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ABSTRACT

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From early middle age onwards myocardial infarction is recognised as being a major cause of death and disability in this country. Approximately 300,000 people in the UK experience an MI each year and about 140,000 will die as a result. The rapid management of patients with chest pain should ensure that there is no more than 30 minutes delay in decision-making and initiation of thrombolytic therapy. This 'door-to-needle' time should be reduced to 20 minutes from April 2003 in line with national service framework recommendations. This article provides an overview of the signs, symptoms and diagnosis of this acute condition. The contemporary management/treatment advocated in the NSF is presented and nursing interventions are explored briefly.

Myocardial infarction: signs symptoms and treatment

MYOCARDIAL infarction (MI) occurs as a result of prolonged myocardial ischaemia that leads to irreversible injury and necrosis of myocardial tissue because of inadequate blood supply. For most people this occurs suddenly and is due to the rupture of an atheromatous plaque and the formation of a thrombus within the coronary circulation.

Less common causes of MI include vasospasm of a coronary artery, which causes temporary occlusion of the artery lumen, or a sudden increase in oxygen demand such as a sustained rapid cardiac dysrhythmia (Julian et al, 1998). From early middle age onwards MI is a major cause of death and disability in the UK, with approximately 300,000 people suffering an MI each year and about 140,000 dying as a result (Peterson et al, 1999).

Risk Factors

Epidemiological studies and clinical trials have provided valuable information about the risk factors associated with MI. The 'classical' risk factors for coronary heart disease (CHD) are divided into two groups:

- Modifiable risk factors can be treated with modification to lifestyle and/or medication, including: cigarette-smoking, diet, weight, exercise, personality/behaviour, diabetes, hypertension and serum cholesterol levels;
- Non-modifiable risk factors are beyond our control. They include: genetic predisposition, age and gender.

Men are more likely than women to develop CHD. However, after the menopause and by the age of 70 the risks are approximately equal (Clancy and McVicar, 2002).

Despite intensive screening and health promotion programmes, heart disease continues to rise. This may be due to an increasing proportion of older people and improved survival rates from acute MI. In recent years new associations and potential risk factors for MI have been described. These include: chronic infection causing inflammation of atheromatous plaques, foetal malnutrition, lack of exposure to sunlight and psychosocial factors (Walker, 1999). Studies into these 'new' risks may open up novel avenues for treatment and prevention.

Clinical features

The most common presenting symptom of MI is chest pain, which is often described as severe retrosternal chest pain of a crushing or squeezing nature. Other clues

to the differential diagnosis of chest pain are that the pain may radiate to the arms (commonly the left arm), shoulders, neck and/or jaw. The pain usually continues for more than 20 minutes and is not relieved by sublingual nitrates, but usually requires intravenous diamorphine for its resolution. In addition the pain may produce anxiety, restlessness and fear, resulting in an increase in heart rate, blood pressure and respiratory rate.

During the earliest stages of MI people are obviously distressed and may be cold and clammy. In extreme cases they may have mottled skin as a result of the reduction in cardiac output. Nausea and vomiting are also common and may be caused by severe pain, vagal stimulation or a decreased cardiac output.

The patient's general appearance improves when the pain is controlled and often looks well within a few hours. A diagnosis of MI is usually easy to make, although some patients do not have the classic symptoms and may present as silent MIs. Groups of people more likely to have atypical presentation include women, individuals with diabetes, older people and people from minority ethnic groups (Department of Health, 2000).

Previous arguments about whether MI should be treated at home or in hospital have subsided and almost all patients diagnosed as having an acute MI are admitted to hospital. Access to the correct care in the first few minutes and hours after the onset of symptoms is crucial as sudden death after an MI is often the result of a disturbance of heart rhythm. Giving thrombolytics (clot-dissolving drugs) as soon as possible after an acute MI reduces the risk of death and disability. Their effectiveness is highest the sooner treatment is begun (DoH, 2000).

Diagnosis

A definitive diagnosis depends on electrocardiogram (ECG) changes and is supported by abnormal serum cardiac enzyme levels. ECG is the single most valuable immediate diagnostic tool for the nurse. ECGs record different views of the electrical activity of the heart and provide information by viewing the heart from different angles. Unequivocal ECG changes of an MI in 80 per cent of patients include ST segment elevation of 1mm or more in two neighbouring leads and generally occur within 20 minutes to two hours of the onset of symptoms (Julian et al, 1998). According to the layers of the heart involved,

MI can be classified as: Q wave infarction – area of necrosis occurs throughout the entire thickness of the heart muscle; and non-Q wave infarction – area of necrosis is confined to the innermost layer of the heart lining the chambers.

