Aldosterone Antagonists in ST Elevation Myocardial Infarction Patients with Low Left Ventricular Ejection Fraction: a Retrospective Study at Shahid Gangalal National Heart Centre, Bansbari, Kathmandu, Nepal

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ABSTRACT

Background: Aldosterone antagonists (AA) improve survival in ST elevation myocardial infarction (STEMI) patients with left ventricular ejection fraction (LVEF) ≤40%, with either clinical heart failure or diabetes mellitus. Our aim was to assess the adherence of AA use in Shahid Gangalal National Heart Centre, Kathmandu, Nepal.

Methods: Medical records of 171 STEMI patients with LVEF ≤40% and discharged from our centre between January 2012 and December 2012 were retrospectively reviewed, regarding the use of AA use.

Results: Among the 171 STEMI patients with LVEF ≤40%, 5 patients were excluded study due to the presence of contraindication to AA therapy. Among the remaining 166 patients, only 135 (81.2%) patients were eligible for the AA therapy (58 patients with diabetes mellitus and clinical heart failure in 77 patients). Out of 58 diabetes mellitus patients, 28 (48.2%) patients were treated with AA. Whereas 39 (50.6%) out of 77 patients with clinical heart failure were treated with AA. Overall, 67 (49.6%) patients among 135 eligible patients were treated with AA.

Conclusions: As in the international studies AA is under-used in our patient population. We still need some more effort to improve our prescription rate.

Keywords: aldosterone antagonist, heart failure, myocardial infarction

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**INTRODUCTION**

The Eplerenone Post-Acute Myocardial Infarction Heart Failure Efficacy and Survival Study (EPHESUS) (1) established that Aldosterone antagonists (AA) improve survival in post ST elevation myocardial infarction (STEMI) patients with left ventricular systolic dysfunction (Left ventricle ejection fraction (LVEF) ≤40%) concomitant with either clinical heart failure (HF) or diabetes mellitus (DM). Current American College of Cardiology/American Heart Association guidelines (2) provide a class I recommendation for AA therapy in STEMI patients, prior to hospital discharge, in the absence of contraindications.

Our aim was to assess the adherence of AA use in STEMI patients with low LVEF in our centre.

**METHODS**

We conducted a retrospective, single centre study at Shahid Gangalal National Heart Centre, Bansbari, Kathmandu, Nepal. Medical records of STEMI patients who were admitted for the first time and discharged during January 2012-December 2012 were retrospectively reviewed. Among the 495 patients discharged after their first admission for STEMI, there were 171 (34.5%) patients whose LVEF ≤40%. Post STEMI Patients with documented LVEF ≤40%, with diabetes mellitus or heart failure symptom without contraindications was considered eligible to receive AA. Serum creatinine levels >2.5 mg/dL or potassium >5 mEq/L during hospitalization were considered contraindications for AA therapy.

Among the 171 patients, five patients were excluded from this study due to the presence of contraindication to AA. Of the remaining 166 patients, 58 patients were diabetic so were eligible for AA therapy. Among 108 non-diabetic patients, 77 patients had HF symptoms. Altogether 135 (58 diabetes and 77 patients non-diabetes but with clinical HF) were eligible for AA therapy. Figure 1 shows the selection process of the eligible patients.

Patient information which included: age, gender, diabetes, dyslipidemia, hypertension, smoking, LVEF (based on echocardiography), way of reperfusion (thrombolysis, primary percutaneous coronary intervention), were recorded.

Cardiovascular risk factors were defined as.

1. Smoking: History confirming cigarette smoking (regularly smokes one or more cigarettes per day)
2. Dyslipidemia: History of Dyslipidemia diagnosed and/or treated by physician or Total cholesterol (TC) greater than 5.18 mmol/l; or . Low-density lipoprotein (LDL) ≥3.37 mmol/l; or High-density lipoprotein (HDL) less than 1.04mmol/l.
3. Hypertension (HTN): defined as blood pressure ≥140/90 mmHg or on treatment.
4. Diabetes (DM): defined as a fasting glucose ≥7.1 mmol/L or on treatment.

