

**MINISTRY OF HEALTHCARE OF UKRAINE  
HSEEU "Ukrainian Medical Stomatological Academy"**

**"Approved"**  
at the meeting of internal  
medicine №1 department  
Head of Department  
**Prof. Skrypnyk I.M.**

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Protocol № 4 from 13.10.2016

**GUIDELINES  
FOR STUDENTS  
INDEPENDENT WORK  
IN THE PRACTICAL CLASSES PREPARING**

<i>Academic discipline</i>	Internal medicine
<i>Module</i>	Current practice of internal medicine
<i>Content module</i>	Management of the patients with main symptoms and syndromes in cardiology clinic
<i>Study subject</i>	<b>Management of the patients with chronic pain in the chest</b>
<i>Course</i>	VI
<i>Faculty</i>	of foreign students training

## **1.The aims of the training course:**

### **To Know:**

1. Differential diagnosis of angina and others chest pains.
2. Plan examination, additional laboratory and instrumental methods of examination.
3. Tactic of patients curation.

### **To be able to:**

- Conduct surveys and patients examination with major cardiological syndromes
- To draft survey the patients with heart diseases, to justify the use of major invasive and non-invasive diagnostic techniques which are using in cardiology, to identify indications and contraindications for their conduction, possible complications
- Identify different options for the course and complications of heart disease
- Carry out differential diagnosis, justify and formulate diagnoses for major cardiac syndromes based on laboratory analysis and test tool
- Prescribe treatment, determine prognosis, to conduct primary and secondary prevention in heart disease
- Register and interpret the ECG in 12 assignments
- Measure and interpret blood pressure
- Diagnose and assist in hypertensive crisis
- Diagnose and assist with arterial hypotension
- Diagnose and assist in the paroxysmal disorders of cardiac rhythm
- Demonstrate knowledge of moral principles medical specialist and professional principles of subordination

### **The contents of topic:**

#### **Text**

## **Chronic Chest Pain**

### **The Clinical Problem**

Angina-like chest pain is an alarming symptom. It is a common reason for presentation to emergency departments and forms the bulk of the workload for cardiologists. Clinical evaluation ranges from simple investigations such as electrocardiograms (ECG) (both at rest and after exercise) and echocardiograms to more expensive and invasive investigations such as coronary angiography and pharmacological stress tests. In patients with recurrent symptoms without an obvious cause, further evaluation excludes cardiomyopathies, microvascular disease, and pericardial disease. However, 10–50% of patients presenting with angina-like chest pain sufficiently severe to warrant invasive cardiac investigations do not have cardiac disease [30] and are classified as having noncardiac chest pain (NCCP).

**Epidemiology and Social and Economic Impact** NCCP is frequent in the Western world. Up to 30% of patients undergoing coronary angiography for chest pain have normal coronary arteries [15]. A recent meta-analysis in 14 separate populations, containing 25,000 subjects, showed a pooled prevalence of NCCP of 13% (95% CI, 9–16). Prevalence was similar in women vs. men but was markedly higher in subjects who also reported gastroesophageal reflux disease (GORD) [19]. Other risk factors include obesity, a family history of GORD, smoking, and analgesic use [13]. Prognosis of patients with NCCP is favorable. Myocardial infarction occurs in at most 1% of cases [31,44], and cardiac death occurs in only 0.6 % after follow-up of up to 10 years. In contrast, patients with coronary disease confined to a single vessel have a mortality of 15% at 48 months and 35% at 11 years [10]. The economic burden is significant. In one American study, the health care costs were estimated to be more than US\$315 million annually; because of multiple clinic and emergency room visits, hospitalizations, and prescriptions [36] **Clinical Characteristics of Cardiac and Esophageal Causes of Chest Pain** In patients with NCCP, gastrointestinal, pulmonary, musculoskeletal, infectious, drug-related, and psychological

disorders are considered. However, esophageal conditions are considered to be the most common contributing factor for angina-like chest pain of non-cardiac origin [16]. Interestingly, the clinical history often does not distinguish between cardiac and esophageal causes of chest pain because pain of esophageal origin can also be located retrosternally with radiation to the arms, neck, jaws, or back. The pain is often described as squeezing or burning and can be triggered by swallowing, but also by exercise. In patients with angina, the presence of heartburn or dysphagia may increase the likelihood of an underlying esophageal condition

