PRESENTATION OF ACUTE MYOCARDIAL INFARCTION IN COSMOPOLITAN SINGAPORE*

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SYNOPSIS

Of 173 patients admitted with acute myocardial infarction to a medical unit in a general hospital in Singapore in 1972, 54% were Chinese, 32% Indian, 10% Malay, and 4% others. Less than 10% were from the professional and executive class, the majority being unskilled, semi-skilled and white-collar workers. Indians who constitute 7% of the population appeared disproportionately susceptible to acute myocardial infarction. Possible reasons for this are discussed. Only 82% were admitted within 24 hours of onset of symptoms. Their mean of 7 hours was highly unsatisfactory in view of the 50% mortality within 2 hours of infarction. This was predominantly due to patient delay. There was an unusually high incidence of atypical descriptions of the character (32%) and site (57%) of chest pain. Terms used by patients such as pricking, pinching, and stabbing clearly contradict standard medical textbook descriptions. Doctors practising in Singapore should be aware of these frequent variations.

INTRODUCTION

Coronary heart disease and deaths from acute myocardial infarction are increasing rapidly in Singapore. Between 1969 and 1973, there was a 32% increase in the number of admissions of acute myocardial infarction to the Outram Road General Hospital. (Central Records Office, 1974). In the decade between 1963 and 1973, deaths from coronary heart disease rose from 3·9% of all deaths in Singapore to 9·3% —a nearly two-and-a-half fold rise (Registry of Births and Deaths, 1974). Coronary care facilities in hospital contribute to the reduction in mortality from acute myocardial infarction (Meltzer, 1972) but as half the deaths occur in the first two hours (McNeilly and Pemberton, 1968) such delays of several hours or even days that have been observed (Wan et al, 1970) would almost nullify the benefits of coronary care or indeed of hospital care. Owing to the cosmopolitan composition of the population, it was thought that language and cultural differences may have influenced the manner of presentation in the different ethnic groups. The object of this paper was to analyse, with these factors in mind, the presentation of acute myocardial infarction among a population composed of four major ethnic groups, and hoping to identify possible areas where improvement in survival might be achieved.

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SUBJECTS AND METHODS

In 1972, a total of 173 patients with acute myocardial infarction were admitted to Medical Unit III at the Outram Road General Hospital, Singapore. The criteria used for diagnosis of myocardial infarction were according to the World Health Organisation (WHO, 1968) and consisted of unequivocal ECG changes and rises in cardiac enzymes in support of typical or occasionally atypical symptoms. Details of the history of each patient were obtained from case notes written in English.

RESULTS

Number of patients and ethnic distribution (Table I)

Of a total of 173 patients with acute myocardial infarction, just over half were Chinese (54%), a third were Indian (32%) and a tenth were Malay (10%). The corresponding population distribution in Singapore indicates however that the Indians appear to have a distinctly higher incidence of myocardial infarction as they only constitute 7% of the population.

Sex and age distribution (Table II)

There were 153 male and 20 female patients, the ratio being 8:1. A breakdown by ethnic groups shows a ratio of 5:1 among Chinese but there is a greater ratio among the Indians and Malays. The number of Malay patients was

TABLE I   NUMBER OF PATIENTS AND ETHNIC DISTRIBUTION

	Number of Patients	Population distribution in Singapore
Chinese	93 (54%)	(76%)
Indian	56 (32%)	(7%)
Malay	18 (10%)	(15%)
Others	6 (4%)	(2%)
	173 (100%)	(100%)

TABLE II   MALE : FEMALE RATIO

	Male	Female	M:F Ratio
Chinese	78 (84%)	15 (16%)	5 : 1
Indian	53 (93%)	3 (7%)	18 : 1
Malay	17 (94%)	1 (6%)	17 : 1
Others	5 (83%)	1 (7%)	5 : 1
All patients	153 (88%)	20 (12%)	8 : 1

TABLE III   MORTALITY IN RELATION TO AGE AND ETHNIC GROUP

	Number of Patients	Mean Age	Number of deaths	%	Mean Age
Chinese	93	57·2 yrs	20	(22%)	62·0 yrs
Indian	56	51·2 yrs	9	(16%)	55·2 yrs
Malay	18	54·3 yrs	3	(17%)	55·3 yrs
Others	6	54·0 yrs	3	(50%)	57·0 yrs
All patients	173	55·5 yrs	35	(20%)	59.2 yrs

