Original articles

Management of acute myocardial infarction in general medical wards in Sri Lanka

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Summary

The study was designed to evaluate the management of acute myocardial infarction in the general medical wards of the National Hospital of Sri Lanka. All patients with acute myocardial infarction admitted from September 1996 to August 1997, were evaluated with regard to the time delay in admission and drug treatment. The facilities for monitoring and resuscitation were also assessed. A total of 259 patients were included in the study, 173 males and 86 females. The median time delay from the onset of the pain to admission at the out-patients department was 12 hours and that between out-patients department admission and ward admission was 20 minutes. The median delay in obtaining a 12-lead electrocardiogram when the patient was in the ward was 90 minutes. Review of the data showed that thrombolytic therapy, beta-blockers and angiotensin-converting enzyme inhibitors are underused. Complications were common. All the medical wards had adequate monitoring and resuscitation facilities. With adequate training of doctors and the availability of specialised cardiac nurses, thrombolytic therapy can be used effectively in medical wards.

Keywords: myocardial infarction; Sri Lanka; thrombolysis

During the last two decades there has been a steady increase in the number of hospital admissions and deaths due to ischaemic heart disease in Sri Lanka.¹ In the spectrum of ischaemic heart disease, acute myocardial infarction (AMI) is the single most important entity determining the disease burden, and in the last decade the prognosis for AMI has improved dramatically. Thrombolytic therapy and adjunctive therapy account for the reduction in early mortality.² Thrombolytic therapy was introduced in Sri Lanka in the mid-1980s, but in the National Hospital, it was initially used only in the coronary care unit.

Patients with chest pain suggestive of AMI are sent to the emergency treatment unit in the out-patients department. In the emergency treatment unit patients are monitored and a 12-lead electrocardiogram (ECG) is taken. If the ECG shows changes characteristic of AMI, patients are transferred to the coronary care

unit for streptokinase therapy. If the diagnosis is missed at this stage or if the patient presents more than 12 hours after onset of pain or if there is no evidence of AMI on ECG, patients are sent to general medical wards. There is no age limit for streptokinase therapy.

In the medical ward patients are re-assessed and the ECG repeated. If the new ECG showed any evidence of AMI, or on recognition of missed ECG changes, patients used to be transferred to the coronary care unit for streptokinase therapy. Since the mid-1990s streptokinase therapy has increasingly been used in the general medical wards.

This study was conducted to analyse the initial management of AMI in medical wards and to identify any shortcomings.

Materials and methods

We studied 259 patients with AMI treated in the general medical wards of the National Hospital of Sri Lanka, from September 1996 to August 1997. This was 30% of the total cases of AMI presenting to the National Hospital during this period, the remaining patients having been treated in the coronary care unit. AMI was diagnosed on the basis of history and ECG findings. Subsequently, cardiac enzymes were also measured in patients who could afford to get the test done from private laboratories as it was not available in the National Hospital. However, cardiac enzymes were not taken into consideration in the decision on initial management.

In the emergency treatment unit, patients are seen by a senior house officer with a brief training in cardiology. In the general medical wards patients are seen by a houseman, registrar and senior registrar. Doubtful cases are seen by the consultant immediately. In the general medical wards, patients with AMI are managed in the acute cubicle with continuous ECG monitoring and periodic blood pressure monitoring. All the wards have defibrillator and resuscitation facilities. In both the emergency treatment unit and medical wards the ECG is carried out by an ECG technician.

During the study period patients were seen and interviewed by the authors. Hospital records were used to obtain details of treatment and investigations. Time of admission at the out-patients department and to the ward were noted. The authors also assessed the monitoring and resuscitation facilities available in the medical wards.

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Table Median time delay at various stages, interquartile range in parentheses

Stage	Time delay (minutes)
Onset of pain to out-patients	720 (120–1440)
Out-patients to ward	20 (15–120)
Time taken to obtain an ECG in the ward	90 (60–180)

Results

There were 173 males and 86 females; 140 (54%) had anterior, 83 (32%) inferior, and 26 (10%) antero-inferior infarction and 10 (4%) had bundle branch block in the ECG. All patients with bundle branch block had typical history and elevated cardiac enzymes. Nine of these patients later developed anteroseptal changes in the ECG.

The median time delay encountered at various stages is given in the table. Streptokinase was administered to 39 (15%) patients, while 124 (48%) presented late (more than 12 hours) and 21 (8%) had contraindications. Streptokinase was not used in 75 (29%) eligible patients.

The pattern of use of aspirin, beta-blockers, angiotensin-converting enzyme (ACE) inhibitors and nitrates is shown in the figure. Aspirin was not used in three patients, two of whom had a history of active peptic ulcer and one could not tolerate aspirin. Beta-blockers were not used in patients with asthma (five), heart failure (96) and heart block (13); 119 eligible patients failed to receive beta-blockers. ACE inhibitors were used in 70 patients with heart failure and in eight patients without any evidence of heart failure. All patients receiving streptokinase were subsequently given heparin 800–1000 IU/h for 24 hours. All the patients who had heart failure received frusemide and 82 patients received digoxin; none of the patients with heart failure received vasodilators other than nitrates.