[2]; however, as many as 50% of patients with a cardiac cause of chest pain may also have heartburn, regurgitation, or dysphagia [7]. Furthermore, cardiac and esophageal disease may overlap; for instance in patients with coronary artery disease, gastroesophageal reflux may trigger ST segment changes on ECG and chest pain [29]. Hence, the existence of cardiac or esophageal disease cannot be assumed on the basis of clinical presentation alone. Despite these confounding factors, patients with NCCP are usually younger and are more likely to have a normal resting ECG compared to patients with cardiac angina [11].

### Pathophysiology of NCCP

Common causes of chest pain of esophageal origin are GORD, visceral hypersensitivity, and esophageal dysmotility. Of these, GORD is the most common esophageal cause of NCCP. Esophageal pH testing has demonstrated that about half of NCCP patients have abnormal esophageal acid exposure [9, 41]. It is unclear why esophageal acid exposure causes heartburn in some patients and chest pain in others. Visceral hypersensitivity is a phenomenon in which conscious perception of visceral stimuli is enhanced. Patients with NCCP, in comparison to healthy control subjects, demonstrate higher pain sensation scores on exposure to a range of esophageal stimuli including balloon distension, acid infusion, and electrical and thermal stimulation [28,35]. Mechanisms proposed to be responsible for esophageal hypersensitivity in patients with NCCP include sensitization of peripheral afferent nerves (peripheral sensitization) and sensitization of spinal dorsal horn neurons (central sensitization [25]). Patients with motility disorders such as symptomatic diffuse esophageal spasm and achalasia may experience retrosternal angina-like pain, and 30% of NCCP patients have abnormal esophageal manometric findings [8,24]. The relationship, however, between the manometric findings and the chest pain is complex. Patients are generally asymptomatic at the time when the motility abnormalities are identified. Finally, pharmacotherapy with motility-modifying drugs does not correlate with improvement of symptoms [37]. Several studies report a high incidence of psychiatric diagnoses, such as panic disorder, generalized anxiety disorder, depression, and somatization disorder, in patients with NCCP [6,23].

Diagnostic Evaluation Gastrointestinal work-up is aimed at demonstrating pathological gastroesophageal reflux, hypersensitivity of the esophagus, or esophageal motor abnormalities.

### Gastroesophageal reflux tests:

#### (i) Proton pump inhibitors:

Empirical PPI therapy (the “PPI test”) is recommended prior to any invasive testing to diagnose GORD-related NCCP. The omeprazole doses used in the PPI test range from 40 mg to 80 mg daily over a duration of 7 to 28 days [17,21]. If the symptom score improves by more than 50–75% relative to baseline, the test is considered positive. In different studies, the sensitivity of the PPI test for GORD-related NCCP ranges from 69% to 95%, and the specificity of the test ranges from 67% to 86% [18]. The PPI test is a cost-saving approach that significantly reduces the number of invasive diagnostic tests.

#### (ii) Reflux monitoring:

Esophageal pH monitoring demonstrates pathological GORD in up to 62% of the patients with NCCP [9,32]. A group of patients may have normal acid exposure, but still have a significant temporal relationship between reflux episodes and chest pain events. These patients are considered to have an acid-hypersensitive esophagus [39].

### (iii)Endoscopy:

Gastrointestinal endoscopy reveals reflux esophagitis in up to 31% of patients with noncardiac chest pain [43]. Endoscopy should be reserved for patients with NCCP and alarm symptoms including dysphagia, odynophagia, weight loss, or anemia.

### Esophageal sensitivity tests:

#### (i) Acid perfusion tests:

Hydrochloric acid, infused into the middle third of the oesophagus, is able to induce chest pain. The acid infusion test is positive in 10–38% of patients with NCCP [3,32]. The sensitivity and specificity for the acid perfusion test is 57% and 62%, respectively [20].

