PAPERS AND SHORT REPORTS

Prognosis of patients with "chest pain ?cause"

R G WILCOX,   J M ROLAND,   J R HAMPTON

Abstract

All 662 patients admitted to the two coronary care units in Nottingham during 12 consecutive months were followed up prospectively for one year. At the time of discharge from hospital they were categorised according to set criteria into the following diagnostic groups: definite, probable, or possible myocardial infarction; ischaemic heart disease without infarction; chest pain ?cause; and other diagnoses. Eighty-nine patients (13% of admissions) were categorised as having chest pain ?cause. No deaths occurred among these patients during the observation period, although two were readmitted with myocardial infarction. Patients with chest pain ?cause had few problems during the year after admission, and at the end of that time 75% were in their original employment. Patients admitted with ischaemic heart disease had a similar death rate (between six weeks and one year after admission) to those with myocardial infarction, and only 36% were in their original employment one year after admission.

Chest pain ?cause is a clinically useful diagnostic category to which patients may be allocated after only simple investigations.

Introduction

Among the patients admitted to a coronary care unit with suspected myocardial infarction are some with chest pain for which no cause can be found. When survival rates for all patients admitted to coronary care units are calculated patients with undiagnosed chest pain are usually either ignored or included with patients who have ischaemic chest pain in a category such as "no myocardial infarction."[1-3] Patients with ischaemic pain but no infarction have a similar long-term outlook to those who are discharged from hospital having had an infarction,[3][4] but here we emphasise the importance of identifying patients with "chest pain ?cause."

Patients and methods

During 12 consecutive months all the patients admitted to the coronary care units of the City and General Hospitals, Nottingham, with suspected myocardial infarction within the previous 24 hours were followed up prospectively, either until death or until 12 months after admission. Some patients were included in a trial of treatment with beta-blockers, but as active treatment failed to show any benefit compared with placebo they were included in this study.

A detailed data sheet was completed for each patient on admission: records were kept of previous cardiovascular morbidity and of the clinical state on admission. While patients were in the coronary care unit results of daily electrocardiography and serum cardiac enzyme activities were recorded (aspartate transaminase and hydroxy-butyrate dehydrogenase at the General Hospital and creatine phos-phokinase and lactate dehydrogenase at the City Hospital). After discharge from hospital all the survivors were asked to attend a special postinfarction clinic six weeks from the date of admission, and thereafter they were seen as frequently as their clinical state required. All patients were asked to attend a clinic 12 months after admission; if a patient failed to attend information about symptoms, treatment, and employment state was obtained by direct contact with the patient by telephone or letter, from the general practitioner, or, if the patient had died, from the coroner's record, hospital notes, and the patient's next of kin. Of those patients who were alive at six weeks, 97% attended the follow-up clinic, and 86% attended at one year.

Diagnostic criteria—At the time of discharge from hospital the patients were assigned to one of five diagnostic categories. (1) Definite or probable myocardial infarction: a convincing history plus the appearance of pathological Q waves with characteristic sequential ST-T changes on electrocardiography or serum cardiac enzyme activities increased to twice the upper limit of normal, or both. (2) Possible myocardial infarction: a convincing history, plus an abnormal electrocardiogram that did not show the appearance of Q waves, plus a rise in serum cardiac enzyme activities but to less than twice the upper limit of normal. (3) Ischaemic heart disease: a convincing history of angina or evidence of a previous infarction, but with no evidence suggestive of a new infarction. (4) Chest pain ?cause: no history of myocardial infarction or angina, chest pain sufficiently

Department of Medicine, University Hospital, Nottingham NG7 2UH
R G WILCOX, BSC, MRCP, lecturer
J R HAMPTON, DM, FRCP, professor of cardiology

Department of Therapeutics, City Hospital, Nottingham
J M ROLAND, BSC, MRCP, research fellow (present appointment: senior registrar, Royal Devon and Exeter Hospital)

similar to that of myocardial infarction to cause admission to a coronary care unit but with persistently normal electrocardiograms and serum enzyme activities, and no evidence of any other disease. (5) Other diagnoses: a confident diagnosis of some condition not related to coronary artery disease.

