Patient Characteristics and Practice Patterns in the Treatment of Acute Myocardial Infarction in Kuwait: A Pilot Study

Wafa Rashed, Mohammad Zubaid, Thomas David, Bader Mohammad, Mahmoud S. Bashar, J. aroslav Smid, Hassan Khan, Anjum Memon

Division of Cardiology, Department of Medicine, Mubarak Al-Kabeer Hospital, Departments of Medicine, Al-Fanawaniya Hospital, Al-Adan Hospital, Al-Sabah Hospital and Al-Jahra Hospital and Department of Community Medicine, Faculty of Medicine, Kuwait University, Kuwait

Received: July 7, 2001
Revised: April 22, 2002

Key Words
Practice pattern · Acute myocardial infarction · Middle East · Coronary artery disease registry

Abstract
Objectives: To determine the characteristics, management and outcomes of patients with acute myocardial infarction (AMI) admitted to the general hospitals and to assess the feasibility of establishing a registry for AMI in Kuwait. Subjects and Methods: We prospectively included 111 consecutive patients (94 males and 17 females, mean age 55 years) admitted to the coronary care units of the five participating hospitals during May 2000. The subjects all had a final diagnosis of AMI. A structured data collection form that included biochemical measurements was filled out for each patient. Results: The prevalence of hypercholesterolemia, diabetes, hypertension and current smoking was 46, 45, 30 and 49%, respectively. Fifty-four of 57 patients who were eligible for thrombolytic therapy received treatment. The median time from symptom onset to thrombolytic therapy was 180 min. At discharge 93% were prescribed aspirin, 81% beta-blockers, 40% angiotensin-converting enzyme inhibitors, and 32% lipid-lowering drugs. The in-hospital mortality was 10%. Conclusions: The incidence of smoking, diabetes and hypercholesterolemia is high among our patients. Thrombolytic therapy is used regularly but insufficiently early. Based on this pilot study, it is feasible to establish an AMI registry in Kuwait.

Introduction

Over the past two decades, there has been considerable progress in the treatment of acute myocardial infarction (AMI) that has led to substantially lower mortality and morbidity. Large randomized clinical trials have shown the benefit of thrombolytic therapy [1], aspirin [2], beta-blockers [3], angiotensin-converting enzyme (ACE) inhibitors [4] and lipid-lowering drugs [5] in the management of AMI. However, despite this evidence, these therapies continue to be underutilized [6–10].
In 1995, coronary artery disease was responsible for 15.4% of all deaths among Kuwaitis and 23.6% of all deaths among expatriates [11]. Two recent reports from Kuwait studied the characteristics of patients with AMI and the use of thrombolytic therapy [12, 13]. Both studies were retrospective and included patients from single centers, which may not have necessarily reflected the practice throughout Kuwait. To date, there has been no report from Kuwait on the use of other medications in the management of AMI.

We have, therefore, conducted a prospective multicenter study to determine (a) the characteristics of patients with AMI, (b) the current AMI in-hospital treatment practices, (c) in-hospital morbidity and mortality, and (d) the feasibility of establishing a long-term registry of AMI in Kuwait.

Methods

The study was conducted at the coronary care units (CCUs) of five of six major hospitals in Kuwait: Al-Adan, Al-Farwaniah, Al-Sabah, Al-Jahra and Mubarak Al-Kabeer. These hospitals are located in different governorates and provide services to about 2 million residents. One hundred and eleven patients who had the final diagnosis of AMI within a 1-month period from May 1 to May 31, 2000 were included in the study. Patients who died in the casualty department before admission to CCU were not included.

A structured data collection form was completed during hospitalization (Appendix 1). The data collected included past medical history, diagnosis on admission, vital signs at presentation, diagnostic electrocardiogram (ECG), thrombolytic therapy, peak creatine kinase, fasting blood sugar, fasting cholesterol, diagnosis on discharge, in-hospital and discharge medications and in-hospital mortality. Data forms were checked for completeness in a national coordinating center and were returned for corrections to the participating hospitals when necessary. The diagnosis of AMI was based on any two of the following three criteria: ischemic type chest pain, diagnostic serial ECG changes and doubling of creatine kinase with at least 6% MB isoenzyme. Patients were considered eligible for thrombolytic therapy if (a) they had presented within 12 h of symptom onset; (b) there was ST-segment elevation ≥0.1 mV in two or more limb leads or ≥0.2 mV in two or more contiguous precordial leads or left bundle-branch block (LBBB); (c) there were no contraindications to thrombolytic therapy. Time to thrombolytic treatment was defined as time from symptom onset to time of thrombolytic therapy administration. Patient care at each hospital was performed according to usual practice, independent of this study.