#### (ii)Balloon distension tests:

A small balloon is placed in the lower esophagus and inflated until patients report pain [35]. Richter et al. and other investigators have observed that balloon distension reproduces chest pain at lower volumes in patients with NCCP than in controls [28,34]. The sensitivity of the test has been reported to vary between 5% and 50% [34].

### Esophageal motility tests:

(i) High-resolution manometry (HRM) is the gold standard for recognition and classification of esophageal motility disorders. A significant percentage (48–64%) of patients with achalasia experience chest pain [12]. A recent study using HRM showed that acid-sensitive NCCP patients have a distinct hypermotility pattern in the smooth muscle portion of the esophagus [26].

#### (ii) Pharmacological provocative tests:

Provocative tests with edrophonium, ergonovine, bethanechol, and pentagastrin have been developed to identify patients with NCCP of esophageal origin [38]. Overall, pharmacological provocative tests are invasive, are associated with adverse events, are not standardized, have low diagnostic sensitivity for NCCP, and fail to predict therapeutic outcome.

### Treatment of NCCP

Treatment of noncardiac chest pain is challenging because of the heterogenous nature of the disorder.

#### (i) Acid suppression:

Several open-label studies have demonstrated efficacy of acid suppression with either PPIs or histamine H<sub>2</sub>-receptor antagonists following the first description by DeMeester et al. in 1982 [9]. Since the first double-blind, placebo-controlled study of acid suppression in NCCP by Achem et al. [1,5], similar controlled studies have consistently shown efficacy of PPI treatment in NCCP.

#### (ii) Smooth muscle relaxants:

Nitrates, phosphodiesterase-5 inhibitors, anticholinergic drugs, and calcium channel blockers have been used in the treatment of NCCP with dysmotility. Most studies included small numbers, and few were placebo controlled, which prevents us from making any firm conclusions about the efficacy of these agents.

#### (iii) Tricyclic antidepressants (TCAs):

A few clinical trials have evaluated the effect of TCAs in NCCP. In a double-blind, placebo-controlled trial [4] in 60 patients, imipramine (50 mg) significantly reduced chest pain episodes in 52% of patients. Prakash and Clouse [33] demonstrated that 75% of NCCP patients experience symptomatic relief during long-term use of TCAs for up to 3 years.

#### (iv) Selective serotonin reuptake inhibitors:

In a double-blind, controlled study of sertraline versus placebo in 30 NCCP patients for 8 weeks, sertraline demonstrated a significant reduction in pain score compared with placebo [42].

However, another study [40] found no differences between paroxetine and placebo.

#### (v) Serotonin-norepinephrine reuptake inhibitors (SNRIs):

Recently, Lee et al. evaluated venlafaxine vs. placebo in a double-blind controlled study in NCCP, reporting that 52 % of patients experienced symptom improvement in comparison to 4% of those taking a placebo [27].

(vi) Miscellaneous treatments:

Symptomatic improvement has been reported in NCCP patients taking adenosine intravenously as well as orally. Small -scale studies have shown improvement with endoscopic injection of botulinum toxin, cognitive-behavioral therapy, and hypnotherapy [22].

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**Self preparation at class:**

Listen information;

Work with patients (with cardiac pathology);

Ask about the problems that have not been found in information given.

