

Anxiety and Other Emotional Factors in Noncardiac Chest Pain

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KEY WORDS

noncardiac chest pain, nonanginal chest pain, anxiety, panic attacks

ABSTRACT

Recurrent chest pain in patients with normal coronary arteries is a common, perplexing problem in primary care and cardiology settings. The majority of these individuals do not receive an organic explanation for their chest pain. As a result, many patients suffer from worry, anxious preoccupation with heart functioning, and recurrent chest pain. The persistent pain and anxiety about heart functioning not only cause much personal discomfort, but may also lead to significant disability and health care utilization. Noncardiac chest pain (NCCP) is a costly multidisciplinary problem that impairs psychosocial functioning, reduces quality of life, and co-occurs with symptoms of anxiety and mood disorders. Primary care providers may serve a central role in the diagnosis, treatment, and/or referral of patients with NCCP. However, identification of those patients most in need of additional health care is hindered by lack of an empirically supported framework of NCCP. This article reviews contemporary research on the syndrome of NCCP, describes an integrative framework for understanding NCCP, discusses potential causes, correlates, and risk and protective factors associated with NCCP, and highlights promising treatment approaches for patients with NCCP. Mental Fitness. 2003;2(4):62-69

INTRODUCTION

Chest pain is one of the most common and frightening medical complaints. More than 6 million people present annually to emergency departments with chest pain that is suggestive of myocardial ischemia;¹

however, the majority of these patients do not receive an organic explanation for their pain.² Ten to thirteen billion dollars are spent annually to care for patients who are initially admitted with suspected ischemic symptoms but who do not sustain acute myocardial infarction.³ In emergency department (ED) settings, two thirds of patients with a chief complaint of chest pain are sent home with largely (more than 80%) noncardiac diagnoses.⁴

Even though the majority of these patients are sent home with the assurance that their chest pain symptoms are not medically significant, a large percentage of them continue to report persistent symptoms, disability, health care utilization, and often high levels of anxiety and concerns about heart disease.⁵ Consistent evidence shows that patients with chest pain who are found to have normal coronary angiograms often have a poor outcome (ie, enduring chest discomfort, disability, worry about heart disease)⁶ that is comparable to the outcome of patients who are diagnosed with coronary artery disease.⁷ Much less, however, is known about the larger number of patients with chest pain who are seen in cardiac clinics but who do not undergo angiography,^{8,9} particularly those patients who are reassured that their chest pain is not medically significant.¹⁰

The syndrome of chest pain in the absence of coronary artery disease or other diagnosable medical condition is commonly referred to as noncardiac chest pain (NCCP).¹¹ Clinical research is needed to improve the differential diagnosis of noncardiac disorders and, in particular, to understand the possible noncardiac factors contributing to the chest pain. Systematic recognition of individuals who may need additional (or alternative) treatment may help to relieve patient suffering, and may also help to guide the development and evaluation of stepped care approaches to the treatment of NCCP.

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This article reviews contemporary research on the syndrome of NCCP. Many early studies in this area have demonstrated considerable medical and psychiatric comorbidity in patients with NCCP. However, the cross-sectional nature of many of these studies provides only a limited understanding of the clinical course of NCCP. Initial sections highlight the prevalence, cost, and impairment in psychosocial functioning that are associated with this condition. This is followed by a discussion of the diagnostic complexity of NCCP. Finally, the review concludes with a summary of treatment approaches and their efficacies in the treatment of NCCP.

NCCP PREVALENCE IN MEDICAL SETTINGS AND COST

Chest pain is one of the most frequent presenting symptoms in medical settings.^{12,13} However, a majority of the chest pain patients are not found to have an organic basis to their pain complaint.² Many research studies have examined the percentage of patients with chest pain who have negative medical workups (ie, NCCP). In cardiology and primary care settings, more than 50% of patients with chest pain do not have ischemic heart disease or another serious medical disorder to account for their physical symptoms.¹⁴⁻¹⁶ In emergency department settings, two thirds of patients with a chief complaint of chest pain are sent home and more than 80% of the patients sent home have noncardiac diagnoses.⁴ Even among patients whose chest pain is suggestive of ischemia and warrants invasive testing using coronary angiography, 20% to 40% have negative test results with normal or near-normal (less than 50% stenosis) coronary arteries.¹⁷