Statistical Analysis

The χ² test was used to assess the significance of association between categorical variables. A p value of <0.05 was considered to be statistically significant. All data management and analyses were conducted using the SPSS program.

Results

Participating Hospitals

The contribution of the five hospitals to the study was well balanced, ranging from 14 to 28% of the total patient population, as shown in table 1. Table 1 also shows characteristics of participating hospitals. Ninety-eight out of 111 of the data forms initially received at the national coordinating center were complete and without inconsistencies. The remaining 13 were returned to participating hospitals for corrections. Ultimately, all the forms were correctly filled out and without inconsistencies.

Patients’ Characteristics

The clinical characteristics of patients on admission are shown in table 2. Kuwaiti nationals accounted for 36% of the patients, other Arabs for 33% and South Asians for 30%. The patients were predominantly male (85%) and their mean age was 55 ± 13.5 years. History of a previous myocardial infarction was recorded in 20% of the patients. Seventy-three percent of the patients presented with ST elevation; of these, 41% had ST elevation of the anterior leads and 50% had ST elevation of the inferior leads.

Six of the 69 (9%) patients who did not give a history of diabetes had a fasting blood sugar of ≥10 mmol/l, indicating diabetes mellitus (table 3). Only 11 patients (10%) reported a history of hypercholesterolemia. However, 40 of the remaining 100 patients who were not known to have hypercholesterolemia had a fasting cholesterol of ≥5.2 mmol/l (table 3). Overall, diabetes and hypercholesterolemia were present in about 43 and 46% of the pa-
**Table 2. Baseline characteristics of study population**

<table>
<thead>
<tr>
<th>Patients</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male sex</td>
<td>94</td>
<td>84.7</td>
</tr>
<tr>
<td>Nationality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kuwaiti</td>
<td>40</td>
<td>36.0</td>
</tr>
<tr>
<td>Non-Kuwaiti Arabs</td>
<td>37</td>
<td>33.3</td>
</tr>
<tr>
<td>South Asians</td>
<td>33</td>
<td>29.7</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Previous myocardial infarction</td>
<td>22</td>
<td>19.8</td>
</tr>
<tr>
<td>ECG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ST elevation</td>
<td>81</td>
<td>73.0</td>
</tr>
<tr>
<td>ST depression</td>
<td>18</td>
<td>16.2</td>
</tr>
<tr>
<td>LBBB</td>
<td>3</td>
<td>2.7</td>
</tr>
<tr>
<td>Other</td>
<td>9</td>
<td>8.1</td>
</tr>
<tr>
<td>Pulse rate on admission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50</td>
<td>2</td>
<td>1.8</td>
</tr>
<tr>
<td>50–100</td>
<td>94</td>
<td>84.7</td>
</tr>
<tr>
<td>&gt;100</td>
<td>15</td>
<td>13.5</td>
</tr>
<tr>
<td>Systolic blood pressure on admission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;90</td>
<td>4</td>
<td>3.6</td>
</tr>
<tr>
<td>90–180</td>
<td>104</td>
<td>93.7</td>
</tr>
<tr>
<td>&gt;180</td>
<td>3</td>
<td>2.7</td>
</tr>
<tr>
<td>Heart failure on admission</td>
<td>14</td>
<td>12.6</td>
</tr>
</tbody>
</table>

**Table 3. Prevalence of risk factors for coronary artery disease among the patients**

<table>
<thead>
<tr>
<th>Patients</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypercholesterolemia(^1)</td>
<td>51</td>
<td>45.9</td>
</tr>
<tr>
<td>Diabetes mellitus(^2)</td>
<td>48</td>
<td>43.2</td>
</tr>
<tr>
<td>Hypertension</td>
<td>33</td>
<td>29.7</td>
</tr>
<tr>
<td>Current cigarette smoker</td>
<td>54</td>
<td>48.6</td>
</tr>
</tbody>
</table>

1. Hypercholesterolemia = Known high cholesterol or fasting cholesterol \(\geq 5.2\) mmol/l.
2. Diabetes mellitus = Known diabetes mellitus or fasting blood sugar \(\geq 10\) mmol/l.