Results

During the 12-month study period 662 patients were admitted to the two units, of whom 20 had conditions other than coronary artery disease or chest pain ?cause: eight had gastrointestinal or gall-bladder disease, four chest pain associated with a primary arrhythmia, three pericarditis, two hypotension associated with antihypertensive treatment, one carcinoma of the bronchus, one atrial fibrillation due to thyrotoxicosis, and one an obvious neurosis.

Eighty-nine patients (13%) were included at the time of discharge from hospital in the diagnostic category of chest pain ?cause. Table I shows that these patients were younger than those with myocardial infarction and included more women. The average time spent in

TABLE I—*Age, sex, and details of hospital stay according to index diagnosis*

				Myocardial infarction (definite, probable, or possible)	Ischaemic heart disease	Chest pain ?cause
No of patients	..	..	..	456	97	89
Men:						
No (%)	..	..	..	376 (82)	79 (81)	67 (75)
Mean (±SD) age (years)			..	59±19	58±9	51±8
Women:						
No (%)	..	..	..	80 (18)	18 (19)	22 (25)
Mean (±SD) age (years)			..	58±19	58±9	49±9
Median No of days in coronary care unit (range)			..	2 (1–7)	2 (1–4)	2 (1–3)
Median No of days in hospital (range)			..	8 (5–41)	5 (2–21)	4 (2–23)
No (%) of patients receiving drugs:						
Diamorphine	..	..	..	337 (74)	27 (28)	14 (16)
Digoxin ⎫						
Diuretics ⎬	..	..	205 (45)	26 (27)	0
Antiarrhythmias ⎭						

the coronary care unit was similar in each group, presumably reflecting the time necessary for the clinicians to be satisfied that any changes in the electrocardiogram or serum enzyme activities that were going to occur had done so. Patients with chest pain ?cause stayed in hospital for considerably less time than those with myocardial infarction; they also differed from these patients in that diamorphine was used less often and digoxin and diuretics were not used at all.

Of the 456 patients with a definite or possible myocardial infarction, 73 (16%) died in hospital (Table II). Between discharge from hospital and the outpatient visit at six weeks 24 more patients (7% of those discharged) who had had a myocardial infarction died, but no deaths occurred among the patients who had been included in the categories ischaemic heart disease and chest pain ?cause. Between six weeks and one year the death rates were similar in the groups of patients who had been admitted with a myocardial infarction or ischaemic heart disease, but no deaths occurred among the patients with chest pain ?cause.

TABLE II—*Deaths according to diagnostic category*

	Myocardial infarction		Ischaemic heart disease	Chest pain ?cause	Other diagnoses
	Definite or probable	Possible			
No of patients admitted ..	400	56	97	89	20
No of hospital deaths ..	71	2	0	0	1
(% of patients admitted who died) ..	(18)	(4)	(0)	(0)	(5)
No of patients discharged	329	54	97	89	19
No of deaths between discharge and 6 weeks..	24	0	0	0	0
(% of patients discharged who died) ..	(7)	(0)	(0)	(0)	(0)
No of patients alive at 6 weeks ..	305	54	97	89	19
No of deaths between 6 weeks and 1 year ..	25	3	7	0	0
(% of patients alive at 6 weeks who died) ..	(8)	(6)	(7)	(0)	(0)
Total No of deaths in 1 year	120	5	7	0	1
(% of patients dying) ..	(30)	(9)	(7)	(0)	(5)

Six patients (7%) considered to have chest pain ?cause were readmitted to hospital during the year of observation. Two men (aged 52 and 57) were admitted with definite myocardial infarction six weeks and eight months after their original illness, respectively; one patient had a further episode of chest pain ?cause, and three had unrelated problems. The readmission rate in the other groups was much higher: 57 patients (15%) discharged with a diagnosis of myocardial infarction were readmitted, as were 19 (20%) of those considered at discharge to have ischaemic heart disease but no new infarction.

