Chest wall tenderness is unhelpful in the diagnosis of recurrent chest pain

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Summary

We investigated whether the presence of chest wall tenderness or fibromyalgia helped to distinguish between ischaemic and non-ischaemic chest pain. Seventy-one patients with recurrent chest pain, 36 with normal (group A) and 35 with abnormal coronary angiograms (group B), were assessed by investigator-administered questionnaires, and were examined for chest wall tenderness and fibromyalgia by a single blinded observer. Chest wall tenderness was greater in group A. However, it was much greater in women, who predominated in group A, than in men, who predominated in group B, and this explained the intergroup difference. Seven patients (25%) (six female, one male) in the group A and one patient (3%) (male) in group B ($\chi^2 p = 0.027$) fulfilled criteria for fibromyalgia. Patients with recurrent chest pain are more likely to have an ischaemic cause if they are male. Although our study suggests that chest wall tenderness alone in patients with recurrent chest pain has no value in excluding myocardial ischaemia as a cause, the confounding factor of gender prevents our study design from answering this question conclusively. Fibromyalgia is commoner in patients with chest pain and normal coronary angiograms, but may be related to the excess of females in this group. Its presence does not preclude the co-existence of ischaemic heart disease.

Introduction

Recurrent chest pain is a common symptom which often causes diagnostic difficulties. Recognized causes include ischaemic heart disease, gastrointestinal or oesophageal pain, psychogenic pain, cervical spondylosis and costochondritis. Clinically, it may often be difficult to differentiate the underlying causes, and there is often a degree of overlap in the conditions. These patients often require recurrent admissions, and many eventually proceed to coronary angiography. Between 10% and 30% are found to have normal coronary angiograms, and the cause of the chest pain often remains unclear. Studies in US populations have found an increased incidence of fibromyalgia in such patients. However, no study has examined fibromyalgia in a UK clinical population who have undergone coronary angiography for the investigation of recurrent chest pain. We therefore investigated the presence of fibromyalgia and localized chest wall tenderness in a British population of patients who had undergone coronary angiography.

Methods

Two groups of patient were selected from the cardiac catheter laboratory log book at Ninewells Hospital: group A with normal coronary angiograms and group B with abnormal coronary angiograms. All patients had recurrent chest pain requiring diagnostic coronary angiography, performed on the recommendation of a consultant...
cardiologist. In most cases, patients had symptoms of angina pectoris, but some would have atypical chest pain, which may also be a valid indication for coronary arteriography. A normal coronary angiogram was defined as coronary arteries showing no stenoses or only mild mural irregularities but without involvement of the lumen. Intravascular ergotamine was not given to exclude coronary artery spasm, as this was thought to be fairly non-specific. Abnormal coronary angiograms were defined as those showing stenoses > 50%. In all cases where the patient was able to exercise, an exercise test was carried out before coronary angiography. Patients who had undergone coronary artery surgery were excluded.

Within each group, patients were selected consecutively, but because patients with abnormal coronary angiograms were more numerous, the search for patients with normal angiograms extended over a longer period than for those with abnormal angiograms. Based on the study by Mukerji et al., we aimed to recruit 35–40 patients to each group. We wrote to each patient with a brief explanation of the study, and invited them to participate in the study. Because of an overall recruitment rate of 48% (46% group A, 51% group B) in order to recruit 36 with normal coronary angiograms (group A) and 35 with abnormal coronary angiograms (group B) we had to invite 78 (57 male, 21 female) consecutive patients with significant coronary artery disease and 68 (20 male, 48 female) with normal coronary angiograms to participate. Because the aim of the study was to assess patients for the presence of chest wall tenderness, and not just fibromyalgia, the groups were not matched for sex.

Each patient underwent a structured interview with standardized questions enquiring about the pattern of chest pain, the presence of pain in the lower body, the right and left sides of the body, axial pain of at least 3 months duration and sleep pattern. Patients were asked about the presence of Raynaud’s phenomenon, irritable bowel syndrome and chronic headache (all of which are well recognized as having a higher prevalence in patients with fibromyalgia). Patients were also asked to complete the Stanford Health Assessment Questionnaire (HAQ) and the Hospital Anxiety (HAD-A) and Depression (HAD-D) questionnaires. In addition to comparing the prevalence of fibromyalgia in patients with chest pain with and without abnormal coronary angiograms, we aimed to distinguish whether chest wall tenderness differed in these groups of patients. Pain arising from the cervical spine or chest wall is well recognized as causing symptoms suggestive of ischaemic heart disease. However, the presence of radiological cervical spondylosis does not correlate well with significant cervical or chest wall pain. Most (possibly all) cases of chest wall tenderness in the distribution described here will result from cervical dysfunction. We therefore attempted to elicit tenderness at the sites recognized as being associated with both fibromyalgia and cervical dysfunction, and grouped these together in the combinations we thought most likely to mimic cardiac pain.