Importantly, not all chest pain caused by coronary arteries is shown on angiography (eg, coronary spasm). Although coronary angiography is generally considered one of the more certain methods of determining the condition of the coronary arteries in view of the potential implications of significant coronary artery disease, recent findings have shown that negative findings on angiography may be misleading, particularly for women.¹⁸ Likewise, even when obstruction of the main coronary arteries can be ruled out as a cause of chest pain, such pain may be accounted for by other cardiac problems (eg, Prinzmetal's angina, microvascular angina)¹⁹ or esophageal disorders (eg, gastroesophageal reflux)²⁰ that can be more difficult to diagnose. Given this, providing results to patients regarding the causal etiology of their chest pain may become even more complex and less certain.

The American Heart Association²¹ estimated that more than 5 million people present annually to emergency departments with chest pain suggestive of myocardial ischemia, and 10-13 billion dollars are spent annually to care for patients who are admitted for suspected ischemic symptoms but do not sustain acute myocardial infarction.²² Although chest pain evaluations commonly result in hospitalizations and tremendous health care cost, a definitive medical diagnosis is identified in only about one third of the cases. Moreover, patients with NCCP are likely to receive repeated electrocardiographic evaluations and prescriptions, often benzodiazepines.^{22,23} Indeed, many patients who are determined to have noncardiac chest pain are often prescribed both cardiac (eg, nitroglycerin) and psychiatric (eg, selective serotonin reuptake inhibitors, benzodiazepines) medications.²³

EFFECT ON FUNCTIONING AND QUALITY OF LIFE

The scope of NCCP can be appreciated by its apparent chronicity and associated impairment of quality of life. Consistent evidence suggests that patients with chest pain who are found to have normal coronary angiograms have poor outcomes and continue to report persistent symptoms, disability, and concerns about heart disease.⁶ In fact, NCCP patients show equal functional impairment, equal medical utilization, and more protective behaviors (eg, avoidance of exertion) than patients diagnosed with coronary artery disease. Many patients may exhibit protective behaviors (or restrict their range of activities) due to fears of experiencing the physical symptoms of chest pain (see Table).⁷ Although many studies have examined the quality of life in patients who have undergone angiograms, less is known about the large number of patients with noncardiac chest pain who have not undergone angiography.^{5,9} Follow-up studies of up to 6 years have documented the chronicity of this impairment in spite of an otherwise healthy prognosis.^{2,14,15}

A MULTIDISCIPLINARY PROBLEM

Chest pain may be associated with many medical disorders including cardiac (eg, microvascular angina), gastroesophageal (eg, esophageal reflux or spasm, nutcracker esophagus), respiratory (eg, bronchial spasm), and musculoskeletal conditions (eg, osteoarthritis).²⁴ Although all of these medical conditions have unique origins, all can be characterized to some extent by chest pain or discomfort.²⁵ Consequently,

SELECTED CARDIOPROTECTIVE AND AVOIDANCE BEHAVIORS ASSOCIATED WITH NONCARDIAC CHEST PAIN

MONITORING OF PHYSICAL SENSATIONS (EG, PULSE CHECKING)

EXCESSIVE USE OF MEDICAL FACILITIES

REASSURANCE AND HELP-SEEKING BEHAVIOR

CARRYING MEDICATION AT ALL TIMES

DECREASE IN CAFFEINE USE

DECREASE OR INCREASE IN ALCOHOL USE

REDUCTION IN STRESSFUL ACTIVITIES

AVOIDANCE OF EXERCISE AND/OR PHYSICAL EXERTION

WITHDRAWAL FROM DAILY ACTIVITIES (EG, WORK, SOCIAL ACTIVITIES)

INCREASE IN SEDENTARY BEHAVIOR (EG, LYING DOWN, RESTING)

DISTRACTION FROM PHYSICAL SYMPTOMS

AVOIDANCE OF BEING ALONE

AVOIDANCE OF EMOTIONAL EXERTION (EG, "HEATED" DEBATES)

TABLE

64

WHITE
AND RAFFA

White KS and Raffa SD. *Mental Fitness*. Vol 2, No 4. 2003.

a thorough medical evaluation is paramount for patients with NCCP because of the possible medical factors involved in the etiology of the pain.

