



Original Article

Examination of musculoskeletal chest pain – An inter-observer reliability study

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ABSTRACT

Chest pain may be caused by joint and muscle dysfunction of the neck and thorax (termed musculoskeletal chest pain). The objectives of this study were (1) to determine inter-observer reliability of the diagnosis 'musculoskeletal chest pain' in patients with acute chest pain of non-cardiac origin using a standardized examination protocol, (2) to determine inter-observer reliability of single components of the protocol, and (3) to determine the effect of observer experience. Eighty patients were recruited from an emergency cardiology department. Patients were eligible if an obvious cardiac or non-cardiac diagnosis could not be established at the cardiology department. Four observers (two chiropractors and two chiropractic students) performed general health and manual examination of the spine and chest wall. Percentage agreement, Cohen's Kappa and ICC were calculated for observer pairs (chiropractors and students) and all. Musculoskeletal chest pain was diagnosed in 45 percent of patients. Inter-observer kappa values were substantial for the chiropractors and overall (0.73 and 0.62, respectively), and moderate for the students (0.47). For single items of the protocol, the overall kappa ranged from 0.01 to 0.59. Provided adequate training of observers, the examination protocol can be used in carefully selected patients in clinical settings and should be included in pre- and post-graduate clinical training.

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1. Introduction

Chest pain is a symptom that can indicate a serious, life threatening condition, and it affects the daily life of numerous people. In the United States, chest pain results in 5% of all emergency department visits or approximately six million visits per year (McCaig and Nawar, 2006). However, less than half of these patients are diagnosed with a cardiac condition and over 50% are diagnosed with "non-cardiac" chest pain, which may relate to a range of disorders including musculoskeletal conditions (Capewell and McMurray, 2000).

Not surprisingly, patients with non-cardiac chest pain have a good prognosis for survival, but for many of these patients chest pain continues to present a problem (Nijher et al., 2001). Seventy five percent experience new episodes of pain, which in 20 percent leads to further contact with the health care system (Ockene et al., 1980; Launbjerg et al., 1997; Best, 1999). This is probably since the

diagnosis of non-cardiac chest pain does not result in new treatment initiatives and as a result leaves the patients worried (Dart et al., 1983; McDonald et al., 1996). In order to clinically differentiate sub-groups of patients with non-cardiac chest pain and to optimize information and treatment plans, further diagnostic initiatives therefore appear warranted.

Practitioners of manual medicine, with status of primary health care provider, may encounter patients with chest pain. The professional responsibilities include proper assessment, documentation and appropriate and timely referral as needed. Systematic assessment of patients may be accomplished through use of classification systems or standardized evaluation protocols. Such systems have been tested in patients suffering from neck and low back pain, but have mainly been developed to identify sub-groups of patients with benign pain syndromes (Childs et al., 2004; Fritz et al., 2006; Cleland et al., 2007; Fritz and Brennan, 2007; Trudelle-Jackson et al., 2008). In a population study of low back pain, results indicate that palpation findings and single tests of mechanical dysfunction have limited clinical value in identifying patients with pain, whereas the collective use of several tests may increase diagnostic discrimination (Leboeuf-Yde and Kyvik, 2000).

Assessment and management of musculoskeletal chest pain, or even mid back pain, have largely been empirically based; however, in

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2005, Christensen et al. developed a standardized examination protocol with the purpose of identifying patients with musculoskeletal chest pain through systematic examination (Christensen et al., 2005). The protocol comprises both case history and manual examination of the chest wall, cervical and thoracic spine. Both case history (Christensen et al., 2006) and manual examination (Christensen et al., 2002, 2003) were tested for *intra*- and *inter*-observer reliability. Items from the case history had excellent reliability between different observers for presence, type, and severity of chest pain, but moderate with respect to classification according to the New York Heart Association (NYHA) (The Criteria Committee of the New York Heart Association, 2007). For three palpation procedures of the thoracic spine *good* reliability was seen only within the same observer, whereas for paraspinal tenderness *good* reliability was seen between different observers. Reliability was unacceptably poor for motion palpation, and variation was considerable between experienced chiropractors palpating for anterior chest wall tenderness.

