

Cause and outcome of atypical chest pain in patients admitted to hospital

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SUMMARY

In patients with acute chest pain the prime need, usually, is to diagnose and treat myocardial infarction or ischaemia. When a cardiac origin for the pain has been excluded, patients are commonly discharged without either a diagnosis or a plan for follow-up. We studied a group of such patients to see how far causation was pursued and how their mortality compared with that of patients with a proven cardiac cause for their symptoms. The study population was 250 patients admitted over five weeks with chest pain suspected of being cardiac in origin. Initial assessment included an electrocardiogram and measurement of troponin T. If neither of these indicated a cardiac event, the patient was deemed to have 'atypical' chest pain and the cause, where defined, was recorded. Outcomes at one year were determined by questionnaire and by assessment of medical notes.

Of the 250 patients, 142 had cardiac pain (mean age 79 years, 58% male) and 108 atypical chest pain (mean age 60 years, 55% male). Of those with atypical pain, 40 were discharged without a diagnosis; in the remaining 68 the pain was thought to be musculoskeletal (25), cardiac (21), gastrointestinal (12) or respiratory (10) in origin. 41 patients were given a follow-up appointment on discharge. At one year, data were available on 103 (96%) patients. The mortality rate was 2.9% (3 patients) compared with 18.3% in those with an original cardiac event. Half of the patients with atypical pain had undergone further investigations and 14% had been readmitted. The yield of investigative procedures was generally low (20%) but at the end of the year only 27 patients remained undiagnosed.

Patients with atypical chest pain form a substantial proportion of emergency admissions. The symptoms often persist or recur. The commonest causation is musculoskeletal, but a sizeable minority remain undiagnosed even after follow-up.

INTRODUCTION

Acute central chest pain leads to 20–30% of all emergency medical admissions, yet less than half the patients are given a final diagnosis of acute myocardial infarction¹. Those remaining are commonly discharged without a firm diagnosis and with the label of 'atypical chest pain'. Indeed, atypical chest pain has been reported to account for 49–60% of all admissions with chest pain^{1,2}. Such patients are often discharged without follow-up², though many experience recurrent symptoms³, and the lack of a firm diagnosis can result in depression, anxiety and a decrease in daily activity³. Such reactions have been ascribed directly to the absence of reassurance that symptoms do not indicate life-threatening disease^{4,5}.

The lack of a definitive diagnosis can also lead to inappropriate investigations and management⁶, with further anxiety and time lost from work. However, the natural history of atypical chest pain has been poorly studied and the prognosis is not well established. Even mortality figures are difficult to find because such patients are usually excluded from standard mortality data as applied to ischaemic chest pain⁷. In the present study we tried to assess mortality and natural history in patients with atypical chest pain from both a medical and a patient perspective.

METHODS

All patients admitted to the coronary care unit or medical assessment unit with chest pain initially suspected to be of cardiac origin by the referring doctor were included in the study, which ran over five weeks. Patients were identified at 9.00 a.m. daily from the central admissions office. Patients with evidence of acute myocardial ischaemia or infarction, as evidenced by a rise in cardiac enzymes (troponin T > 0.06 µg) or ST segment change on electrocardiography,

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were excluded from the study although their demographic data were recorded.

Data were collected from the medical notes on age, gender, investigations performed, discharge diagnosis and follow-up arrangements. The discharge diagnosis was divided into the following categories: musculoskeletal, gastrointestinal, cardiac (excluding acute ischaemia), respiratory and no diagnosis.

One year after their initial admission to hospital, questionnaires were sent to all patients who had had atypical chest pain, with the exception of 3 who had died. The questions included whether the patient had received an explanation of the pain, whether it had recurred, whether more tests had been done since the original episode and whether any new treatment had been prescribed. Ethical approval was obtained both for this and for access to the medical notes which were requested for all patients.

Data were extracted from the medical notes and questionnaires and compared. From the medical notes, all investigations since discharge were recorded, together with further admissions to hospital, outpatient appointments and altered diagnoses. From the questionnaires, data relating to the patients' understanding of their diagnosis were collected, together with the frequency of symptom recurrence, investigations and treatment.

Demographic data and mortality rates at one year were recorded for the patients with objective evidence of an acute cardiac event at admission (controls). No attempt to examine their medical notes was made and questionnaires were not sent to these patients. The odds ratio test was used to evaluate the significance of any difference in mortality between the two groups⁸.

RESULTS

250 patients were admitted with chest pain of suspected cardiac origin over the five-week study period. They accounted for 22% of all admissions to the medical unit. An acute ischaemic event was diagnosed in 142. In the remaining 108, the pain was judged at discharge to have been musculoskeletal in 25 (23%), cardiac in 21 (19%), gastrointestinal in 12 (11%) and respiratory in 10 (9%). These diagnoses were usually based on clinical findings and few patients had confirmatory investigations during their initial inpatient stay. No diagnosis was offered in 40 (37%) patients. 21 patients had a history of ischaemic heart disease and in 13 of these symptoms were classified as cardiac in origin on this admission. Follow-up appointments were offered to 41 patients, but the probability of follow-up was not obviously related to the discharge diagnosis. Most follow-up appointments were made for medical rather than

Table 1 Demographic details on patients with atypical chest pain and patients with acute myocardial event

	<i>Atypical chest pain</i>	<i>Cardiac</i>
No.	108	142
Mean age (years)	59.5	61.7
% male	54.6	58.1
1 year % mortality	2.7	18.3
% with established ischaemic heart disease	24	57

specialty clinics: there were no protocols to guide clinicians on who should be further investigated.

