supply-led ischaemia
  - Symptoms at rest
  - Unpredictable
  - Symptoms over short term
  - Frequent or nocturnal symptoms
- Risk Assessment:
  - ECG changes at rest
  - ECG changes with symptoms
  - Elevation of troponin
Evaluation of Stable Ischemic Heart Disease (SIHD)

- Symptoms consistent with stable coronary artery disease.
- Proceed with stress testing
## Evaluation of Stable Ischemic Heart Disease (SIHD)

<table>
<thead>
<tr>
<th>Indication</th>
<th>Asymptomatic</th>
<th>Ischemic Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not on AA Therapy or With AA Therapy</td>
<td>PCI</td>
<td>CABG</td>
</tr>
<tr>
<td>Not on AA Therapy</td>
<td>PCI</td>
<td>CABG</td>
</tr>
<tr>
<td>On 1 AA Drug (BB Preferred)</td>
<td>PCI</td>
<td>CABG</td>
</tr>
<tr>
<td>On ≥2 AA Drugs</td>
<td>PCI</td>
<td>CABG</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Proximal LAD or Proximal Left Dominant LCX Involvement Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Low-risk findings on noninvasive testing</td>
</tr>
<tr>
<td>M (5)</td>
</tr>
<tr>
<td>R (3)</td>
</tr>
<tr>
<td>M (4)</td>
</tr>
<tr>
<td>M (4)</td>
</tr>
<tr>
<td>M (5)</td>
</tr>
<tr>
<td>M (5)</td>
</tr>
<tr>
<td>M (4)</td>
</tr>
<tr>
<td>A (7)</td>
</tr>
<tr>
<td>A (7)</td>
</tr>
<tr>
<td>5. Intermediate- or high-risk findings on noninvasive testing</td>
</tr>
<tr>
<td>M (5)</td>
</tr>
<tr>
<td>M (5)</td>
</tr>
<tr>
<td>M (6)</td>
</tr>
<tr>
<td>M (6)</td>
</tr>
<tr>
<td>A (7)</td>
</tr>
<tr>
<td>A (7)</td>
</tr>
<tr>
<td>A (8)</td>
</tr>
<tr>
<td>A (8)</td>
</tr>
<tr>
<td>6. No stress test performed or, if performed, results are indeterminate</td>
</tr>
<tr>
<td>M (5)</td>
</tr>
<tr>
<td>M (5)</td>
</tr>
<tr>
<td>M (6)</td>
</tr>
<tr>
<td>M (6)</td>
</tr>
<tr>
<td>M (6)</td>
</tr>
<tr>
<td>M (6)</td>
</tr>
<tr>
<td>A (8)</td>
</tr>
<tr>
<td>A (7)</td>
</tr>
<tr>
<td>FFR ≤0.80</td>
</tr>
</tbody>
</table>
## Evaluation of NSTEACS

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perform rapid determination of likelihood of ACS, including a 12-lead ECG within 10 min of arrival at an emergency facility, in patients whose symptoms suggest ACS</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Perform serial ECGs at 15- to 30-min intervals during the first hour in symptomatic patients with initial nondiagnostic ECG</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Measure cardiac troponin (cTnl or cTnT) in all patients with symptoms consistent with ACS*</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Measure serial cardiac troponin I or T at presentation and 3-6 h after symptom onset* in all patients with symptoms consistent with ACS</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Use risk scores to assess prognosis in patients with NSTE-ACS</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Risk-stratification models can be useful in management</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>Obtain supplemental electrocardiographic leads V7 to V9 in patients with initial nondiagnostic ECG at intermediate/high risk for ACS</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>Continuous monitoring with 12-lead ECG may be a reasonable alternative with initial nondiagnostic ECG in patients at intermediate/high risk for ACS</td>
<td>IIb</td>
<td>B</td>
</tr>
<tr>
<td>BNP or NT-pro-BNP may be considered to assess risk in patients with suspected ACS</td>
<td>IIb</td>
<td>B</td>
</tr>
</tbody>
</table>
## Evaluation of NSTEACS