Complications were common with 96 (37%) patients developing left ventricular failure, 13 (5%) developing complete heart block, and one developing ventricular tachycardia. There were four deaths. Complications were less common among patients who received streptokinase; five (13%) developed left ventricular failure and four (10%) developed bradycardia, three of whom required atropine and one needed temporary pacing.

All the patients who developed complete heart block were transferred to the coronary care unit for pacing. The patient with ventricular tachycardia reverted with electrical cardioversion and remained stable thereafter. Amongst the four deaths, three were due to resistant cardiac failure and the other was due to resistant ventricular fibrillation in a patient with cardiac failure.

All the medical wards had adequate facilities for cardiac monitoring and resuscitation.

Discussion

Recent advances in the management of AMI have resulted in a 30–40% reduction in early

Figure Use of adjunctive drugs: ASA=aspirin (256/259); ACEI= ACE inhibitors (78/259); BB=beta blockers (26/259); Ni=nitrates (259/259)

mortality and an improvement in the functional state of the myocardium in the long term.^{2,3} There are two important aspects in the initial management of AMI. One is the time factor, and the other is the use of adjunctive drug therapy. In a previous study we looked at the time delay to thrombolytic therapy in the coronary care unit of the National Hospital of Sri Lanka. We observed undue delay in patients who were transferred from medical wards to the coronary care unit for thrombolytic therapy.⁴ Since then, the use of thrombolytic therapy has been encouraged in the general medical wards. The National Hospital is the biggest hospital in Sri Lanka and the study findings may not be representative of smaller hospitals. However, we made some important observations which merit consideration.

During the study period patients presenting to the out-patients department with ECG changes suggestive of AMI were sent to the coronary care unit. The patients who received streptokinase in the general medical wards are those who presented late, without ECG changes characteristic of AMI, or those who were missed at the initial assessment in the emergency treatment unit.

We also looked at two stages of the delay: the prehospital delay, which is determined mainly by patient-related factors,⁴ and the in-hospital delay. There was a very long prehospital delay in the present study as compared to our previous study on thrombolytic therapy in the coronary care unit (720 *vs* 130 minutes). This is due to the high proportion of late presentations in this study (48%). However, there was a considerable saving of time between transport of patients from the emergency treatment unit to the coronary care unit or to the medical wards (61 *vs* 20 minutes).

When the patient is in the medical wards considerable time is lost in obtaining a 12-lead ECG. This could be improved by either the doctor or a trained nurse taking the ECG.

Another factor contributing to in-hospital delay is the failure to realise the urgency of the condition. In our study, 91 (35%) patients were not regarded as requiring urgent treatment by the admitting medical officer. This total included 30 atypical presentations. A similar observation was made in our previous study.⁴

This reflects lack of experience and training of the medical officers in the out-patients department.

In our study only 44 (17%) patients received streptokinase. We did not study the reasons for underuse. However, late arrival, delay in diagnosis, and overemphasis on relative contraindications for thrombolytic therapy are the main reasons for withholding streptokinase. The high incidence of complications may partly be due to underuse of thrombolytic therapy.

Aspirin, beta-blockers and ACE inhibitors are the most useful adjunctive drugs in AMI.⁵⁻⁷ The recent guidelines on the management of AMI emphasise the early use of adjunctive drugs.² The underuse of adjunctive drugs is increasingly being realised; certainly, beta-blockers and ACE inhibitors are underused as adjunctive drugs in our country. This situation is also seen in more developed countries.⁸ In our study, ACE inhibitors were used mainly in patients with evidence of left ventricular failure and their use for myocardial infarction *per se* was low.

Most of our patients were on captopril (92%), others were on enalapril. The maximum dose of captopril used in our study was 37.5 mg per day. This dose is much lower than those shown to be effective in large clinical trials.⁹

Nitrates are still used extensively and the majority of patients were on long-acting nitrates. Long-acting nitrates may cause unexpected prolonged hypertension,² and their use should be discouraged.

Underuse of adjunctive drugs is a common problem. This can be rectified by implementing management guidelines and regular audit.

The initial outcome of AMI in patients treated with thrombolytic therapy is similar in medical wards and the coronary care unit. However, a large proportion of eligible patients failing to get streptokinase indicates a lack of experience of the doctors in the medical wards in managing AMI. This situation could be improved if registrars are given training in cardiology at an earlier stage in their training. The implementation of management guidelines will also be useful.

From this and our previous study,⁴ we have found that delay to thrombolysis can be reduced by giving thrombolytic therapy in medical wards. The efficacy of thrombolytic therapy in general medical wards depends to a great extent on the experience of the medical staff. Since management of AMI in medical wards may reduce the cost of medical care, this area needs to be studied further.

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