Characteristic elevations in the serum levels of several myocardial cell enzymes occur after an MI. Unequivocal changes consist of an initial rise and subsequent fall in the iso-enzyme creatine kinase MB and troponin I (Hubbard, 2002). The concentration of enzymes released roughly parallels the severity of myocardial damage.

Management and nursing intervention

The early diagnosis of an MI facilitates admission to coronary care units (CCUs) where registered nurses with clinical expertise in cardiac nursing can quickly identify and act on complications. Whether the patient is admitted directly to the CCU or an A&E department, the rapid management of patients with chest pain should ensure that there is no more than 30 minutes delay in decision-making and initiation of thrombolytic therapy.

This maximum time allowable from 'door to needle' will be reduced to 20 minutes from April 2003 based on recommendations by the *National Service Framework for Coronary Heart Disease* (DoH, 2000). The NSF establishes clear standards for treatment before and during hospitalisation, and continuing care after discharge (Table 1).

Nursing interventions are broadly designed to promote healing of the damaged myocardium, prevent complications (such as dysrhythmias, heart failure and shock), and facilitate the patient's rapid return to normal health and life style. For the first few days after the onset of an MI the risk of sudden and unexpected death is high. This is usually due to a dysrhythmia and the patient will require continuous cardiac monitoring in coronary care for the first 24 to 48 hours.

The principal nursing priority for a patient during this time is pain management: diamorphine is the drug of choice for pain control. Most patients will initially receive 5mg of diamorphine intravenously, and this may be repeated until the patient is pain free. In addition, thrombolysis, nitrates and intravenous beta-blockers may also help to alleviate the pain (Table 1).

Patients are usually confined to bed to reduce the oxygen requirements of the damaged myocardium. However, it may be possible for them to sit out of bed in one to two days if they have no free, ischaemic chest pain. From then on mobilisation is rapid and the majority of patients should be ready for discharge in five to seven days.

Psychological support is another vital component of the nurse's role as patients often experience fear and anxiety for the first few days after admission. Encouragement and information can prevent this; cardiac rehabilitation needs to start early with guidance from experienced staff. During the rehabilitation phase of hospitalisation, particular attention is paid to modifying the patient's risk factors in the hope of preventing a recurrence of infarction. Many patients benefit from a formal rehabilitation programme, which may include training for

TABLE 1: NATIONAL SERVICE FRAMEWORK FOR CORONARY HEART DISEASE INTERVENTIONS FOR PATIENTS WITH ACUTE MI (DoH, 2000).

Before hospital

- Cardio-pulmonary resuscitation and defibrillation in the event of cardiac arrest
- High concentration of oxygen
- Pain relief: for example 2.5–5mg diamorphine intravenously with an anti-emetic
- At least 300mg aspirin given orally
- Immediate transfer to hospital

Hospital

- Aspirin – 300mg orally (if not already given)
- Oxygen
- Pain relief (for example 2.5–5mg diamorphine intravenously, with anti-emetic, if still in pain)
- Thrombolytic therapy (door-to-needle time will be 20 minutes from April 2003)
- Beta-blockers (to be continued for at least one year)
- Consider insulin/glucose infusion for people with diabetes

Continuing care

- Risk factor advice about smoking cessation, physical activity and diet
- Low dose aspirin (75mg daily)
- Beta-blockers (for at least one year)
- Provide advice and treatment to maintain blood pressure below 140/85mmHg
- Statins to lower serum cholesterol concentration either to less than 5mmol/litre or by 30 per cent (whichever is greater)
- Angiotensin converting enzyme (ACE) inhibitors for people with symptomatic heart failure, echocardiographic evidence of left ventricular dysfunction or extensive q-wave infarcts
- Control glucose levels meticulously as well as blood pressure in people who have diabetes
- Arrange systematic individualised rehabilitation and secondary prevention

physical activity and psychosocial or vocational counselling when necessary. At four to eight weeks after discharge, the person should be able to walk outside and up hills and stairs, return to driving, and resume sexual activity. A return to work usually occurs after 12 weeks.

Conclusion

Early identification of an MI facilitates prompt admission to coronary care where complications can be identified early and treated. The focus of what should be done for a patient with an acute MI has changed from bed rest to early intervention and attention is now given to treatment that can alter the course of the disease. The NSF provides evidence-based guidance for treatment and should reduce death and disability from MI. ■

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