Acute Coronary Syndromes

Case presentation

Robert-Jan van Geuns, MD
Thoraxcenter,
Erasmus MC, Rotterdam,
The Netherlands.
Case

- Female 57 years old
- 2 hours of chest pain
- Prehospital triage: ECG: inferior AMI
- O₂, Nitrates sl, Heparin 5000 IU, ASA, Prasugrel
Case

CAG:

- LAD, CX non-significant coronary artery disease
- RCA:

*chest pain: 10:00*
*local hospital: 10:26*
*erasmusmc: 11:30*
*cathlab: 11:50*
*puncture: 11:55*
Will ASA 325 mg iv + prasugrel 60 mg orally (86 min before procedure) result in accurate platelet inhibition?

1) Yes

2) No

<table>
<thead>
<tr>
<th></th>
<th>ADP &lt;20%</th>
<th>MPA to 20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pra</td>
<td>Clo</td>
</tr>
<tr>
<td>At 0.5 h</td>
<td>42.9</td>
<td>87.7</td>
</tr>
<tr>
<td>At 2 h</td>
<td>2.7</td>
<td>55.1</td>
</tr>
<tr>
<td>At 6 h</td>
<td>0</td>
<td>27.3</td>
</tr>
</tbody>
</table>

**Figure 3. LD-phase platelet function measures.**

**Elective PCI**
Verify now testing in Rotterdam

- Biological effectiveness of Prasugrel has only been tested in stable PCI patients.
- AMI patients have reduced circulation and different intestinal absorption.
- Single-center, observational study performed in Rotterdam. (PI: Tuncay Yetging)
- 47 Patients: Mean time for Prasugrel ingestion to first blood from sheath: 103 ± 129 min.
- Mean PRU was 244 ± 114 (<230: effective)
- 17 patients (36%) insufficient platelet inhibition
Case

<table>
<thead>
<tr>
<th>Pre</th>
<th>Thrombectomy 1</th>
<th>Thrombectomy 2</th>
<th>Post</th>
</tr>
</thead>
</table>

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Question 3

Does thrombectomy remove the majority of the thrombus load?

- A = Yes
- B = No
OCT post Thrombectomy
OCT post Thrombectomy
Assessment of Culprit Lesion Morphology in Acute Myocardial Infarction

Ability of Optical Coherence Tomography Compared With Intravascular Ultrasound and Coronary Angioscopy

Takashi Kubo, MD, PhD, Toshio Imanishi, MD, PhD, Shigeho Takarada, MD, PhD, Akio Kuroi, MD, Satoshi Ueno, MD, Takashi Yamano, MD, Takashi Tanimoto, MD, Yoshiki Matsuo, MD, PhD, Takashi Masho, MD, Hironori Kitabata, MD, Kazushi Tsuda, MD, PhD, Yoshiaki Tomobuchi, MD, PhD, Takashi Akasaka, MD, PhD

Wakayama, Japan

Table 2

<table>
<thead>
<tr>
<th>Finding</th>
<th>OCT (n = 30)</th>
<th>CAS (n = 30)</th>
<th>IVUS (n = 30)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibrous cap disruption</td>
<td>22 (73)↑</td>
<td>14 (47)</td>
<td>12 (40)</td>
<td>0.021</td>
</tr>
<tr>
<td>Fibrous cap erosion</td>
<td>7 (23)↑</td>
<td>1 (3)</td>
<td>0 (0)</td>
<td>0.003</td>
</tr>
<tr>
<td>Thrombus</td>
<td>30 (100)↑</td>
<td>30 (100)↓</td>
<td>10 (33)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Values are given as n (%). *p < 0.05, optical coherence tomography (OCT) versus coronary angiography (CAS); †p < 0.01, OCT versus intravascular ultrasound (IVUS); ‡p < 0.01, CAS versus IVUS.
Question 4

Suggested RCA treatment
A = Medical treatment
B = Balloon + Stent
C = Direct stenting
Question 5

Suggested stent for RCA
A = BMS
B = DES
C = Self expanding Nitinol stent
D = Bioresorbable scaffold
BMS vs DES

Primary Endpoint:
Composite of all-cause death, any MI or any revascularization

Primary Efficacy Endpoint: Ischemic TLR

- Diff [95% CI] = -3.0% [-5.1, -0.9]
- HR [95% CI] = 0.59 [0.43, 0.83]
- P = 0.002

