Relation of In-Hospital Serum Creatinine Change Patterns and Outcomes among ST Segment Elevation Myocardial Infarction Undergoing Primary Percutaneous Intervention

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Conflict of interest

None

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AKI (Acute Kidney Injury) in Acute MI

- A serious complication of Acute MI
- Reported incidence 10%*
- Associated with adverse short and long term outcomes*

* Shacham et al, Clin Res Card 2014
AKI definition

- Serum creatinine (sCr) change as compared to admission sCr level
- Related mainly to contrast induced nephropathy
- No information is present regarding the incidence and outcomes associated with AKI prior to PCI in STEMI patients
Objectives

The incidence, in hospital complications, long-term mortality were compared between patients having pre-PCI and post-PCI AKI, identified on the basis of the changes in sCr during hospitalization.
Study population

- **Included**
  - 1260 consecutive STEMI patients, undergoing primary PCI between January 2008 - December 2013

- **Excluded**
  - Conservative / Thrombolytic Tx
  - Non STEMI diagnosis on discharge
  - Death within 24 hrs of admission
Serum creatinine (sCr) were taken prior to primary PCI and at least daily throughout CICU stay.

AKI was defined applying the AKIN classification ( > 0.3 mg/dl sCr increase)
AKI group classification

- Stable sCr throughout hospitalization
- Worsened (> 0.3 mg/dl increase)
- Improved (> 0.3 mg/dl decrease)
Results

- Worsening of sCr occurred in 127/1260 pts. (10%)
- Improvement of sCr occurred in 44/1260 pts. (4%)
<table>
<thead>
<tr>
<th>Variable</th>
<th>Stable sCr (n=1089)</th>
<th>Improved sCr (n=44)</th>
<th>P</th>
<th>Worsened sCr (n=127)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age(years)</td>
<td>60 ±12</td>
<td>64 ± 14</td>
<td>0.05</td>
<td>72 ± 12</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Men</td>
<td>891(82%)</td>
<td>34(77%)</td>
<td>0.43</td>
<td>88(69%)</td>
<td>0.003</td>
</tr>
<tr>
<td>Diabetes</td>
<td>211(19%)</td>
<td>15(34%)</td>
<td>0.02</td>
<td>39(31%)</td>
<td>0.001</td>
</tr>
<tr>
<td>HTN</td>
<td>441(41%)</td>
<td>22(50%)</td>
<td>0.21</td>
<td>91(72%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Smoker</td>
<td>568(52%)</td>
<td>20(45%)</td>
<td>0.44</td>
<td>43(34%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Critical state</td>
<td>5(3%)</td>
<td>9(7%)</td>
<td>0.41</td>
<td>21(17%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Time to reperfusion (minutes)</td>
<td>±659 374</td>
<td>420±808</td>
<td>0.39</td>
<td>528±577</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>LV ejection fraction</td>
<td>48 ± 8</td>
<td>48 ± 11</td>
<td>0.70</td>
<td>43 ± 9</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
## In hospital complications

<table>
<thead>
<tr>
<th>Variable</th>
<th>Stable sCr (1089)</th>
<th>Improved sCr (n=44)</th>
<th>P</th>
<th>Worsened sCr (n=127)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiogenic shock</td>
<td>26 (3%)</td>
<td>2 (4%)</td>
<td>0.29</td>
<td>21 (17%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Mechanical ventilation</td>
<td>13 (1%)</td>
<td>2 (4%)</td>
<td>0.26</td>
<td>25 (20%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Heart failure</td>
<td>64 (6%)</td>
<td>1 (2%)</td>
<td>0.51</td>
<td>39 (31%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Severe Bradycardia</td>
<td>22 (2%)</td>
<td>6 (14%)</td>
<td>&lt;0.001</td>
<td>9 (7%)</td>
<td>0.002</td>
</tr>
<tr>
<td>VT/VF</td>
<td>50 (5%)</td>
<td>5 (11%)</td>
<td>0.06</td>
<td>14 (11%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Major bleeding</td>
<td>13 (1%)</td>
<td>2 (4%)</td>
<td>0.11</td>
<td>12 (9%)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Survival Function

AKIN_class

- Stable sCr
- Improved sCr
- Worsened sCr

p < 0.001

Cum Survival vs. Days of Follow Up
Conclusion:

In STEMI patients undergoing primary PCI, renal impairment prior to PCI is a frequent finding. In contrast to post-PCI sCr worsening, this entity is not associated with adverse short and long term outcomes.
Comments

AKI in AMI:

- Contrast induced nephropathy\(^1\)
- Hemodynamic state\(^2\)
- Drugs\(^2\)
- Sepsis, bleeding, atheroembolic disease and acute hyperglycemia\(^2\)

1-james et al, circ CVI 2013
2-Shacham et al, Am J card 2014
Time to reperfusion and AKI\(^1\)

1-Shacham et al, Am J Card 2014,
Left ventricular function and AKI

Hazard ratio 1.1 (95% CI 0.86-0.96; p=0.001) for every 1% reduction in EF

1- Shacham et al, Am J Card 2014,
Clinical implications

- Admission sCr may not reflect true sCr
- Frequent assessment of sCr
- Small (> 0.3 mg/dl) rise may be associated with increased risk

Prophylactic measures:
- High dose statins\(^1\)
- Early alkalization\(^2\)

1- Zaho et al, Int J card 2008,
2- Udea et al AJC. 2011
Thank you!