TABLE IV   OCCUPATIONS

	Chinese	Indian	Malay	Others	Overall
Manual labourers/un-skilled workers	10	21	3	0	34 (20%)
Skilled workers/technicians	12	7	1	1	21 (12%)
Drivers/conductors/postmen	12	5	5	0	23 (13%)
White collar workers/teachers/shop-keepers	30	13	3	2	48 (28%)
Professional/manage-rial/executive	9	4	1	1	15 (8½%)
Housewives	11	2	1	1	15 (8½%)
Unknown/unem-ployed	9	4	3	1	17 (10%)
TOTAL	93	56	18	6	173 (100%)

too small for the figure to be meaningful and the ratio among Indians will be discussed below. The mean age for men was 54·8 years and for women 60·8 years.

Mortality in relation to age and ethnic group (Table III)

The mean age of Chinese patients was 57·2 years which was the highest, and that of Indians was 51·2 years, the lowest. There was an overall mortality of 20%. It is difficult to make any meaningful comparison of this figure with other published figures because there was a considerable delay before admission among this series. In all ethnic groups those who died were older than the mean age in each group. This was as expected.

Occupations (Table IV)

It will be seen that the professional, managerial and executive group comprised less than 10% of the total while unskilled and semiskilled workers represented half of the total. White collar workers formed a further third. It is probable that members of the higher social classes are more likely to seek medical attention outside the General Hospital, and are therefore not truely represented in this series. Nevertheless this data indicates that susceptibility to coronary heart disease and myocardial infarction is not, as commonly believed, largely confined to the professional, managerial or executive classes.

Time of onset of symptoms (Table V)

Two thirds of the patients developed symptoms during non-working hours. The exact

circumstances at onset were difficult to determine.

Route of admission to hospital ward (Table VI)

In 1972, all patients were screened at the Emergency Unit before admission to the unit for definitive management. It can be seen from the table that half of the patients sought medical attention by presenting themselves at the Emergency Unit and the other half saw their general practitioner or attended an outlying Government Outpatient clinic first, adding to the delay in admission to hospital.

Time between onset of symptoms and admission (Table VII)

Eighty-two percent of the 173 patients were admitted within 24 hours of the onset of symptoms of myocardial infarction. The other 18% were admitted after a delay of between one and seven days after the onset of symptoms. The mean for patients in the first group was 7 hours and for the second group it was 3·3 days. The overall mean for all 173 patients was 20 hours Only 42% of the patients were admitted within 4 hours (Fig. 1). These figures represent a considerable delay.

Site of chest pain (Table VIII)

Less than half of the patients (43%) described a central or retrosternal site of their chest pain. Indeed 42% had left sided or praecordial pain and a further 15% had either right sided or epigastric pain or no pain at all. There is therefore an unusually high incidence of variations from the classical site of cardiac pain.
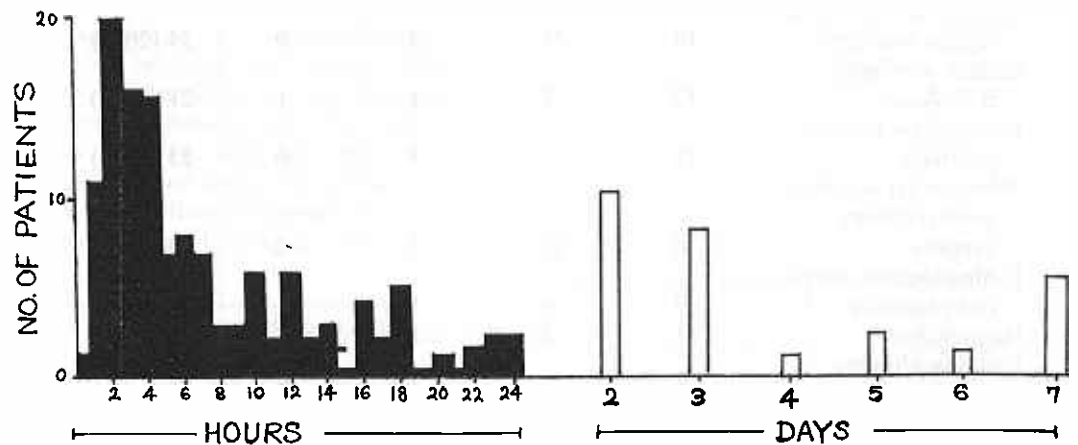

Fig. 1. Delay between onset of symptoms of infarction and admission to hospital.