Patients, respectively. The most prevalent risk factors for AMI were smoking and hypercholesterolemia (table 3).

**Medications**

Fifty-four of the 57 patients (94.7%) eligible for thrombolytic therapy received the treatment. Eligibility was based on initial ECG, presentation to the hospital within 12 h from the onset of symptoms and no contraindications to thrombolytic therapy. The median time from symptom onset to thrombolysis was 180 min. Overall time to treatment was \(\leq 2\) h in 29.6% of the patients, between 2 and 4 h in 33.3%, between 4 and 6 h in 16.7%, and >6 h in 20.4%. The median time from the first diagnostic ECG to treatment was 44 min.

Upon discharge, 93% of the patients were prescribed aspirin, 81% beta-blockers, 78% nitrates, 40% ACE inhibitors, and 32% lipid-lowering drugs.

**Morbidity and Mortality**

During the stay in CCU, heart failure was recorded in 15 patients (13.5%), recurrent ischemia in 15 patients (13.5%), reinfarction in 4 patients (3.6%), cardiogenic shock in 4 patients (3.6%), major bleeding in 2 patients (1.8%), and stroke in 1 patient (0.9%). The in-hospital mortality rate was 10%.

**Discussion**

This pilot study was of 1 month’s duration, which accounted for the relatively small study population; however, since five out of the six major hospitals in Kuwait that routinely admit AMI patients participated, the study may be considered fairly representative of AMI clinical practices in Kuwait.

Overall, the rate of prescribing medications at discharge among survivors was 93% for aspirin, 81% for beta-blockers, 40% for ACE inhibitors, and 32% for lipid-lowering drugs. In this study, the prescription of aspirin and beta-blockers is higher than in previous reports in the 1990s [14, 15] and is equivalent to that of ACE inhibitors and lipid-lowering drugs [9, 10, 14, 15]. We did not collect data regarding the prevalence of the major contraindications to ACE inhibitors and beta-blockers, and thus could not determine the shortfall for both treatments.

Our patients were relatively young as compared with patients from industrialized countries because 92% of the Kuwaiti population is younger than 50 years [16]. The finding concerning the prevalence of diabetes and smoking in this study is consistent with previous reports [17, 18] and is considerably higher than that reported from other countries [8, 16].
In the present study, there was a high rate of thrombolysis (96%), contrary to previous reports of 37% in Europe [6] and 24% in the USA [8]. Obviously, ours is one of the highest reported rates of thrombolysis. The high thrombolysis rate could be due to a higher proportion of men and relatively younger patients (table 2). Studies have shown that the rate of thrombolysis is higher in men and in younger patients [6, 8]. Another factor could be that CCUs in Kuwait are administered solely by cardiologists, who are more likely than internists and family physicians to utilize thrombolytic treatment [19].

The alarmingly high rates of smoking, diabetes and hypercholesterolemia need attention. It is reassuring to note that, in Kuwait, thrombolysis is being used in the great majority of eligible patients. To obtain the maximum benefit from such treatment, measures need to be introduced to decrease the time to treatment. While the use of aspirin, beta-blockers and calcium channel blockers seems appropriate, ACE inhibitors and lipid-lowering medications are underutilized.

The experience of this pilot study demonstrated that it would be feasible to establish a long-term registry of AMI in Kuwait. The data form consists of one page that is simple to fill out. With reasonable effort, the data were complete and of high quality. All involved hospitals were cooperative, and the communication with the coordinating center was smooth and trouble-free. Overall, no major difficulties were encountered during data collection and management.

Conclusions

Our study, which included all patients admitted to five of the six hospitals in Kuwait specializing in AMI, is fairly representative of actual AMI practices in this country. While thrombolytic therapy is highly utilized, ACE inhibitors and lipid-lowering agents appear to be underutilized. This study lays the ground for a long-duration registry of AMI in Kuwait.