NCCP is broadly defined as the experience of chest pain or discomfort in the absence of coronary artery disease or other diagnosable medical conditions.²² Although many patients are ultimately diagnosed with NCCP (ie, no detectible organic cause for their chest pain), typically these individuals are offered no more than the feedback that there is nothing medically wrong with them; this tends to be the case even when a psychological or psychiatric condition is evident.²⁶ As a result, many such individuals continue to be active in the health care system for extended periods of time.²⁷ In 1990, a multidisciplinary conference of researchers from cardiology, gastroenterology, general medicine, medical psychology, and psychiatry convened to discuss the issue of chest pain in patients with normal coronary arteries.²⁸ Professionals at this meeting concluded that although some physical abnormalities often can be identified in patients with NCCP, the pain most patients experience does not have a distinct physical etiology.²⁹ Moreover, other researchers have argued that even when anomalies are

found in patients with NCCP, these are typically not significant enough to account for the level of distress and interference that these patients experience.¹⁵

PSYCHIATRIC DISORDERS AMONG PATIENTS WITH NCCP

Because the symptoms presented by patients with NCCP resemble those of panic disorder, researchers have recently attempted to establish the presence of anxiety disorders in patients with chest pain who have insignificant medical work-ups. Several studies have established that about 30% of patients with NCCP suffer from panic disorder.^{16,30} The hallmark characteristics of panic disorder are spontaneous, episodic, and intense periods of anxiety or discomfort with several of the following physical and cognitive symptoms: chest pain, palpitations, shortness of breath, dizziness, trembling, sweating, choking, nausea, depersonalization or derealization, flushes or chills, fear of dying, and fear of going crazy.³¹ The significantly high prevalence of panic disorder in chest pain patients may lead the patient to think they have a heart condition, motivating them to seek reassurance from physicians that

their physical health is fine. Adding to its seriousness, patients with NCCP, if untreated, often show a chronic course;¹⁷ 50% of NCCP patients with comorbid panic disorder visit the emergency department more than once per year for chest pain, and many continue to seek treatment 5 years later.³² Moreover, although NCCP patients are likely to receive repeated expensive medical evaluations and prescriptions (often benzodiazepines), they are unlikely to receive basic psychological screening.^{22,23} In addition to panic disorder, other anxiety disorders (eg, generalized anxiety disorder) have been identified at the same rate.³³

With regard to comorbidity, when psychiatric illnesses are associated with chronic illness, additional factors may be associated with the clinical presentation. First, the psychiatric condition may lead to an amplification of symptomatic complaints of the chronic illness. Second, self-monitoring of medical illness in this patient group may be weak. In the case of NCCP, it may be that the patient misinterprets the consequences of autonomic arousal (ie, chest tightness, heart palpitations, numbness) as evidence of heart disease and, in turn, exhibits a heightened sensitivity to these and other interoceptive cues as signs of impending doom or death. Finally, it may be that patients presenting to medical settings with NCCP are in the early phases of developing an anxiety or other psychiatric disorder (eg, hypochondriasis). Longitudinal studies are needed to evaluate the development and course of the chest pain and co-occurrence of other psychiatric morbidity.

NCCP: A DIAGNOSTIC DILEMMA

Although studies have documented the apparent overlap in symptoms of NCCP and anxiety disorders (ie, panic disorder, generalized anxiety disorder), the condition of NCCP is often considered one of exclusion rather than inclusion.²³ As a result, the diagnosis of a patient's pain complaint as NCCP is often unhelpful from both medical and psychological perspectives. These problems in identification and diagnostic classification suggest the need for a conceptual model to help guide the assessment and treatment of this condition.