**Self preparation at home:**

Compose the plan of your answer;

Answer the questions to the topic;

**Questions**

1. What is syndrome X cardiac disease?
2. What are non-atherosclerotic causes of angina pectoris?

**Recommended literature:*****A. Main:***

1. "Harrison's principles of internal medicine", Editors: Anthony S. Fauci, Dennis L. Kasper, Stephen L Hauser, Dan L. Longo, Joseph Loscalzo, McGraw-Hill Education / Medical; 19 edition (April 8, 2015), 1-2 volumes, 3000 p.
2. CURRENT Medical Diagnosis and Treatment 2012, Fifty-First Edition (LANGE CURRENT Series) by Stephen McPhee, Maxine Papadakis and Michael W. Rabow (Paperback - Sep 12, 2011)
3. Davidson's Principles and Practice of Medicine: With STUDENT CONSULT Online Access, 21e (Principles & Practice of Medicine (Davidson's)) by Nicki R. Colledge BSc FRCP(Ed), Brian R. Walker BSc MD FRCP(Ed) and Stuart H. Ralston MB ChB MD FRCP FMedSci FRSE (Paperback - Mar 11, 2010) Kumar and Clark's Clinical Medicine, 7e (Kumar, Kumar and Clark's Clinical Medicine) by Parveen J. Kumar (Paperback - Jul 2, 2009)
4. 1000 Questions and Answers from Kumar & Clark's Clinical Medicine, 2e [Paperback] Parveen Kumar CBE BSc MD FRCP FRCP(Edin) (Editor), Michael L Clark MD FRCP (Editor)
5. Differential Diagnosis in Internal Medicine: From Symptom to Diagnosis by Walter Siegenthaler (Mar 21, 2007)
6. Symptom to Diagnosis: An Evidence Based Guide, Second Edition (LANGE Clinical Medicine) by Scott D. C. Stern (Sep 16, 2009)
7. CURRENT Diagnosis and Treatment Emergency Medicine, Seventh Edition (LANGE CURRENT Series) by C. Keith Stone (May 23, 2011)
8. Harrison's Gastroenterology and Hepatology by Dan Longo and Anthony Fauci (May 3, 2010)
9. Goldman's Cecil medicine / [edited by] Lee Goldman, Andrew I. Schafer.—24th ed. Elsevier Sanders. Rev. ed. of: Cecil medicine. 23rd ed. — 2012. p.

**Additional literature:**

1. Kovalyova O.M., Asheulova T.V. Propedeutics to internal medicine. Part 1, Diagnostics. Vinnytsya, Nova Knyha, 2006, 424 p

**Answers**

1. Syndrome X cardiac disease describes decreased blood flow to the heart muscle with normal coronary arteries not caused by the vasospasm that is seen in Prinzmetal angina. This may be a



variant of microvascular angina. Rare causes may also include abnormalities that occur with the coronary arteries that are not due to ASHD including scarring that can occur from chest radiation, inflammation of the arteries because of underlying illness like systemic lupus erythematosus, scleroderma and Kawasaki's disease, as well as congenital abnormalities affecting coronary artery anatomy.

2. Non-atherosclerotic causes of angina pectoris are:

- Poorly controlled high blood pressure (arterial hypertension) can place significant strain on the heart muscle as it continues to pump blood, causing pain.
- Aortic stenosis describes the narrowed valve that controls blood flow from the left ventricle, the chamber of the heart that pumps blood to the body, into the aorta. If the valve narrows enough, decreased blood flow into the coronary arteries may be the cause of angina.
- Cardiomyopathy describes a variety of conditions where the heart muscle is unable to adequately pump blood to meet the body and the heart's oxygen needs. Ischemic cardiomyopathy, heart muscle that has been damaged by atherosclerotic heart disease, is the most common type of cardiomyopathy.
- Situations exist that can cause the body not to be able to meet the heart's demand for oxygen. These include anemia and poisonings.
- Other circumstances may occur where the heart's oxygen demand is increased and angina occurs. Oxygen demand increases when the heart is asked to pump harder and faster. Examples include tachycardias like atrial fibrillation or atrial flutter that are out of control, fevers, hyperthyroidism and the stress of major illness, infection, and trauma.
- Some causes for angina are multifactorial. For example, a patient with atherosclerotic heart disease may become acutely ill or injured, where a fever or anemia may compound the inability of narrowed blood vessels to deliver oxygen to heart muscle cells. Or a patient who abuses cocaine can increase heart rate plus cause coronary arteries to constrict, leading to angina.

**Methodical recommendations consisted by**

**Kulishov S.K.**