Patients were examined for the classic fibromyalgia (FMS) tender spots. Examination was carried out using a spring loaded dolorimeter. The force necessary to produce pain was recorded for each individual site and a force < 4 kg was regarded as ‘positive’. All patients were assessed by a single blinded observer (SW). The ACR criteria for the classification of fibromyalgia were used. In addition, the number of tender spots and sum of the forces required to produce a positive response were recorded for the twelve ACR upper body tender sites, six ACR upper left quadrant tender sites and the combination of left lower cervical transverse processes, left second costochondral junction and left lateral epicondyle. These groupings of sites were chosen as the ones most likely to be mistaken for cardiac pain.

The sum of forces was calculated by adding the forces necessary to produce pain at each site; if no pain was produced, a value of 5 kg was assigned, as described by McCain et al.

All assessments were performed within a year of the angiogram. Patients continued their usual medications immediately prior to assessment. The study protocol was approved by Tayside Committee on Medical Research Ethics, and written informed consent was obtained from each patient. Statistical analysis of nominal data was carried out using a \( \chi^2 \) test (two-tailed) or Fisher’s exact test. Analysis of numerical data used the Mann–Whitney U test.

Results

Demographic details and interview findings are shown in Table 1. Seven patients (6 female, 1 male) (19%) from group A and one male patient (3%) from group B fulfilled the ACR criteria for fibromyalgia (\( \chi^2 = 4.897; p = 0.027 \)); i.e. 22% of women (0% of men) in group A had FMS, compared to 0% of women (3% of men) in group B. There were however, no significant differences between the two groups when analysed by gender. The associated features of FMS, i.e. Raynaud’s phenomenon, irritable bowel syndrome and chronic headache, were also significantly more frequent in group A. Patients with normal coronary angiograms (group A) had significantly greater tenderness at all combinations of sites (upper body 22.5 kg vs. 33.0 kg,
Table 1  Demographic details and prevalence of fibromyalgia and associated features in Group. A (normal coronary angiogram) and Group. B (abnormal coronary angiogram)

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>( \chi^2 ) test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (n)</td>
<td>36</td>
<td>35</td>
<td>–</td>
</tr>
<tr>
<td>Female: male</td>
<td>27.9</td>
<td>6.29</td>
<td>( p&lt;0.001 )</td>
</tr>
<tr>
<td>Age (years) (median, IQR) (years)</td>
<td>52.5, 14.5</td>
<td>61.13, 5.5</td>
<td>( p&lt;0.05 )</td>
</tr>
<tr>
<td>Fibromyalgia</td>
<td>7 (6F:1M)</td>
<td>1 (M)</td>
<td>( p&lt;0.027 )</td>
</tr>
<tr>
<td>Raynaud’s phenomenon</td>
<td>5/36</td>
<td>0/35</td>
<td>( p&lt;0.05 )</td>
</tr>
<tr>
<td>Irritable bowel syndrome</td>
<td>4/36</td>
<td>0/35</td>
<td>( p&lt;0.05 )</td>
</tr>
<tr>
<td>Chronic headache</td>
<td>9/36</td>
<td>2/36</td>
<td>( p&lt;0.05 )</td>
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IQR, interquartile range.

Table 2  Total force to produce pain for tender spots groups

<table>
<thead>
<tr>
<th></th>
<th>Upper body</th>
<th>Upper left quadrant</th>
<th>Left lower cervical, 2nd rib and lateral epicondyle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males (n = 9)</td>
<td>44.3 (21.6) kg*</td>
<td>23.0 (14.2) kg*</td>
<td>10.5 (10.8) kg*</td>
</tr>
<tr>
<td>Females (n = 27)</td>
<td>27.0 (17.2) kg*</td>
<td>13.1 (7.8) kg*</td>
<td>5.2 (4.2) kg**</td>
</tr>
<tr>
<td>Male vs. Female</td>
<td>( p&lt;0.05 )</td>
<td>( p&lt;0.01 )</td>
<td>( p&lt;0.001 )</td>
</tr>
<tr>
<td>Group B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males (n = 29)</td>
<td>44.0 (20.7) kg*</td>
<td>23.0 (10.6) kg*</td>
<td>9.6 (5.3) kg*</td>
</tr>
<tr>
<td>Females (n = 6)</td>
<td>20.4 (13.6) kg**</td>
<td>9.6 (6.8) kg**</td>
<td>5.1 (2.8) kg**</td>
</tr>
<tr>
<td>Male vs. female</td>
<td>( p&lt;0.001 )</td>
<td>( p&lt;0.001 )</td>
<td>( p&lt;0.01 )</td>
</tr>
</tbody>
</table>