The extent to which the psychiatric diagnoses in patients with NCCP are distinct or overlapping disorders is a key challenge in understanding the syndrome of NCCP. One limitation of some past studies is the failure to retain the diagnostic differential between panic attacks and panic disorder. Panic attacks may occur in the context of any anxiety disorder, and as

a result, past studies may not provide a pure reflection of the psychiatric comorbidity in patients with NCCP. Although up to 12% of the population will experience an occasional unexpected panic attack,³⁴ fewer than 3% go on to develop anxiety that meets diagnostic criteria for a clinically significant panic disorder.³¹

This is further complicated by the lack of a universal terminology to describe this patient group. An early description of this group put forth by Eifert³⁵ describes this syndrome as “cardiophobia,” which is defined as an anxiety disorder characterized by repeated complaints of chest pain, heart palpitations, and other somatic symptoms accompanied by fears of having a heart attack or dying.³⁵ More recently, Eifert³⁶ has suggested that because a large portion of these patients are focused on the symptom of chest pain, and experience anxiety surrounding it, a useful term for describing the fear associated with NCCP may be “heart-focused anxiety.”³⁶ This conceptualization of NCCP as closely related to other psychological disorders supports the apparently essential role of anxiety in the presentation of patients with NCCP.

THEORETICAL CONCEPTUALIZATIONS OF NCCP

Theoretical models of NCCP assert that the etiology of the pain is multi-causal and interactive.^{16,37} Mayou's (1998) model of NCCP provides a framework for explaining the persistent functional impairment seen in many patients with NCCP.¹⁶ The central component of this model is attribution (cognitive appraisal) of physiological or minor pathological symptoms being misinterpreted as evidence of serious physical illness. Although evidence for this model is largely descriptive, it is supported by evidence for the models of panic and health anxiety and by evidence from a wide range of functional symptoms.³⁷ Two published reports suggest that the likelihood of misinterpreting physical symptoms is associated with increased awareness of heart disease (eg, experience of heart attacks in others), evidence of previous psychiatric history, panic attacks, and severe autonomic symptoms.^{37,38}

Building on the broad and deep understanding of anxiety disorders, theoretical models of anxiety, particularly panic disorder, may be relevant to NCCP. One model that has gained increasing empirical support with panic disorder is reviewed in more detail in White and Barlow.³⁹ This model emphasizes the importance of biological vulnerability, stress, and psychological vulnerability leading to anxious

apprehension and learned alarms. This model posits that patients develop interoceptive sensitivity (ie, a heightened awareness of internal, autonomic sensations) and anxiety focused on physical sensations, which are then perceived as dangerous. These relatively benign physical sensations are interpreted as heart disease or other medical conditions, which may then lead to increased anxiety and more physical symptoms. In turn, this may result in an exacerbation of the episode of chest pain. This model has garnered considerable empirical support in the past decade with panic disorder,⁴⁰ and the model has recently found some support in a study applying a modified treatment derived from this model with patients suffering with NCCP in an emergency setting.⁴¹

Building on some of the early work by Eifert,³⁵ numerous psychological, biological, and social factors have been hypothesized to be related to NCCP. The Figure illustrates many of these factors described by Eifert that may be associated with NCCP, including psychological vulnerability, biological vulnerability, learning history, situational factors, and response behaviors. This figure was modified from Eifert³⁵ and incorporates theoretical factors suggested by others.^{16,23}

66

WHITE
AND RAFFA

MANAGEMENT OF CHEST PAIN IN PATIENTS WITH NORMAL CORONARY ARTERIES

Although more longitudinal studies are needed, it seems safe to conclude that without proper intervention, many patients with NCCP may continue to worry, experience chest pain, repeatedly use medical care services, and continue to suffer from significant psychosocial disability. These results highlight the importance of designing sensitive clinical assessments to guide immediate intervention or referral for additional psychological assessment and/or treatment to decrease the continued distress and functional impairment in patients with NCCP. Behavioral medicine interventions for NCCP provided within the hospital may be a promising approach to improve treatment outcome.

It is reasonable to conclude that failure to directly assess for anxiety and mood disorders in patients with NCCP may increase patient suffering and appears to place added burden on the health care system. This additional burden appears to extend beyond the emergency department to the healthcare system as a whole. Longitudinal studies examining the causal role of anxiety and psychological risk factors have not been examined in NCCP, but represent an important

approach to understanding the development and maintenance of pain in this population.