<table>
<thead>
<tr>
<th>Number at risk</th>
<th>TAXUS DES (n=2257)</th>
<th>EXPRESS BMS (n=749)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time in Months</td>
<td>7.5%</td>
<td>4.5%</td>
</tr>
<tr>
<td>0</td>
<td>TAXUS DES 2257</td>
<td>EXPRESS BMS 749</td>
</tr>
<tr>
<td>1</td>
<td>2132</td>
<td>697</td>
</tr>
<tr>
<td>2</td>
<td>2098</td>
<td>675</td>
</tr>
<tr>
<td>3</td>
<td>2069</td>
<td>658</td>
</tr>
<tr>
<td>4</td>
<td>1888</td>
<td>603</td>
</tr>
</tbody>
</table>
DES vs BMS in STEMI

1. Comparison of drug-eluting stents with bare metal stents in patients with ST-segment elevation myocardial infarction
   Bindu Kalesan, Peter Jüni

   De Luca G, .., Stone GW
   Arch Intern Med. 2012 Apr 23;172(8):611-21

- No difference in survival,
- Less TVR,
- No difference in stent thrombosis
- Still risk of stent thrombosis increased vs elective patients
Current issues in PCI for ACS

3. Stéphane Cook and Stephan Windecker, Circulation 2009;119;657-659
4. Stéphane Cook, Circulation 2007;115;2426-2434
5. Renu Virmani, MD, of CVPath Institute (Gaithersburg, MD) in a telephone interview with TCTMD
**APPOosition II**

- **Design:** International, prospective, randomized, two-arm multi-center trial
- **Objective:** To compare the STENTYS® Stent with balloon-expandable stents in AMI
- **Endpoints:**
  - Stent strut apposition and expansion at 3 days (measured by OCT)
  - MACE @30 days and 6 months

*Independent monitoring: Genae Core Lab: Cardialysis*

80 STEMI patients enrolled between 12/09 and 06/10 in 9 European sites

- **STENTYS® Stent**
- **VISION / Driver**

Invasive follow-up at 3 days (QCA, OCT)

Clinical follow-up at 30 days and 6 months

![Graphic showing patients with stent malapposition](image)

*Stent Malapposition defined as more than 5% of struts malapposed under OCT.*

Presented by R.J. van Geuns & S.Verheye at TCT 2010
Case

Stent, DES 3.0 x 28

Final

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Question 6

What is the optimal duration of dual antiplatelet treatment of successful primary PCI in single vessel disease

- 1 = 1 month
- 2 = 3 months
- 3 = 12 months
- 4 = 24 months
Guidelines on myocardial revascularization

The Task Force on Myocardial Revascularization of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)

Developed with the special contribution of the European Association for Percutaneous Cardiovascular Interventions (EAPCI)

(b) Recommended duration of dual antiplatelet therapy

After percutaneous coronary intervention

- 1 month after BMS implantation in stable angina;
- 6–12 months after DES implantation in all patients;
- 1 year in all patients after ACS, irrespective of revascularization strategy.
DAPT post PCI

Interventional Cardiology

Short- Versus Long-Term Duration Therapy After Coronary
A Randomized Multicenter

Marco Valgimigli, MD, PhD; Gianluca Campo, MD; Monica Cianfranco Percoco, MD; Carlo Tumscitz, MD; Fausto Castiglioni, MD; Matteo Tebaldi, MD; Giuseppe Fucà, MD; Moh’d Kubb, MD; Monica Minarelli, MD; Antonella Scalone, MD; Caterina Caccia, MD; Marco Borghesi, MD; Lienia Marchesini, MD; Giovanni Parodi, MD

for the Prolonging Dual Antiplatelet Treatment After Grading S (PRODIGY) Investigator

6 vs 24 months of DAPT
32% STEMI, 23% Non-STEMI
25% BMS,
25% EES,
25% PES
25% ZES