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diagnosis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure cardiac-specific troponin (troponin I or T) at presentation and 3–6 h after symptom onset in all patients with suspected ACS to identify pattern of values</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Obtain additional troponin levels beyond 6 h in patients with initial normal serial troponins with electrocardiographic changes and/or intermediate/high risk clinical features</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Consider time of presentation the time of onset with ambiguous symptom onset for assessing troponin values</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>With contemporary troponin assays, CK-MB and myoglobin are not useful for diagnosis of ACS</td>
<td>III: No Benefit</td>
<td>A</td>
</tr>
<tr>
<td><strong>Prognosis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Troponin elevations are useful for short- and long-term prognosis</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Remeasurement of troponin value once on d 3 or 4 in patients with MI may be reasonable as an index of infarct size and dynamics of necrosis</td>
<td>IIb</td>
<td>B</td>
</tr>
<tr>
<td>BNP may be reasonable for additional prognostic information</td>
<td>IIb</td>
<td>B</td>
</tr>
</tbody>
</table>
## NSTEACS AUC

### NSTEMI/Unstable Angina

<table>
<thead>
<tr>
<th>Indication</th>
<th>Appropriate Use Score (1–9)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revascularization by PCI or CABG</strong></td>
<td></td>
</tr>
<tr>
<td>15. Evidence of cardiogenic shock</td>
<td>A (9)</td>
</tr>
<tr>
<td>▪ Evidence of cardiogenic shock</td>
<td></td>
</tr>
<tr>
<td>▪ Immediate revascularization of 1 or more coronary arteries</td>
<td></td>
</tr>
<tr>
<td>16. Patient stabilized</td>
<td>A (7)</td>
</tr>
<tr>
<td>▪ Patient stabilized</td>
<td></td>
</tr>
<tr>
<td>▪ Intermediate- OR high-risk features for clinical events (e.g., TIMI score 3–4)</td>
<td></td>
</tr>
<tr>
<td>▪ Revascularization of 1 or more coronary arteries</td>
<td></td>
</tr>
<tr>
<td>17. Patient stabilized after presentation</td>
<td>M (5)</td>
</tr>
<tr>
<td>▪ Patient stabilized after presentation</td>
<td></td>
</tr>
<tr>
<td>▪ Low-risk features for clinical events (e.g., TIMI score ≤2)</td>
<td></td>
</tr>
<tr>
<td>▪ Revascularization of 1 or more coronary arteries</td>
<td></td>
</tr>
</tbody>
</table>
Anti-anginal Medications

* Beta Blocker
  * Metoprolol
    * Goal Dose 100mg BID
  * Coreg
    * Goal Dose 25mg BID

* CCB
  * Amlodipine
    * Goal Dose 10 mg daily

* Long acting nitrates
  * Imdur
    * Goal Dose 60 mg or more daily

* Ranolazine
  * Goal Dose 1000 mg BID
PCI Historic Timeline

- 1940: Vineberg procedure
- 1945: Cardiopulmonary bypass
- 1950: First coronary angiography
- 1955: Venous graft for CABG
- 1960: First off-pump revascularization
- 1965: First POBA
- 1970: First radial graft
- 1975: First coronary stent
- 1980: IVUS + high-pressure dilatation
- 1985: FFR introduced
- 1990: First DES approved for use in US (sirolimus)
- 1995: No-touch radial grafts
- 2000: Clopidogrel approved for use in US
- 2005: First "2nd-generation" stent approved for use in US (zotarolimus)
- 2010: Prasugrel approved for use
- 2015: Ticagrelor approved for use in Europe
- 2020: Bioabsorbable scaffold approved for use in Europe
Plain Old Balloon Angioplasty - PTCA
**POBA/PTCA**

- Initial percutaneous therapy
- High rate of restenosis (recoil)
- High rate of re-intervention (in the range of 30-50%)
- High rate of coronary artery dissection.
- Very widely available early on, however, with the advent of stents, this therapy was essentially relegated to pre-dilation of lesions, dilation of in stent lesions or as a last resort for difficult lesions.
CONCLUSIONS:

The implantation of a Palmaz-Schatz stent almost completely eliminates the decrease in vessel dimensions caused by elastic recoil and therefore diminishes the impact of hyperplasia and reduces the rate of restenosis.
A comparison of balloon-expandable-stent implantation with balloon angioplasty in patients with coronary artery disease


Acute angiographic and procedural success rates were similar between the two groups. At seven-month follow-up, the primary clinical end point was achieved in 30% of patients in the balloon angioplasty group versus 20% of patients in the stent group (*p* = 0.02). The difference in primary end point was largely driven by the significant reduction in TLR in the stent group (10% vs. 21%; *p* = 0.001). Furthermore, the incidence of re-stenosis was 22% in the stent group versus 32% in the POBA group (*p* = 0.002). Bleeding and vascular complications were significantly higher in the stent group who received warfarin in addition to dual antiplatelet therapy (13.5% vs. 3.1%; *p* <0.001). In addition, the mean hospital stay was significantly longer in the stent group compared with the POBA group (8.5 vs. 3.1 days; *p* <0.001).
Palmaz Schatz Stent

- Thick struts
- Very early design
- No very deliverable
2nd generation Bare Metal Stent

- Multi-link Vision stent – Abott Vascular
- Rebel Stent – Boston Scientific
- Intergrity - Medtronic
2nd generation Bare Metal Stent

- Multi-link Vision stent – Abott Vascular
  - CoCr alloy
  - Open cell design
  - Thin struts
- Rebel Stent – Boston Scientific
  - PlCr alloy – allows for better visibility
  - Open cell design
  - Thin struts
- Driver – Medtronic
  - CoCr alloy
  - Open cell design
  - Thin struts
2\textsuperscript{nd} generation Bare Metal Stent
Multi-Link Vision

- Approved through Vision registry data in 2003.
- 268 patient enrolled
- 11% TLR at 270 days
- No stent thrombosis
* Approved through the Driver Registry
* 298 patients enrolled
* 7% TLR at 270 days
* No stent thrombosis
Rebel

- Approved through OMEGA trial 2014
- 328 patient enrolled
- 7% TLR at 270 days
- 0.6% stent thrombosis
Bare Metal Stents

- Endothelialize fairly rapidly
- This leads to
  - a lower rate of ST than say a DES
  - Increased rate of restenosis and TLR
- Mostly indicated for patients felt to be poor candidates for long term DAPT
  - Adherence issues
  - Upcoming surgeries
Bare Metal Stents

The graph shows the percentage of endothelialization over different days following stent placement for three different types of stents:

- Stainless Steel stent
- Cobalt-Chromium stent
- Tacrolimus-Eluting stent

For each stent type:

- 1 day (n=9): Stainless Steel 29%, Cobalt-Chromium 29%, Tacrolimus-Eluting 31%
- 3 days (n=9): Stainless Steel 46%, Cobalt-Chromium 81%, Tacrolimus-Eluting 95%
- 7 days (n=15): Stainless Steel 79%, Cobalt-Chromium 98%, Tacrolimus-Eluting 79%
Drug Eluting Stents

* First Generation
  * Taxus
  * Cypher
* Second Generation
  * Xience
  * Promus
  * Resolute
Drug Eluting Stents

- Components of DES
  - Scaffold
  - Polymer
  - Drug
First Generation Drug-Eluting Stents

**TABLE 3. SIRIUS: Cumulative Clinical Events**

<table>
<thead>
<tr>
<th></th>
<th>Sirolimus-Eluting</th>
<th>Bx VELOCITY™</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACE</td>
<td>8.3 (44)</td>
<td>22.3 (117)</td>
</tr>
<tr>
<td>TVF</td>
<td>9.8 (52)</td>
<td>24.8 (130)</td>
</tr>
<tr>
<td>Stent thrombosis</td>
<td>0.4 (2)</td>
<td>0.8 (4)</td>
</tr>
</tbody>
</table>