Yelland et al. (2002) tested an analogous protocol of thoracic spinal examination and came to similar conclusions. Reliability of palpation showed mixed results ranging from slight to substantial. Consequently, both Yelland and Christensen question the utility of parts of the thoracic spine examination, because poor reliability of some of the protocol items may hamper the ability of clinicians to diagnose and classify the musculoskeletal component of chest pain (Christensen et al., 2003). Additionally, three more recent studies have evaluated reliability of thoracic spine palpation with mixed results ranging from *poor* to *substantial* (Heiderscheit and Boissonnault, 2008; Brismee et al., 2006; Potter et al., 2006); however, these studies use asymptomatic study subjects and the clinical relevance may be questioned. To date, *inter*-observer reliability of the *overall* musculoskeletal chest pain diagnosis has never been tested. Hence, when evaluating the same patient, it is not known whether two or more observers are able to agree on an overall diagnosis of musculoskeletal chest pain.

Currently, musculoskeletal chest pain is a clinical diagnosis without a reference standard to verify diagnosis, and it would be desirable to have a more clinically appropriate assessment tool. This trial is part of a larger study with the overall aim of developing such a diagnostic tool, the results of which will be reported elsewhere. The objectives of the present study were (1) to investigate the *inter*-observer reliability of the overall diagnosis of musculoskeletal chest pain using a standardized examination protocol in a cohort of patients with acute chest pain suspected to be of non-cardiac origin, and (2) to investigate if any of the single components of the protocol had a clinically acceptable level of *inter*-observer reliability. Finally, (3) to investigate the importance of clinical experience on the level of *inter*-observer reliability.

2. Methods

2.1. Study population and recruitment

This study is part of a larger study addressing diagnosis and manual treatment of musculoskeletal chest pain. Inclusion and exclusion criteria are presented in Table 1 and have been described in detail elsewhere (Stochkendahl et al., 2008). In brief, for this part of the study, 80 patients were included from September 2007 to March 2008. Patients with non-specific chest pain were recruited from the emergency cardiology department at Odense University Hospital, Denmark. All patients had been admitted with suspected acute coronary syndrome. To identify chest pain patients with non-cardiac chest pain, one of the authors (MJS) scanned the patient medical records for inclusion and exclusion criteria (Table 1). Following discharge from the hospital, eligible patients were contacted, and written consent was obtained from those willing to participate. In case of doubt concerning eligibility of a patient, the medical record was presented to an experienced cardiologist and consensus was reached. The patients were examined in this study within two weeks following their episode of acute chest pain. Approval has been granted by the regional ethics committee for Funen and Vejle Counties, Denmark, approval number VF 20060002.

2.2. Observers and training

Two experienced chiropractors, each with more than nine years of clinical experience, and two senior chiropractic students were observers. Five training sessions were completed prior to the actual study. This involved 15 patients, of which some had chest pain. The observers were instructed in the use of the protocol, and consensus was established regarding positive findings. Two chiropractors with more than three years of experience in using the protocol, including the creator of the protocol (HWC), acted as instructors.

2.3. Overall procedure

The standardized examination protocol comprises three parts: a semi-structured interview, a general health examination and a specific manual examination of the muscles and joints of the neck, thoracic spine and chest wall. Prior to the examination, patients answered self report questionnaires regarding patient demography, pain intensity, general health and quality of life (SF36 and EuroQoL 5-D; The EuroQol Group, 1990; Bjorner et al., 1998a, b).

First, an experienced clinician, who did not take part in the reliability study, carried out the semi-structured interview. Results

Table 1
Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
<p>Participants included had to</p> <ul style="list-style-type: none"> • Have chest pain as their primary complaint • Have an acute episode of pain of less than 7 days duration before admission. • Consent to the standardized evaluation program at the cardiology department. • Have pain in the thorax and/or neck. • Be able to read and understand Danish. • Be between 18 and 75 year of age. • Be a resident of the Funen County, Denmark. 	<p>Patients were not included if any of the following conditions were present</p> <ul style="list-style-type: none"> • Acute coronary syndrome. • Previous percutaneous coronary intervention or coronary artery by-pass grafting. • Chest pain from other definite cause, cardiac or non-cardiac. The condition must be verified clinically during admission (i.e. pulmonary embolism, pneumonia, dissection of the aorta, ...). • Inflammatory joint disease. • Insulin dependent diabetes. • Fibromyalgia. • Malignant disease. • Apoplexy, dementia, or unable to cooperate. • Major osseous anomaly. • Osteoporosis. • Pregnancy. • Not willing to participate. • Other.

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