If periprocedural MI is not an endpoint... is the simple strategy really better?

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What is a peri-procedural MI?

• pre-1990

• WHO definition
  – Q-waves
  – chest pain
  – ECG changes
  – (insensitive) enzyme changes

• a “proper” heart attack...
What is a periprocedural MI?

- 2000

- ESC/ACC definition
  - Q-waves
  - chest pain
  - ECG changes
  - special circumstances post PCI (CK or CKMB >3 ULN)

- not necessarily a proper heart attack
What is a periprocedural MI?

• 2007

• Universal definition
  – Q-waves
  – chest pain
  – ECG changes
  – 3 x ULN troponin

• not really a heart attack at all
Short term outcomes after bifurcation stent

- Simple vs Complex strategies
- Much of the initial difference between techniques is accounted for by PPMI

<table>
<thead>
<tr>
<th></th>
<th>Simple</th>
<th>Complex</th>
<th>PPMI counted?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORDIC</td>
<td>1.4%</td>
<td>1.0%</td>
<td>No</td>
</tr>
<tr>
<td>BBC ONE</td>
<td>3.6%</td>
<td>11.2%</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Use of troponin rather than CK (BBC ONE)
I digress a little...

- and that’s with the standard troponin assay rather than the high-sensitivity troponin assay....
So, is PPMI bad for you?
So, is PPMI bad for you?

OR (95%CI) 1.35 (1.13-1.60); p=0.001

OR for ↑ mortality with ↑ troponin I or T

Lansky and Stone. Circ Intvn 2010
So, if we exclude the concept of PPMI..

- what is the difference between simple and complex strategies?
- death
- target vessel revascularisation
- subsequent MI
- stent thrombosis
Short term differences

- No differences in death
  - low event rate
TVR (NORDIC & BBC ONE meta-analysis)

Behan et al Circ Intvn 2011
# Stent thrombosis

<table>
<thead>
<tr>
<th>Study</th>
<th>Simple strategy (n/N)</th>
<th>Complex strategy (n/N)</th>
<th>Relative ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pan, et al.</td>
<td>0/47</td>
<td>1/44</td>
<td>0.31 (0.01, 7.47)</td>
</tr>
<tr>
<td>NORDIC</td>
<td>1/207</td>
<td>0/206</td>
<td>2.99 (0.12, 72.9)</td>
</tr>
<tr>
<td>BBK</td>
<td>1/101</td>
<td>2/101</td>
<td>0.50 (0.05, 5.43)</td>
</tr>
<tr>
<td>CACTUS</td>
<td>2/173</td>
<td>3/177</td>
<td>0.68 (0.12, 4.03)</td>
</tr>
<tr>
<td>BBC ONE</td>
<td>1/249</td>
<td>5/248</td>
<td>0.20 (0.02, 1.69)</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td><strong>5/777</strong></td>
<td><strong>11/776</strong></td>
<td><strong>0.50 (0.19, 1.32)</strong></td>
</tr>
</tbody>
</table>

*Fixed Effects*

Test for heterogeneity: chi-squared = 2.11 (d.f. = 4) P = 0.72

Test for overall effect: z = 1.40 P = 0.162
## Predictors of LST / VLST

Multivariable analysis

LST / VLST in 67 lesions among 16,801 lesions treated exclusively by Cypher

<table>
<thead>
<tr>
<th>Factors</th>
<th>R.R.</th>
<th>95% C.I.</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemodialysis</td>
<td>1.91</td>
<td>(1.29 - 2.65)</td>
<td>0.002</td>
</tr>
<tr>
<td>ESRD (e-GFR &lt; 30/Non-HD)</td>
<td>1.81</td>
<td>(1.2 - 2.65)</td>
<td>0.007</td>
</tr>
<tr>
<td>Two stents for bifurcation</td>
<td>1.81</td>
<td>(1.17 - 2.59)</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Those variables with p value < 0.1 in the univariable analysis were incorporated into the multivariable model.
Long term differences
Long-term clinical outcome (NORDIC)

MACE Free Survival
Cardiac death, MI, TVR, stent thrombosis

Days

Days

%
CONCLUSIONS

• “high-grade” Periprocedural MI is prognostically adverse (CKMB > 5-8)

• “low-grade” periprocedural MI is probably prognostically adverse

• The incidence of periprocedural MI is higher in complex bifurcation treatment

• Excluding periprocedural MI, there is still a trend towards less good long-term outcome for complex strategies
  – A perfectly executed culotte probably incurs no added long-term risk
  – A poorly executed culotte almost certainly incurs added long-term risk