### Preoperative aspirin and major perioperative outcomes in patients with hypertension undergoing cardiac surgery

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**Introduction**

- Hypertension is prevalent in patients undergoing cardiac surgery and associated with a higher incidence of cardiovascular complications.
- Aspirin has been shown to prevent cardiovascular events in patients with a high risk of cardiovascular disease.
- Very few studies have investigated aspirin and hypertension, particularly its effects on major outcomes in hypertensive patients undergoing cardiac surgery.1,2

**Objective**

- To determine the effects of preoperative aspirin on postoperative outcomes for patients with hypertension undergoing cardiac surgery.
- To examine the impact of chronic kidney disease and heart failure superimposed with hypertension on outcomes after cardiac surgery.

**Methods**

- Retrospective cohort study.
- 6,514 consecutive patients from two tertiary hospitals undergoing cardiac surgery from 2001 to 2014, including:
  - Coronary artery bypass graft (CABG), valve surgery, CABG plus valve surgery, and other cardiac surgery
- 3,290 patients had hypertension and met inclusion criteria; they were divided into two groups:
  - With preoperative aspirin or without (control).
- Patients were also divided into three groups based on the presence of additional comorbidities:
  - Hypertension plus heart failure (HHF), hypertension plus chronic kidney disease (HCKD), or hypertension without heart failure or CKD (HTN).
- Outcomes include:
  - Major adverse cardiac events (MACE), 30-day mortality, renal failure, intensive care unit (ICU) stay, and readmission.

**Results**

- The aspirin group of hypertensive patients had significantly higher rates of comorbidities including diabetes mellitus, peripheral vascular disease, and previous myocardial infarction compared to the non-aspirin group.
- Among 3,290 patients:
  - 71.2% were taking aspirin preoperatively.
  - 28.8% were not.
- With propensity score adjustment and multivariate logistic regression, this study showed that preoperative aspirin in hypertensive patients undergoing cardiac surgery significantly reduced the risk of (Figure 1, Table 1):
  - 30-day mortality (3.7% vs 6.8%, P = 0.066)
  - Postoperative renal failure (4.2% vs 8.0%, P < 0.001)
  - Prolonged ICU stay (mean 109.1 vs 133.7 h, P < 0.001)
  - MACEs (9.1% vs 12.7%, P = 0.046)
- There was no significant difference in readmissions between the two groups.
- In addition to hypertension, 13.6% of patients had heart failure and 15.1% had CKD.
- Overall, there was a tendency toward unfavorable outcomes in patients with heart failure and CKD (Table 2):
  - 30-day mortality rates were 4.1%, 4.8%, and 7.1% in the HTN, HCKD, and HHF group respectively.

**Discussion**

- Preoperative aspirin therapy is associated with a significant decrease in the risk of MACEs, postoperative renal failure, prolonged ICU stay, and 30-day mortality, but does not increase the risk of readmissions in patients with hypertension undergoing cardiac surgery.
- This indicates, for the first time, that preoperative aspirin is beneficial for hypertensive patients undergoing cardiac surgery.
- In addition, hypertensive patients with superimposed CKD or heart failure are at an increased risk of mortality following cardiac surgery compared to patients with hypertension alone.

**Table 1. Effects of aspirin on postoperative complications and mortality in hypertensive patients undergoing cardiac surgery**

<table>
<thead>
<tr>
<th>OUTCOME</th>
<th>HTN</th>
<th>HCKD</th>
<th>HHF</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACE</td>
<td>9.8% (248)</td>
<td>6.7% (48)</td>
<td>12.4% (52)</td>
<td>0.079</td>
</tr>
<tr>
<td>Total Hrs ICU (h)</td>
<td>106.32 ± 172.79</td>
<td>123.55 ± 192.28</td>
<td>166.76 ± 299.38</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Readmission</td>
<td>13.6% (93)</td>
<td>14.5% (72)</td>
<td>17.4% (78)</td>
<td>0.114</td>
</tr>
<tr>
<td>30-Day Mortality</td>
<td>4.1% (90)</td>
<td>4.8% (42)</td>
<td>7.1% (31)</td>
<td>0.021</td>
</tr>
</tbody>
</table>

Notes: HTN, hypertension without heart failure or chronic kidney disease; HCKD, hypertension with chronic kidney disease; HHF, hypertension with heart failure. Among patients with HCKD and HHF, 74 had both heart failure and chronic kidney disease.

**Table 2. Postoperative complications and mortality in hypertension patients undergoing cardiac surgery**

<table>
<thead>
<tr>
<th>OUTCOME</th>
<th>HTN</th>
<th>HCKD</th>
<th>HHF</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACE</td>
<td>9.1% (113)</td>
<td>12.7% (102)</td>
<td>0.077 (0.535 - 0.858)</td>
<td>0.001</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>4.2% (46)</td>
<td>8.6% (176)</td>
<td>0.506 (0.372 - 0.960)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Total Hrs ICU (h)</td>
<td>109.1 ± 164.77</td>
<td>132.65 ± 223.16</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Readmission</td>
<td>14.6% (183)</td>
<td>13.5% (138)</td>
<td>0.098 (0.377 - 1.361)</td>
<td>0.06</td>
</tr>
<tr>
<td>30-Day Mortality</td>
<td>4.7% (86)</td>
<td>6.8% (54)</td>
<td>0.327 (0.177 - 0.697)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**References**