To date, a relatively small number of treatment studies have been conducted with NCCP patients. Investigations into the use of cognitive-behavioral therapy (CBT) have shown promise. Such interventions seek to identify and intervene on factors that maintain psychological distress, including physiological arousal, cognitive distortions, and maladaptive behaviors. For instance, breathing retraining has been shown to be efficacious in the treatment of NCCP patients, regardless of the presence of panic symptoms.⁴² In addition, several randomized, controlled trials have utilized cognitive and behavioral procedures.^{38,43,44} The treatment components included such techniques as a functional analysis of symptoms, rationale for psychological treatment, relaxation procedures, cognitive restructuring, situational exposure (enabling within- and between-session habituation), and problem-solving skills training. Results from all but 1 of these studies suggest that CBT interventions with NCCP patients result in significant reductions in chest pain, limitation of daily life, psychological morbidity, and concern about heart disease. Importantly, the study that did not yield significant results was conducted immediately following negative test results, while patients were still in the hospital.

Pain coping skills training is another method that has been utilized in treating patients with NCCP. Also based on cognitive and behavioral principles, this method utilizes such techniques as progressive muscle relaxation, cognitive restructuring and coping, imagery, and goal setting. To date, 5 controlled studies have examined the utility of pain coping strategies in managing NCCP.^{38,43-46} Four of the 5 studies yielded significant improvement in 1 or more measures of pain, anxiety, worry, depression, psychological distress, and physical disability.

Pharmacological treatments have also been investigated in NCCP treatment outcome studies. For instance, 1 study demonstrated that imipramine can reduce the frequency of chest pain in NCCP patients by up to 50%, independent of psychological morbidity.⁴⁷ More recently, selective serotonin reuptake inhibitors (SSRIs) have been used by clinicians in treating patients with NCCP. Results from a placebo-controlled, double-blind study examining the effects of sertraline versus placebo indicated a significant reduction in pain.⁴⁸ Finally, despite the fact that benzodiazepines are commonly prescribed to NCCP patients in clinical practice,^{22,23} it is unclear whether such treatments have significant clinical advantages.¹⁶