At follow-up, medical notes were available for 103 of the 108 patients (3 had died as a result of heart failure or emphysema). Having ascertained that all other patients were still alive, we sent questionnaires to the remaining 105 patients and these were returned by 61. The one-year mortality among patients with atypical chest pain was 2.7% (3), compared with 18.3% (26) among the patients with an original acute ischaemic event. The odds ratio for death in this group was 7.9 (95% confidence interval 2.3–26.9) versus those with atypical pain ($P < 0.001$). Table 1 compares the two groups.

Of the 100 patients with atypical chest pain still alive at follow-up and whose notes were available, 14 had been readmitted to hospital with similar or related symptoms. A total of 51 had undergone further investigation and 73 were still taking prescribed medication for their symptoms. The most frequent performed were exercise testing, myocardial perfusion scanning, gastroscopy and transthoracic echocardiography, with an average yield of positive results of only 20% (Table 2). The diagnostic category had altered for 13 patients (Table 3). The proportion of positive diagnoses had increased in each of the subgroups, with the commonest categories being musculoskeletal (27), cardiac (25), gastrointestinal (14) and respiratory (12). Although 22 patients

Table 2 Range and yield of investigations performed to identify cause of atypical chest pain

<i>Investigation</i>	<i>No. of patients</i>	<i>Positive results</i>
Gastroscopy	6	2
Exercise test	10	2
Thallium scan	6	1
Echocardiogram	7	1
Coronary angiogram	5	1
24-hour ECG tape	3	0
Perfusion lung scan	7	1

Table 3 Patients with defined causes for atypical chest pain at baseline and after one year

<i>Diagnostic category</i>	<i>Baseline</i>	<i>Follow-up</i>
Musculoskeletal	25	27
Cardiac	21	25
Gastrointestinal	12	14
Respiratory	10	12
No diagnosis	40	22
No follow-up data	—	5
Died during follow-up	—	3
Total	108	108

were still without a diagnosis, these were patients who had not been readmitted and whose questionnaires generally confirmed the absence of recurrent symptoms.

The questionnaire responses correlated poorly with the notes with regard to patients' comprehension of their diagnosis. 30 patients correctly identified their diagnostic category, while 16 did not know what their physician considered to be the cause of their symptoms and 15 gave a diagnosis different from that recorded in their medical notes. The questionnaire did confirm the impression that symptoms are persistent or recurrent in many patients (61%) and correlated in all cases with the medical notes with regard to investigations and prescribed treatment.

DISCUSSION

This study confirms that atypical chest pain has a wide range of potential causes⁹ and that special investigations are commonly needed to make a diagnosis^{10,11}. A high proportion of patients continue to have symptoms after discharge from hospital, but mortality is lower than in patients with ischaemic cardiac pain¹².

When myocardial infarction has been ruled out, a patient will often need more than simple reassurance that life-threatening disease has been excluded³. Other causes for ischaemic-sounding chest pain are well recognized¹³. Gastro-oesophageal reflux may produce symptoms similar to angina¹⁴, and pH monitoring can be useful in such patients¹⁵. Respiratory causes are also well described, including hyperventilation resulting from anxiety¹⁶. Musculoskeletal pain is perhaps less often considered, but in our study was the most frequent cause of symptoms.

The yield of individual investigations was low overall, as has been noted by others⁴. Coronary angiography has a low

yield of positive results in both sexes^{17,18}. Endoscopy was the most frequently positive test, allowing confirmation or recategorization of a small number of patients as having gastro-oesophageal disease—usually reflux, with or without oesophagitis. Most investigations related to further cardiac tests and, despite a low yield of positive results of under 20%, these led to recategorization of a small number of patients as cardiac. The yield from pulmonary function testing and other respiratory tests (such as perfusion scanning for pulmonary emboli) was especially low. Overall, there was very little realignment between the diagnostic groups during follow-up, with most of the new diagnoses coming from the group of patients with no diagnosis at discharge. Despite the low yield of positive results on investigation, a negative result may be reassuring to the patient; thus, such investigations should be guided by individual clinical assessment.

Although few specific investigations for musculoskeletal disease were considered, this diagnostic category swelled during follow-up, mainly as a result of clinical assessment. A search for areas of anterior chest wall tenderness, pressure over which reproduced symptoms, was particularly helpful. Additionally, examination of the cervical and thoracic spine yielded positive findings. Physiotherapy was commonly initiated, and topical anti-inflammatory drugs were frequently prescribed.

A follow-up appointment was kept by 38% of patients, but a further 14% had been readmitted, so that over half of the patients had been reviewed during the year. Continuing symptoms had been documented in all but one of these patients. From the questionnaires, persisting symptoms were recorded by 61% of patients, although this may have been unrepresentative of the group as a whole because symptomatic patients were probably more disposed to return questionnaires. However, it is clear that over half of all patients remained symptomatic after discharge. Several of these remained undiagnosed.

Patients' perceptions of the diagnosis differed somewhat from the diagnosis recorded in the medical notes: this seems to indicate failure of communication. Patients also commented that the outlook for their condition had not been discussed. Where the prognosis had been described, it was often inaccurate, with physicians underestimating both duration and frequency of recurring symptoms.

In summary, atypical chest pain is a common diagnosis in the acute medical setting. Exclusion of ischaemic heart disease is only the first step in management, and many patients will need further investigation and treatment. Three-quarters will be diagnosed within a year but many will continue to have symptoms nevertheless. The associated mortality is low, and this reassuring fact should be communicated to the patient.

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