Force data are medians (interquartile ranges). *\( p>0.05 \) [group A males vs. group B males]; **\( p>0.05 \) [group A females vs. group B females]. All tests are Mann–Whitney U.

\( p = 0.012 \); upper left quadrant 11.25 kg vs. 17.0 kg, \( p = 0.014 \); left lower cervical, left rib, left lateral epicondyle 4.8 kg vs. 7.7 kg, \( p = 0.007 \); all medians). Females were generally more tender than males. There were no significant differences between groups A and B when analysed according to gender (Table 2). There were no significant differences between the groups for the HAQ (median score 0.313, interquartile range 0.938 vs. 0.24, IQR 0.844), HAD-A (7, IQR 4.5 vs. 7, IQR 5.75), HAD-D (5, IQR 6 vs. 4.5, IQR 5), sleep disturbance (28/36 vs. 6/35) or non-restorative sleep (23/36 vs. 18/35) (all comparisons A vs. B).

Discussion

Our patients in each group were selected consecutively from angiogram lists, and this revealed a preponderance of women in the normal coronary angiogram group. This suggests that women with recurrent chest pain who require coronary angiography are more likely to have a non-ischaemic cause, confirming similar previous reports.\(^{12}\)

Females in general have a significantly greater degree of chest wall tenderness compared with males, and this is not surprising. The tender points used in this study to identify fibromyalgia and chest wall tenderness do occur in the general population (median number in men 3/18, median number in women 6/18) and are commoner in those with pain (especially chronic widespread pain), sleep disturbance and depression.\(^{13}\) We were however, surprised to find a similar degree of chest wall tenderness, after correction for sex, in patients with positive and negative angiograms. Clinically, in the presence of chest wall tenderness, it is often thought appropriate to attribute chest pain to a musculo-skeletal, non-ischaemic cause. Although limited by the confounding influence of gender mix, our study suggests that this may not be the case, and that patients with ischaemic heart disease may be equally likely to have chest tenderness. Thus the presence of chest wall tenderness alone may not help to differentiate between the absence and presence of ischaemic heart disease. A more conclusive answer would depend on further studies in which the angiogram-negative and angiogram-positive groups are matched for sex. The reasons for the tenderness are unclear, but it is of interest that there was overall, a high incidence of sleep problems in our study group, between 51% and
77% in the various subgroups analysed. Perhaps the chest pain causes sleep difficulty, but it is not inconceivable that sleep difficulties may perhaps also contribute to the sensation of chest pain and tenderness, and overall experience of being ill in a way similar to that hypothesised in fibromyalgia.\textsuperscript{14}

The results also demonstrate an increased prevalence of fibromyalgia in patients with chest pain and normal coronary angiograms compared with those who have abnormal coronary angiograms. Most of these fibromyalgic patients were women. The prevalence of fibromyalgia in a general population has been estimated to be 2%, with 0.5% occurrence in men and 3.4% in women.\textsuperscript{15} In a general hospital in-patient population, 5% of patients (11% in females) were found to have fibromyalgia.\textsuperscript{16} There were no women with fibromyalgia in our positive angiogram group. Although the subjective impression is that the presence of fibromyalgia in a woman makes it more likely for the pain to be non-ischaemic in nature, there were no statistically significant differences in the prevalence of fibromyalgia between women in the angio-positive and angio-negative groups. This may be a reflection of the small number of women (six) in the former group, and we recognize this limitation of our study.

Thus, fibromyalgia occurs more frequently but not exclusively in those with normal coronary angiograms. Chest wall tenderness is much greater in patients with normal coronary angiograms, but this difference is wholly explained by the much larger number of women in this group. The conclusion of this study is that the presence of chest tenderness and fibromyalgia may not help to distinguish between an ischaemic and non-ischaemic cause of chest pain.

References