NONCARDIAC CHEST PAIN

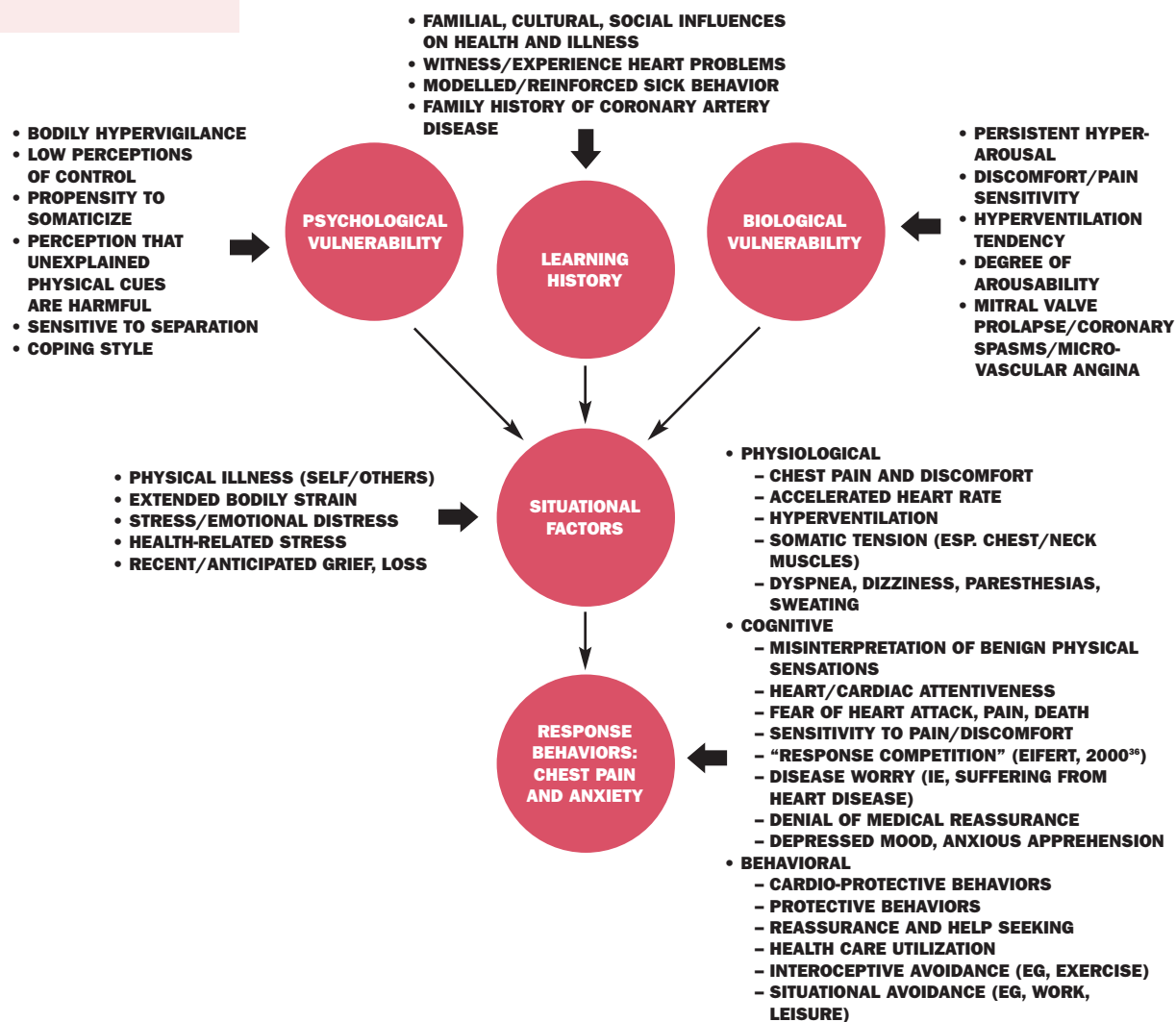
One study suggested a reduction in chest pain and panic symptoms following treatment with alprazolam;⁴⁹ however it is unknown whether this treatment would be helpful to patients with chest pain in the absence of panic disorder.

SUMMARY

In sum, recurrent chest pain in patients with normal coronary arteries is a common and perplexing problem facing many health care providers in primary care and in cardiology settings. Many studies have documented

FACTORS OF NONCARDIAC CHEST PAIN. FIGURE IS MODIFIED FROM EIFERT, 1991³⁵ AND INCORPORATES SUGGESTIONS MADE BY OTHERS (MAYOU, 1998;¹⁶ WHITE ET AL, 2000²³)

FIGURE



67

WHITE
AND RAFFA

the often harmful effects of NCCP on patient quality of life, and the complexity of differential diagnosis is often complicated by the use of terminology that is exclusive rather than inclusive (ie, noncardiac chest pain). It seems safe to deduce that, as a result, many patients suffer from undue worry and anxious preoccupation with heart functioning, as well as continuing chest pain. Despite the challenges of proper diagnosis and assessment, promising treatment approaches exist for helping patients with the anxiety and emotional distress associated with NCCP.

Areas for future research on NCCP include continued efforts to prospectively refine and evaluate theoretical conceptualizations of NCCP, identify maintaining factors that contribute to continued disability, and begin to understand factors that are important in designing intervention programs for this patient population. Future research focusing on the objective medical risks of this patient population for developing a cardiac condition is essential. Moreover, qualitatively-designed and quantitatively-evaluated interventions sensitive to this population are vital to reduce patient suffering, disability, and health care utilization. Demonstrated, empirically supported treatment programs exist that address similar symptom presentations (eg, panic disorder) that may be especially beneficial with this patient population. Psychosocial interventions for NCCP that build upon the deep and broad understanding of anxiety and other emotional disorders comprise a promising approach toward successful intervention tailored to the needs of each individual patient. **MJ**

68

WHITE
AND RAFFA

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NONCARDIAC CHEST PAIN

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