All the variables were entered into the Statistical Package for Social Sciences software, version 14 (SPSS Inc) for data analysis. Descriptive statistics were computed and presented as

<table>
<thead>
<tr>
<th>Baseline Characteristics</th>
<th>n=171 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTN</td>
<td>99 (57.8)</td>
</tr>
<tr>
<td>DM</td>
<td>58 (33.9)</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>78 (45.6)</td>
</tr>
<tr>
<td>Smoker</td>
<td>108 (63.1)</td>
</tr>
<tr>
<td>Primary PCI</td>
<td>19 (11.1)</td>
</tr>
<tr>
<td>Streptokinase</td>
<td>25 (14.6)</td>
</tr>
</tbody>
</table>

| TABLE 1. Baseline characteristics of the patients included in the study n=171 (%) |

<table>
<thead>
<tr>
<th>Biochemical Parameters (Mean±SD)</th>
<th>Creatinine</th>
<th>Potassium</th>
<th>Total Cholesterol</th>
<th>TG</th>
<th>HDL</th>
<th>LDL</th>
<th>FBS</th>
<th>LVEF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creatinine</td>
<td>0.9±0.3mg/dL</td>
<td>4.2±0.3 mEq/L</td>
<td>4.1±0.8 mmol/L</td>
<td>1.4±0.6 mmol/L</td>
<td>1.0±0.1 mmol/L</td>
<td>2.3±0.7 mmol/L</td>
<td>7.0±5.0 mmol/L</td>
<td>32.3±6.5%</td>
</tr>
</tbody>
</table>

| TABLE 2. Biochemical parameters (Mean±SD) |
ALDOSTERONE ANTAGONISTS IN ST ELEVATION MYOCARDIAL INFARCTION PATIENTS WITH LOW LEFT VENTRICULAR EJECTION FRACTION

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RESULTS

Table 1 shows the demographic and clinical characteristics of the 171 patients whose LVEF was ≤40%. The mean age was 59.6±13.5 years. Of the total number of patients included in the study, 119 (69.6%) were males and 52 (30.4%) were females. Table 2 shows the biochemical parameter of study population. Table 3 shows the localization of STEMI.

As shown in Table 4, more than 90% patients were treated with Aspirin (97.6%), clopidogrel (94.7%) and statin (95.9%). Patients were more commonly treated with ACEI/ARB (83.1%) than β-blocker (61.1%).

As shown in Table 5, among 58 diabetic patients, 28 (48.2%) patients were treated with AA at the time of discharged. Among 77 with heart failure, 39 (50.6%) were treated with AA. Overall 67 (49.6%) patients were treated with AA among 135 ideal patients.

DISCUSSION

According to the EPHESUS trial, the ideal patients to receive AA include those with AMI associated with an LVEF <40% and clinical HF or diabetes mellitus, in the absence of contraindications. Of the 171 patients included in the study, 135 were eligible to receive AA, of these only 67 (49.61%) received AA.

Our study result is comparable to Spain REICIAM registry, in which 416 patients were eligible to receive AA, and of these only 282 (54.8%) received AA (3). Prescription rates of AA in US hospitals vary widely. Only 2% of the hospitals had discharge rates of AA exceeding 50%, among eligible patients. In a contemporary survey of practice patterns post-MI in the United States, it was observed that 10% of patients with MI had an indication for AA therapy, but only 1 in 7 eligible patients was prescribed an AA on discharge (4).

In the EPHESUS (1) trial, the addition of Eplerenone, a selective aldosterone blocker, resulted in a 15% (p = 0.008) reduction in total mortality, 17% (p = 0.005) reduction in cardiovascular mortality within one month (5), predominantly due to 21% (p = 0.02) reduction in sudden cardiac death in patients already receiving optimal adjunctive therapy. Though Implantable cardioverter-defibrillators are effective in reducing long-term mortality in chronic heart failure patients with severe LV systolic dysfunction, they are ineffective in reducing total mortality when used early post MI (6). This clearly indicates that AA should be prescribed more in the eligible patients.

This discrepancy between evidence based therapy and actual prescribing patterns suggests the need for specific targeted performance improvement efforts (7). There are multiple factors that may contribute to the limited use of AA. Performance measures of ACC/AHA for NSTEMI or STEMI do not include prescription of AA therapy as a performance measure in hospitalized patients with acute MI (8). AA is considered a “layered therapy” for patients already treated with ACEI and β-blockers (9).

Even in the EPHESUS trial, not all patients were receiving ACEI/ARB and β-blocker: only 86.5% patients were receiving ACEI or ARB, whereas β-blocker was prescribed in 75% patients. This clearly suggests that AA can be initiated even before the use of ACEI/ARB and β-blocker. Early use of AA is effective in prevention of sudden cardiac death in STEMI patient with low LVEF.
Clinicians may be hesitant to use AA because of fear of hyperkalemia (10,11) or adverse effects (gynecomastia, reduced libido) (12). Among the two AA, eplerenone has more favorable adverse effect profile (13), than Spironolactone, but Eplerenone has not been widely used historically, potentially because of higher cost.

The main limitation of our study is the fact that it is a single centre study conducted in small number of patients without a long term follow up.

CONCLUSION

The results of this study demonstrate that AA is under-used in our patient population, as in the international studies. This discrepancy between evidence based therapy and actual prescribing patterns suggests the need for specific targeted performance improvement efforts in the future.

Conflict of interests: none declared.
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REFERENCES