**Time after Initial Procedure (days)**
First Generation Drug Eluting Stents

TABLE 2. Cumulative Adverse Event Rates at 12 Months

<table>
<thead>
<tr>
<th>Event Rate (%)</th>
<th>Bare metal stent</th>
<th>Paclitaxel-eluting stent</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac death</td>
<td>0.2</td>
<td>0</td>
<td>0.50</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>1.1</td>
<td>0</td>
<td>0.007</td>
</tr>
<tr>
<td>TLR</td>
<td>4.0</td>
<td>5.8</td>
<td>0.003</td>
</tr>
<tr>
<td>TVR</td>
<td>1.4</td>
<td>2.4</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Target vessel failure</td>
<td>2.4</td>
<td>2.4</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Major adverse cardiac events</td>
<td>2.4</td>
<td>2.4</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
Increased rates of late stent thrombosis

Stent thrombosis after discontinuation of DAPT more than one year out from implantation

Suspected to be due to decreased endothelialization and continued exposure of stent to bloodstream

First Generation Drug Eluting Stents
Second Generation Drug Eluting Stents

**A**

- Target-Lesion Failure (%)
- No. at Risk
  - Everolimus-eluting stent: 2458, 2390, 2362, 2323, 2298
  - Paclitaxel-eluting stent: 1229, 1165, 1137, 1119, 1104
- Months
- Hazard ratio, 0.61 (95% CI, 0.46–0.82)
- P<0.001

**B**

- Ischemia-Driven TLR (%)
- No. at Risk
  - Everolimus-eluting stent: 2458, 2419, 2392, 2353, 2328
  - Paclitaxel-eluting stent: 1229, 1185, 1158, 1140, 1125
- Months
- Hazard ratio, 0.54 (95% CI, 0.38–0.78)
- P<0.001

**C**

- Cardiac Death or Target-Vessel Myocardial Infarction (%)
- No. at Risk
  - Everolimus-eluting stent: 2458, 2393, 2378, 2353, 2339
  - Paclitaxel-eluting stent: 1229, 1179, 1165, 1154, 1146
- Months
- Hazard ratio, 0.69 (95% CI, 0.46–1.05)
- P=0.08

**D**

- Stent Thrombosis (%)
- No. at Risk
  - Everolimus-eluting stent: 2458, 2426, 2412, 2388, 2376
  - Paclitaxel-eluting stent: 1229, 1195, 1184, 1174, 1166
- Months
- Hazard ratio, 0.27 (95% CI, 0.11–0.67)
- P=0.003
Third Generation Drug Eluting Stents

* Synergy stent
  * PtCr based stent with a new bioresorbable polymer for delivering drug to abluminal surface only
  * Reduced time to elute drug leading to quicker endotheliaization with reduced neo-intimal thickening.
  * Best of both worlds theory.
Third Generation Drug Eluting Stents

SYNERGY vs PROMUS Element Plus
HR 1.04 [0.71, 1.52] P=0.83
Stent Issues

- Continue to have permanent metal scaffold in vessel
  - Vessel reactivity is negated
  - Prevention of late vessel adaptive or expansive remodeling
- Need for re-intervention leads to higher risks
  - More layers = faster restenosis
- Drug Eluting stents have lower rate of TLR, but higher rate of ST
- Hindrance of surgical revascularization
- Impairment of imaging with multislice CT
Bio-resorbable scaffolds

* Most notably: Absorb – Abbott Vascular
* Also multiple iron, magnesium or zinc based metallic absorbable stents under development.
Table 3. Safety and Efficacy Outcomes at 1 Year.