Acknowledgments

We thank Ms. Shahida Khan for her excellent help with data entry and statistical analysis. This study was sponsored by a grant from Merck Sharp & Dome.
# Appendix

## KUWAIT HOSPITALS MI REGISTRY – MAY 2000

<table>
<thead>
<tr>
<th>Center #</th>
<th>PL</th>
<th>Pt. Initials</th>
<th>Pt. File</th>
<th>Age</th>
<th>Sex</th>
<th>Nationality</th>
<th>Admission Date</th>
</tr>
</thead>
</table>

### Past Medical History
- Known IHD: [ ] yes [ ] no
  - Angina: [ ] Yes [ ] No
  - MI: [ ] Yes [ ] No
  - < 30 days [ ]
  - > 30 days [ ]
  - PTCA [ ]
  - CABG [ ]

- Current smoker (3 months): [ ]
- Known IDDM [ ]
- Known NIDDM [ ]
- Known HTN [ ]
- Known hypercholesterolemia [ ]
- Family history [ ]

### Admitting Diagnosis (check only one)
- Acute MI [ ]
- UA R/O MI [ ]
- UA [ ]
- RSCP NYD [ ]
- LVF [ ]
- Arrhythmia [ ]
- Other [ ]

### V5 at Presentation
- HR [ ]
- SBP [ ]

### LVF [ ] [ ]

### Timeline: (ST↑ & LBBB MI only) (24 hr clock)
- Symptom onset ≤ 12 hr: [ ] Yes [ ] No
  - Symptom onset [ ]
  - Hospital arrival [ ]
  - First diagnostic ECG [ ]

### Diagnostic ECG: (choose one only)
- Normal [ ]
- RBBB [ ]
- LBBB [ ]
- Paced [ ]
- ST elevation (Choose one only)
  - A: Anteroseptal (V1-V3)
  - B: Anterolateral (V1-V4)
  - C: Extensive anterior (V1-V5 or V6)
  - D: Lateral (V4-V6)
  - E: High lateral (I, aVL)
  - F: Inferior (II, III, aVF)
  - G: Inferolateral (II, III, aVF + Lat. Leads)
  - H: Anterior & inferior
  - Other [ ]

### Thrombolytic Therapy (for ST↑ & LBBB only)
- Yes [ ]
- t-PA [ ]
- SK [ ]
- Other [ ]

### Time ordered [ ]
- Time started [ ]

- No [ ]
- Symptom onset > 12 [ ]
  - Missed [ ]
  - Contraindications (choose one only)
    - TBF [ ]
    - CVA/TIA [ ]
    - Previous SK [ ]
    - Trauma [ ]
    - CPR [ ]
    - Surgery [ ]
    - Bleed [ ]
    - GI [ ]
    - GU [ ]
    - Other [ ]

### Primary PTCA [ ] [ ]

### Course In Hospital
- CHF [ ]
- Recurrent ischemia (CP or ECG) [ ]
- Re-infarction [ ]
- Major bleed [ ]
  - If yes [ ]
    - GI [ ]
    - Gu [ ]
    - Other [ ]

### Discharge Information
- PredischARGE EST done: [ ] Yes [ ] No

### Discharge Diagnosis
- Acute MI [ ] [ ]
  - If yes [ ]
    - Q wave: [ ]
    - Non Q wave: [ ]

### Medicine
- In Hospital
  - ASA/antiplatelets [ ] [ ]
  - B Blocker [ ] [ ]
  - Ca Blocker [ ] [ ]
  - Nitrates [ ] [ ]
  - ACE-I [ ] [ ]
  - Diuretics [ ] [ ]
  - Digoxin [ ] [ ]
  - Cholesterol lowering [ ] [ ]
  - Heparin [ ] [ ]
  - LMWH [ ] [ ]
  - Insulin [ ] [ ]
  - Oral hypoglycemics [ ] [ ]
  - Oral anti coagulant [ ] [ ]

### In-Hospital Mortality
- Discharged alive [ ] [ ]

### In-Hospital death [ ] [ ]

### Discharge
- Date [ ]

### Person completed form:
- Last name: [ ]
  - first initial [ ]

### Investigations
- Peak CK [ ]
- FBS [ ]
- F. Cholesterol [ ]

### Interventions during admission
- No [ ]
- Yes [ ]
- Scheduled [ ]

- Catheterization: [ ] [ ]
- PTCA: [ ] [ ]
- CABG: [ ] [ ]
References