Table III shows that at one year the patients with chest pain ?cause were on the whole free of symptoms and did not require any medical treatment. A substantial minority of patients who had been admitted with myocardial infarction or ischaemic heart disease, however, had symptoms and needed treatment.

TABLE III—*Morbidity at one year, showing cardiovascular symptoms and drugs taken. (Figures are numbers (%) of patients)*

			Index diagnosis		
			Myocardial infarction (definite, probable, or possible)	Ischaemic heart disease	Chest pain ?cause
No of patients alive	..		331	90	89
Symptoms:					
Dyspnoea:					
Mild	..	..	80 (24)	30 (33)	0
Moderate	..	..	19 (6)	8 (9)	1*
Severe	..	..	2	0	0
Angina:					
Mild	..	..	67 (20)	32 (36)	2
Moderate	..	..	11 (3)	12 (13)	0
Severe	..	..	0	2	0
Drugs:					
Digoxin	..	..	25 (8)	17 (19)	0
Diuretics	..	..	49 (15)	23 (26)	0

*This patient had carcinoma of the lung.

Table IV shows that one year after admission with chest pain ?cause 56 (88%) of those who could have been working were employed, mostly in their original jobs. Of those who had had a myocardial infarction, 142 (65%) were back at their original work, but only 20 (36%) of those who had been admitted with ischaemic heart disease had managed to achieve this.

TABLE IV—*Employment state of surviving men after one year according to diagnostic categories*

			Myocardial infarction (definite, probable, or possible)	Ischaemic heart disease	Chest pain ?cause
No potentially employable ..		..	220	56	64
No (%) in original job	..	..	142 (65)	20 (36)	48 (75)
No (%) in lighter work	..	..	29 (13)	10 (18)	8 (13)
No (%) unemployed	..	..	17 (8)	17 (30)	5 (8)
No (%) retired prematurely		..	32 (15)	9 (16)	3 (5)

Discussion

No universally accepted criteria exist for the diagnosis of myocardial infarction. The most commonly used are those of the World Health Organisation (WHO), by which a patient is considered to have either a definite or possible myocardial infarction or no myocardial infarction.[5] The category of definite infarction includes patients with a history that may be typical or atypical, provided the electrocardiogram shows unequivocal changes, and also those patients with a typical history but a normal electrocardiogram provided the serum cardiac enzyme activities are raised; the necessary rise in cardiac enzyme activity, however, is not specified. Patients considered to have a possible infarction are those with a typical history but without electrocardiogram or enzyme changes. No myocardial infarction is a category applied to those patients in whom a firm alternative diagnosis is made or in whom the history is atypical and the electrocardiogram and enzyme activities are unhelpful. Thus our patients with chest pain ?cause might be allocated to either

possible myocardial infarction or no myocardial infarction on WHO criteria, for the classification relies heavily on whether or not the history is regarded as typical. History taking is a difficult art, and patients' histories vary with repeated taking so for scientific purposes histories must be regarded as unreliable. Since all our patients had chest pain sufficiently similar to that of a myocardial infarction to justify admission to a coronary care unit they should probably be in the WHO category of possible infarction.

The WHO criteria were developed primarily for the maintenance of coronary registers and were never intended to have a clinical value. Clearly, our categories of definite or probable infarction, possible infarction, ischaemic heart disease, and chest pain ?cause are of practical use, for the mortalities in these groups were different. In the first few weeks after admission to hospital separating patients with our categories of definite and probable infarction from those with our category of possible infarction or ischaemic heart disease is clearly important, for in the first six weeks there was a much higher death rate among the patients with a definite or probable infarction. Once six weeks have elapsed these categories of diagnosis become less important, for in each group about 7% of the patients died within a year of their admission to hospital. Identifying patients with chest pain ?cause then becomes extremely important, for these patients do not seem to come to harm at any time and may rapidly be discharged from medical supervision.