TABLE V   TIME OF ONSET OF SYMPTOMS

	Chinese	Indian	Malay	Others	All Patients
Working Hours (8 am to 6 pm)*	35%	36%	45%	0%	34%
Non-Working hours	65%	64%	55%	100%	66%

(*or otherwise if shift worker)

TABLE VI   ROUTE OF ADMISSION TO WARD

	Chinese	Indian	Malay	Others	All Patients
Through Emergency Unit	54	33	4	3	94 (54%)
Through GPs or Outlying Govt. OPDs and Emergency Unit	37	22	14	3	76 (44%)
Already in Hospital	2	1	0	0	3 (2%)

TABLE VII   TIME BETWEEN ONSET OF SYMPTOMS AND ADMISSION

	Less than 24 Hours (Range ½ to 24 Hrs)	Over 24 Hours (Range 1 to 7 Days)	Overall
Chinese	78% (Mean 8.3 Hrs)	22% (Mean 3.1 Days)	(Mean 23 Hrs)
Indian	85% (Mean 5.9 Hrs)	15% (Mean 3.8 Days)	(Mean 18.7 Hrs)
Malay	88% (Mean 6.7 Hrs)	12% (Mean 3.0 Days)	(Mean 14.4 Hrs)
Others	100% (Mean 4.7 Hrs)	0	(Mean 4.7 Hrs)
ALL PATIENTS	82% (Mean 7.0 Hrs)	18% (Mean 3.3 Days)	(Mean 20 Hrs)

TABLE VIII   SITE OF PAIN

	Chinese	Indian	Malay	Others	All Patients
Retrosternal	45%	40%	32%	50%	43%
Left-Sided	39%	45%	42%	33%	42%
Other Sites*	16%	15%	26%	17%	15%

(* Right sided, epigastric, or absent)

Character of chest pain (Table IX)

One third of the patients described their chest pain as pricking, pinching, stabbing or burning. Only a few did not have pain at all. It would be natural to suspect that differences in language and difficulty in translation accounted for this observation. However, these atypical terms were not employed exclusively by any one ethnic group as can be seen in the table. Besides, it was not uncommon for English speaking patients to use these atypical terms to describe their symptoms spontaneously.

Associated symptoms (Table X)

The symptoms accompanying typical or atypical chest pain were profuse sweating, dyspnoea, nausea or vomiting, and dizziness or syncope in that order of frequency. They did not differ in each ethnic group.

Risks factors (Table XI)

Smoking was consistently the commonest risk factor in all ethnic groups. Fifty eight percent were regular smokers of 15 or more cigarettes daily for 5 or more years. Hypertension (37%) occurred in over a third in each ethnic group and Diabetes (23%) appeared to be notably commoner among the Indians (34%). It is interesting that obesity and hypercholesterolaemia (over 260 mg. %) were not remarkable in this series. Eighty four percent of the patients had one or more of these risk factors and 44% had two or more. There was insufficient data on family history, living habits and hyperuricaemia for analysis.

DISCUSSION

From the information presented, there were three outstanding features—the greater incidence of Indian infarcts, the considerable delay before admission, and the frequency of atypical character and site of cardiac pain.

The greater susceptibility of Indians to myocardial infarction has been observed previously (Danaraj et al, 1959; Muir, 1960; Wee et al, 1967; and Chao, 1973). Several factors have been considered as possibly contributing to this. The Indian diet is thought to be high in cholesterol and saturated fats. Staple cooking ingredients such as coconut oil, and "Ghee" or liquefied butter are high in these constituents. Fatty mutton is a popular meat and among some sub-communities milk is drunk in large quantities (Muir, 1960). However, a large scale nutritional survey did not detect any appreciable difference in total fat intake among the local ethnic groups (ICNND, Nutritional Survey, 1964), and studies locally and in India (Malhotra, 1967) do not implicate high serum cholesterol levels. Serum Triglyceride levels were however not measured in this and other studies (Wee et al, 1967; Balasundaram, 1972).