<table>
<thead>
<tr>
<th>Adverse Event</th>
<th>Absorb Scaffold (N=1322)</th>
<th>Xience Stent (N=686)</th>
<th>Relative Risk (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target-lesion failure</td>
<td>102/1313 (7.8)</td>
<td>41/677 (6.1)</td>
<td>1.28 (0.90–1.82)</td>
<td>0.16</td>
</tr>
<tr>
<td>Cardiac death</td>
<td>8/1313 (0.6)</td>
<td>1/677 (0.1)</td>
<td>4.12 (0.52–32.91)</td>
<td>0.29</td>
</tr>
<tr>
<td>Target-vessel myocardial infarction</td>
<td>79/1313 (6.0)</td>
<td>31/677 (4.6)</td>
<td>1.31 (0.88–1.97)</td>
<td>0.18</td>
</tr>
<tr>
<td>Ischemia-driven target-lesion revascularization</td>
<td>40/1313 (3.0)</td>
<td>17/677 (2.5)</td>
<td>1.21 (0.69–2.12)</td>
<td>0.50</td>
</tr>
<tr>
<td>Death from any cause</td>
<td>15/1313 (1.1)</td>
<td>3/677 (0.4)</td>
<td>2.58 (0.75–8.87)</td>
<td>0.12</td>
</tr>
<tr>
<td>Any myocardial infarction</td>
<td>90/1313 (6.9)</td>
<td>38/677 (5.6)</td>
<td>1.22 (0.85–1.76)</td>
<td>0.28</td>
</tr>
<tr>
<td>Q-wave</td>
<td>10/1313 (0.8)</td>
<td>3/677 (0.4)</td>
<td>1.72 (0.47–6.22)</td>
<td>0.56</td>
</tr>
<tr>
<td>Non-Q-wave</td>
<td>80/1313 (6.1)</td>
<td>35/677 (5.2)</td>
<td>1.18 (0.80–1.73)</td>
<td>0.40</td>
</tr>
<tr>
<td>During procedure</td>
<td>41/1313 (3.1)</td>
<td>22/677 (3.2)</td>
<td>0.96 (0.58–1.60)</td>
<td>0.88</td>
</tr>
<tr>
<td>Not during procedure</td>
<td>49/1313 (3.7)</td>
<td>16/677 (2.4)</td>
<td>1.58 (0.90–2.76)</td>
<td>0.10</td>
</tr>
<tr>
<td>Any revascularization</td>
<td>120/1313 (9.1)</td>
<td>55/677 (8.1)</td>
<td>1.12 (0.83–1.53)</td>
<td>0.45</td>
</tr>
<tr>
<td>Ischemia-driven</td>
<td>115/1313 (8.8)</td>
<td>54/677 (8.0)</td>
<td>1.10 (0.81–1.50)</td>
<td>0.55</td>
</tr>
<tr>
<td>Target vessel</td>
<td>66/1313 (5.0)</td>
<td>25/677 (3.7)</td>
<td>1.36 (0.87–2.14)</td>
<td>0.18</td>
</tr>
<tr>
<td>Nontarget vessel</td>
<td>71/1313 (5.4)</td>
<td>39/677 (5.8)</td>
<td>0.94 (0.64–1.37)</td>
<td>0.74</td>
</tr>
<tr>
<td>Not ischemia-driven</td>
<td>8/1313 (0.6)</td>
<td>5/677 (0.7)</td>
<td>0.82 (0.27–2.51)</td>
<td>0.77</td>
</tr>
<tr>
<td>Target lesion</td>
<td>2/1313 (0.2)</td>
<td>2/677 (0.3)</td>
<td>0.52 (0.07–3.65)</td>
<td>0.61</td>
</tr>
<tr>
<td>Target vessel</td>
<td>3/1313 (0.2)</td>
<td>3/677 (0.4)</td>
<td>0.52 (0.10–2.55)</td>
<td>0.42</td>
</tr>
<tr>
<td>Nontarget vessel</td>
<td>5/1313 (0.4)</td>
<td>2/677 (0.3)</td>
<td>1.29 (0.25–6.63)</td>
<td>1.00</td>
</tr>
<tr>
<td>Patient-reported angina</td>
<td>238/1302 (18.3)</td>
<td>125/678 (18.4)</td>
<td>0.99 (0.82–1.21)</td>
<td>0.93</td>
</tr>
<tr>
<td>Definite or probable device thrombosis</td>
<td>20/1301 (1.5)</td>
<td>5/675 (0.7)</td>
<td>2.08 (0.78–5.51)</td>
<td>0.13</td>
</tr>
<tr>
<td>Early: 0 to 30 days</td>
<td>14/1315 (1.1)</td>
<td>5/686 (0.7)</td>
<td>1.46 (0.53–4.04)</td>
<td>0.46</td>
</tr>
<tr>
<td>Acute: ≤24 hr</td>
<td>2/1320 (0.2)</td>
<td>4/686 (0.6)</td>
<td>0.26 (0.05–1.42)</td>
<td>0.19</td>
</tr>
<tr>
<td>Subacute: &gt;24 hr to 30 days</td>
<td>12/1315 (0.9)</td>
<td>1/686 (0.1)</td>
<td>6.26 (0.82–48.04)</td>
<td>0.04</td>
</tr>
<tr>
<td>Late: 31 days to 1 yr</td>
<td>6/1299 (0.5)</td>
<td>0/675</td>
<td>NA</td>
<td>0.10</td>
</tr>
<tr>
<td>Definite</td>
<td>18/1301 (1.4)</td>
<td>5/675 (0.7)</td>
<td>1.87 (0.70–5.01)</td>
<td>0.21</td>
</tr>
<tr>
<td>Probable</td>
<td>2/1301 (0.2)</td>
<td>0/675</td>
<td>NA</td>
<td>0.55</td>
</tr>
</tbody>
</table>
Post Stenting Care
Post Stenting Care