MACE

Death

MI

CVA

ST

Bleeds
### DAPT post PCI

#### 6 vs 24 months of DAPT

<table>
<thead>
<tr>
<th>Condition</th>
<th>Log Hazard Ratio (95% CI)</th>
<th>Hazard Ratio (95% CI)</th>
<th>P-Value</th>
<th>Superiority</th>
<th>Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td></td>
<td>0.98 (0.74-1.29)</td>
<td>0.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>1.09 (0.77-1.55)</td>
<td>0.85</td>
<td></td>
<td></td>
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<tr>
<td>Female</td>
<td></td>
<td>1.00 (0.60-1.68)</td>
<td>0.66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 65 yr</td>
<td></td>
<td>1.12 (0.82-1.51)</td>
<td>0.48</td>
<td></td>
<td></td>
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<tr>
<td>&lt; 65 yr</td>
<td></td>
<td>0.57 (0.28-1.16)</td>
<td>0.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td></td>
<td>0.85 (0.53-1.38)</td>
<td>0.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Diabetes</td>
<td></td>
<td>1.06 (0.76-1.50)</td>
<td>0.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bare metal stents</td>
<td></td>
<td>1.13 (0.68-1.86)</td>
<td>0.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug-eluting Stents</td>
<td></td>
<td>0.93 (0.67-1.30)</td>
<td>0.66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stable Coronary Disease</td>
<td></td>
<td>0.60 (0.29-1.23)</td>
<td>0.16</td>
<td></td>
<td></td>
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<tr>
<td>Unstable Coronary Disease</td>
<td></td>
<td>1.07 (0.79-1.45)</td>
<td>0.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single Lesion Treatment</td>
<td></td>
<td>0.88 (0.62-1.28)</td>
<td>0.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple Lesions Treatment</td>
<td></td>
<td>1.14 (0.74-1.76)</td>
<td>0.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complex Lesion(s) Treated</td>
<td></td>
<td>1.07 (0.77-1.49)</td>
<td>0.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple Lesion(s) Treated</td>
<td></td>
<td>0.78 (0.46-1.32)</td>
<td>0.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creatinine Clearance &gt; 60 ml/min</td>
<td></td>
<td>0.90 (0.58-1.38)</td>
<td>0.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creatinine Clearance ≤ 60 ml/min</td>
<td></td>
<td>1.14 (0.78-1.65)</td>
<td>0.50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

24-month Clopidogrel better 6-month Clopidogrel better

32% STEMI, 23% Non-STEMI

DAPT post PCI

49 trials including 50,844 patients

Stent thrombosis with drug-eluting and bare-metal stents: evidence from a comprehensive network meta-analysis.

Question 6

What is the optimal duration of dual antiplatelet treatment of successful primary PCI in single vessel disease

- 1 = 1 month
- 2 = 3 months
- 3 = 12 months
- 4 = 24 months
OCT post implantation
OCT post implantation
Case FU

- Cholecystitis, treated conservative, elective surgery proposed.
Question 7

What is your advise for her surgery after initial PCI with DES stent?

- 1 = 1 month
- 2 = 3 months
- 3 = 12 months
OCT FU of TROFI study (6 mnd)

6 Months FU
OCT FU of TROFI study (6 mnd)
Question 8

What is your advise for her surgery with the knowledge of her invasive imaging a 6 mth FU

- 1 = Dual antiplatelet therapy can be stopped and surgery performed after 7 days
- 2 = Continue DAPT till 12 months
- 3 = Continue DAPT till 24 months
Timing of First DAPT Interruption and Stent Thrombosis Through 2 Years

P values vs.
never interrupted

P < 0.0001

P = 0.04

P = 0.13

P = 0.34

P = 0.33

ST through 2 Years (%)

Never Interrupted through 2-year study period

Interrupted on or before 1 month

Interrupted between 1 and 3 months

Interrupted between 3 and 6 months

Interrupted between 6 and 12 months

Interrupted between 1 and 2 years

Median # days off DAPT (IQR)

0 (0, 0)

374 (8, 731)

482.5 (19, 668)

518 (59, 566)

379 (365, 481)

287 (103.5, 351)

Median # days to ST (IQR)

13 (2, 127)

12 (5, 105)

132 (40, 331)

231 (52, 433)

292 (75, 550)

361.5 (37, 568)

Rates are KM estimates. Note: DAPT may have been interrupted before or after a ST event.
Impact of DAPT Discontinuation on Definite or Probable Stent Thrombosis with Everolimus- and Paclitaxel-Eluting Stents Through 2 Years

Kedhi E. presented at ACC 2012

A Pooled Analysis of SPIRIT II, III, IV, and COMPARE Trials

- EES: p for trend = 0.75
- PES: p for trend = 0.05

<table>
<thead>
<tr>
<th>Time of DAPT Discontinuation</th>
<th>EES</th>
<th>PES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 6 months</td>
<td>1.1%</td>
<td>6.2%</td>
</tr>
<tr>
<td>6 to 12 months</td>
<td>0.5%</td>
<td>2.3%</td>
</tr>
<tr>
<td>12 to 24 months</td>
<td>0.5%</td>
<td>2.3%</td>
</tr>
<tr>
<td>NO discontinuation</td>
<td>0.8%</td>
<td>1.5%</td>
</tr>
</tbody>
</table>
Summary

- Newer ADPreceptor blockers are more effective but still to slow in pPCI setting
- After thrombectomy significant amount of thrombotic material is remaining and continued medical therapy is essential to prevent (sub)acute occlusion
- In STEMI DES is preferred over BMS
- EES is superior to BMS for stent thrombosis
- DAPT therapy may be shortened if adequate apposition is achieved