The observation made in this paper of a high prevalence of Diabetes among Indians is supported by the study of Peninsular Malaysian Indians (Balasundaram, 1972), and this is likely to be an important contributing factor.

According to the Singapore Census (1970) there are nearly twice as many Indian males as females in Singapore. The additional males are entirely in the 30 to 60 year age group and hence in the coronary risk age range. As they often return to India on retirement, we do not see many elderly Indian infarcts, and this is probably one reason for the lower mean age of Indian infarcts in this series. The factor of extra males is not sufficient however to explain entirely the higher prevalence of Indian infarcts, though it does contribute towards it. For, while there are approximately 150,000 male Chinese between 40 and 60 years old, there are only 30,000 male Indians in the same age range, a ratio of 5:1. The observed ratio of Chinese to Indian infarcts is 1·5:1 (Table I). This could of course be interpreted as reflecting a relatively low susceptibility among the Chinese. Finally, a genetic propensity cannot be discounted and indeed is most likely to be an important factor (Malhortra, 1972; Wee et al, 1967).

It is widely accepted that prehospital mortality from acute myocardial infarction is extremely high. About 50% of those who die from myocardial infarction will have died within 2 hours (McNeilly and Pemberton, 1968). This implies that the majority of those patients admitted after the first few hours may not benefit much from hospital care. Even considering those patients in this series who were admitted within 24 hours, the mean of 7 hours between onset of symptoms and admission is highly unsatisfactory. It is also obvious that the basic delay lies with the patients who do not seek medical attention in time through failure to recognise the symptoms and to appreciate the importance of immediate medical care. Diversion through Emergency Unit and outlying clinics contribute further to the delay. Therefore there is urgent need for public education on this subject, and

TABLE IX

CHARACTER OF CHEST PAIN

	Chinese	Indian	Malay	Others	All Patients
TYPICAL:	67 (72%)	34 (61%)	13 (72%)	4 (67%)	118 (68%)
ATYPICAL:					
Pricking	11	10	3	0	
Stabbing	8	3	1	1	
Pinching	0	3	1	0	
Burning	3	7	0	1	
No pain	4	0	0	0	
	26 (28%)	22 (39%)	5 (28%)	2 (33%)	55 (32%)
TOTAL	93	56	18	6	173 (100%)

TABLE X

ASSOCIATED SYMPTOMS

	Chinese	Indian	Malay	Others	All Patients
Sweating	66%	64%	67%	83%	66%
Dyspnoea	35%	48%	28%	33%	39%
Nausea/Vomiting	15%	13%	11%	17%	14%
Dizziness/Syncope	9%	11%	11%	17%	10%

TABLE XI

RISK FACTORS

	Chinese	Indian	Malay	Others	All Patients
Hypertension	39%	34%	33%	33%	37%
Smoking	58%	57%	72%	33%	58%
Diabetes Mellitus	19%	34%	11%	17%	23%
Hypercholestero-laemia	13%	9%	22%	0%	12%
Obesity	10%	5%	0%	0%	7%

indeed on methods of primary prevention, for after all half of Singapore's population at present is under the age of 21 (Singapore Census 1970).

Typical cardiac pain is, according to conventional medical teaching constricting, crushing, squeezing, or tight, and localised to the centre of the chest. Pain that is described as sharp, shooting, pinching, pricking or stabbing is regarded as non-cardiac in origin (Price, 1966; Wood, 1968; Oram, 1971). In this series, there appears to be a high incidence of atypical descriptions of the character and site of pain, some distinctly contradicting conventional teaching. One could attribute this to difficulties in translation or to ethnic differences in manner of expression, but whatever the explanation, the fact remains that such atypical terms will continue to be used by patients in this cosmopolitan city. Therefore it is important that doctors practising in Singapore should be aware of these frequent variations lest unnecessary delay be incurred by doubt in the diagnosis of cardiac pain.

ACKNOWLEDGEMENTS

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