* DAPT
  * Ticagrelor and Prasugrel have increased efficacy with increased bleeding risk in comparison with Clopidogrel
    * Prasugrel should be avoided in patient with history of stoke or the elderly
  * Benefit out to 30 months balanced by increase in bleeding risk
In patients on therapeutic anticoagulation:

- DAPT leads to 2-3 fold increase in bleeding risk
- If low bleeding risk triple therapy is currently recommended.
- If bleeding risk higher (elderly, fall risk, etc)
  - Consider use of P2Y12 inhibitor with therapeutic oral anticoagulation with either Warfarin or DOAC
Access Site

* Radial vs Femoral
  * The USA continues to have about 30% of cases by radial approach over the past few years.
  * Recent urge for radial approach due to patient preference, comfort and risk of vascular complications.
  * Mortality benefit of radial approach during ACS due mostly to decreased bleeding complications.
Patient will have air removed from band every 10-15 minutes until there is no air left then band will be removed (about 2-3 hour process).

After band removed, light duty with wrist for the rest of the day. If patient in hospital they will be left with brace on until the next day.
Access Site - Care

* Femoral access:
  * Depending on closure method the period of bedrest will vary, however, at least 2 hours of bedrest
  * After bedrest period, patient will have HOB elevated.
  * Then legs dangling over side of bed hours later
  * Then ambulation.
Regardless of access site:
* No lifting more than 10lb for one week
* No Tennis
* No Golf
* No soaking (bath, pool, beach, dishes, or mopping)
* No driving (time limit depends on cardiologist and access site)
* Showering is OK.
Future Developments

STOPDAPT Study Demonstrates XIENCE’s Safety with 3-Month DAPT

1-Year XIENCE Event Rates Using 3-Month DAPT

Cardiac Death: 0.6%
Myocardial Infarction: 0.3%
Any Stroke: 1.1%
Target Lesion Revascularization: 2.0%
Definite/Probable Stent Thrombosis: 0.0%

n = 1,525
Future Developments

* Several Major short DAPT trials
  * XIENCE Short Dual Antiplatelet Therapy (DAPT) Study – 3 month DAPT trial - Enrolling
  * Resolute – one month DAPT trial – enrolling
  * Synergy – SENIOR trial – one month DAPT trial – data collection phase
  * Synergy – EVOLVE short DAPT – 3 months - enrolling
Drug Coated balloons.

- Intended to address issues of stents:
  - Treatment of small vessel disease
  - Issues related to the duration of dual antiplatelet therapy (DAPT)
  - Treatment failure leading to restenosis
  - Late stent thrombosis
- Promising results peripherally and in some trial.
- Multiple trials ongoing
Open Forum for Questions