Chest pain ?cause seems to be a recognisable syndrome in the coronary care unit and does not seem to have the same characteristics as the "effort" or Da Costa's syndrome, which Wood considered to be synonymous with cardiac neurosis.[6] [7] Left inframammary pain is a typical feature of the effort syndrome, and classically pain occurs frequently, especially after exercise. The pain is usually associated with breathlessness, palpitations, and fatigue. In the classical distribution of the effort syndrome, however, the pain is not sufficiently severe to cause the patient's admission to hospital. While many of our patients were clearly frightened and worried by their experience, the low readmission rate and the lack of morbidity in the following year are much against an underlying neurosis.

The cause and site of origin of chest pain ?cause is thus far from clear. Obviously the syndrome could conceal a variety of pathological problems in the heart, lungs, oesophagus, or chest wall, but whatever these might be treatment with powerful analgesics is seldom necessary and they are evidently self-limiting. The simple investigations of daily electrocardiography and measurement of cardiac enzyme activities for three days might fail to detect ischaemic heart disease, and the fact that two of our patients later had infarctions and two more developed what was probably angina suggests that in a small proportion of patients chest pain ?cause may have an ischaemic basis. More advanced investigations might possibly show a higher proportion of these patients to have coronary disease, but to carry out such tests on 13% of admissions to a busy coronary care unit would seem to be a classic example of what Todd called "the fruitless search for infallibility."[8] If a clinician discharges a patient from hospital with a diagnosis of chest pain ?cause, merely on the basis of clinical evaluation by electrocardiography and measurements of cardiac enzyme activities, he may with considerable confidence assure the patient that all will be well.

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THE ORDINARY SMALL CENTAURY. This grows up most usually but with one round and somewhat crusted stalk, about a foot high or better, branching forth at the top into many sprigs, and some also from the joints of the stalks below; the flowers thus stand at the tops as it were in one umbel or tuft, are of a pale red, tending to carnation colour, consisting of five, sometimes six small leaves, very like those of St John's Wort, opening themselves in the day time and closing at night, after which come seeds in little short husk, in forms like unto wheat corn. The leaves are small and somewhat round; the root small and hard, perishing every year. The whole plant is of an exceeding bitter taste.

There is another sort in all things like the former, save only it bears white flowers.

They grow ordinarily in fields, pastures, and woods, but that with the white flowers not so frequently as the other. They flower in July or thereabouts, and seeds within a month after.

They are under the dominion of the Sun, as appears in that their flowers open and shut as the Sun, either shews or hides his face. This herb, boiled and drank, purges choleric and gross humours, and helps the sciatica; it opens obstructions of the liver, gall, and spleen, helps the jaundice, and eases the pains in the sides and hardness of the spleen, used outwardly, and is given with very good effect in agues. It helps those that have the dropsy, or the green-sickness, being much used by the Italians in powder for that purpose. It kill the worms in the belly, as is found by experience. The decoction thereof, viz. the tops of the stalks, with the leaves and flowers, is good against the cholic, and to bring down women's courses, helps to avoid the dead birth, and eases pains of the mother, and is very effectual in all pains of the joints, as the gout, cramps, or convulsions. A dram of the powder taken in wine, is a wonderful good help against the biting and poison of an adder. The juice of the herb with a little honey put to it, is good to clear the eyes from dimness, mists and clouds that offend or hinder sight. It is singularly good both for green and fresh wounds, as also for old ulcers and sores, to close up the one and cleanse the other, and perfectly to cure them both, although they are hollow or fistulous; the green herb especially, being bruised and laid thereto. The decoction thereof dropped into the ears, cleanses them from worms, cleanses the foul ulcers and spreading scabs of the head, and takes away all frickles, spots, and marks in the skin, being washed with it; the herb is so safe you cannot fail in the using of it, only giving it inwardly for inward diseases. It is very wholesome, but not very toothsome.

There is beside these, another small Centaury, which bears a yellow flower; in all other respects it is like the former, save that the leaves are larger, and of a darker green, and the stalks pass through the midst of them, as it does in the herb Thorowan. They are all of them, as I told you, under the government of the Sun; yet this, if you observe it, you shall find an excellant truth; in diseases of the blood, use the red Centaury; if of choler, use the yellow; but if phlegm or water, you will find the white best. (Nicholas Culpeper (1616-54) The Complete Herbal, 1850.)