ZEBRAS OF MEDICINE
HEART ATTACK VS. PANIC ATTACK: TO PANIC OR NOT TO PANIC?

Elisah Geertman[1]

[1] Bachelor Student Medicine, Radboud university medical center, Nijmegen, the Netherlands.

Abstract

Background: Acute myocardial infarction (MI) is a life-threatening event defined as myocardial necrosis due to ischaemia. A panic attack is a sudden episode of fear that may include physical symptoms. Symptoms associated with acute MI show a substantial overlap and similarity with symptoms presented in a panic attack. This makes it difficult for patients and doctors to distinguish one from the other, especially since symptoms vary between individuals for both MI and panic attacks.

Objective: The aim of this review is to delineate the characteristic properties that could enhance differentiation between the symptoms of MI and panic attacks.

Discussion: Chest pain or chest discomfort is a core symptom of MI, but is also featured in 70% of panic attacks. Other shared symptoms are dyspnoea, nausea, diaphoresis (sweating), palpitations, feeling light-headed, and paraesthesia. Symptoms that are associated with panic attacks, but are not characteristic for MI, include chills or heat sensations and trembling, as well as derealisation and depersonalisation. Back pain, which is frequently found in MI patients as part of chest pain radiation, is not related to panic attacks. Fatigue is distinctive for MI and is not associated with panic attacks. A panic attack typically peaks within a short period (<10 minutes), whereas symptoms accompanying MI are generally more persistent (>20 minutes). Non-anginal chest pain is more associated with panic attacks, whereas anginal chest pain is more suggestive of MI. Typical angina can also occur in patients with panic disorder (PD), and patients with acute coronary syndrome (ACS) can have atypical presentations of MI.

Conclusion: The diagnostic performance of chest pain characteristics is limited, but several discriminative differences between acute MI and panic attacks exist. Further diagnostic testing is mandatory for every patient with acute prolonged chest pain. Since PD and ACS can co-occur, and symptoms of both MI and PD have an interindividual presentation, acute causes of chest pain should not be excluded in the evaluation of psychiatric disorders for patients presenting with chest pain.

KEYWORDS: myocardial infarction, acute coronary syndrome, panic disorder, chest pain, clinical presentation

Introduction

Acute myocardial infarction (MI), also known as a heart attack, is defined as myocardial cell death due to ischaemia (inadequate oxygen supply) [1]. MI is classified under the term acute coronary syndrome (ACS) [4]. ACS refers to a number of conditions associated with abruptly reduced blood flow to the heart, ranging from unstable angina pectoris (UAP) to acute MI (Figure 1) [1]. Based on ECG characteristics, acute MI can be designated as either ST elevation myocardial infarction (STEMI) or non-ST elevation myocardial infarction (non-STEMI) [1]. STEMI is the result of complete coronary artery occlusion, whereas non-STEMI is usually caused by partial occlusion of the artery [1]. Thus, ACS includes the following three clinical manifestations: STEMI, non-STEMI, and UAP [1].

In addition to these categories, MI (STEMI/non-STEMI) can be further classified into five different subtypes, of which type 1 and 2 are the most important [1]. A type 1 MI is caused by athero-thrombotic artery disease and is typically precipitated by atherosclerotic plaque disruption [1]. In type 2 MI, an acute stressor may lead to myocardial injury resulting from an imbalance between oxygen supply and demand [1].

The most prominent symptom featured in MI is chest pain or chest discomfort. Another phenomenon in which chest pain or discomfort can occur is a panic attack, which is experienced by at least 10% of the general population once in their lifetime [2]. A panic attack can be described as a sudden episode of intense fear or discomfort, often reaching a peak within 10 minutes [2]. Besides psychiatric symptoms as derealisation, fear of losing control, and fear of dying, panic attacks are also associated with several cardiopulmonary, autonomic, neurologic, and gastrointestinal symptoms, including chest pain or chest discomfort [3]. The traditional clinical classification of chest pain describes three types: typical angina, atypical angina, and non-anginal chest pain [4]. Typical angina is characterised by substernal chest discomfort, precipitated by exertion or emotional stress and relieved by rest or nitroglycerine within minutes, whereas atypical angina meets two out of these three criteria [4]. Chest pain is considered non-anginal when it meets one or none of the characteristics [4].

Even though MI can be lethal and a panic attack is not life-threatening, both entities have a substantial overlap in symptoms. Therefore, it can be challenging for patients and doctors to distinguish one from the other, especially since symptoms differ between individuals for both MI and panic attacks. This review aims to delineate the characteristic properties of MI and panic disorder (PD) that could enhance differentiation between the two fundamentally different diagnoses.

Table 1: Similarities and differences in symptoms of myocardial infarctions and panic attacks

Myocardial infarction	Panic attack
Chest pain or discomfort	Chest discomfort
Nausea or vomiting	Nausea or abdominal stress
Light-headedness or syncope	Feeling dizzy, unsteady, light-headedness or syncope
Diaphoresis (sweating)	Diaphoresis (sweating)
Paraesthesia (numbness or tingling sensations)	Paraesthesia (numbness or tingling sensations)
Dyspnoea	Sensations of shortness of breath or smothering Feelings of choking
Palpitations	Palpitations, pounding heart or tachycardia
Sense of doom	Fear of dying Fear of losing control or going crazy
Fatigue	*Derealisation (feelings of unreality) or depersonalisation (being detached from oneself)*
Discomfort or pain in arms, shoulder, neck, back or jaw	*Trembling or shaking*
	Chills or heat sensations

Clinical presentation

In patients suffering from MI, chest pain is often similar to anginal pain, but there are some differences. These patients may experience more severe, longer-lasting (for over 20 minutes) chest pain which is not relieved by rest or nitroglycerine within minutes. It is often described as a dull pressure sensation that may also be perceived as squeezing and may radiate up to the neck, left arm (less frequently to both arms or to the right arm), shoulder, neck, jaw, and back [4]. Pain in the upper back, arm, neck, and jaw are more often reported by women when compared with men [4, 5]. Chest discomfort might present itself in combination with diaphoresis (sweating), nausea, dyspnoea, or abdominal pain [6]. Atypical presentations such as indigestion-like symptoms, epigastric pain, dyspnoea, fatigue, palpitations, and light-headedness (with or without syncope) are more frequently reported by women, diabetics and elderly [5].

Research found that up to 70% of panic attacks feature chest pain as a symptom as well [7]. In general, panic attacks are associated with non-anginal chest pain, often described as aching or stabbing in character. In one study, 91% of individuals diagnosed with an anxiety disorder reported atypical chest pain [8]. Among these patients, palpitations were the most frequently associated symptom, followed by dyspnoea, fear of dying, dizziness, and chills or heat sensations [8]. However, it is essential to note that panic attacks can occur with typical angina as well [5].

Symptoms that can be seen in both MI and panic attacks include dyspnoea, nausea, diaphoresis (sweating), palpitations and feeling light-headed [6, 9]. There are certain symptoms that are associated with panic attacks, but are not characteristic for MI: chills or heat sensations, derealisation and depersonalisation and trembling. However, back pain can be presented in case of MI as part of chest pain radiation, but is not characteristic for a panic attack. Another symptom that can be distinctive for MI, but is not associated with panic attacks, is fatigue [3]. Thus, there are similarities and differences in symptoms (Table 1).

Diagnosis

In patients presenting with acute chest pain, it is important to consider MI, pulmonary embolism, or aortic dissection [6]. ACS is more probable in patients with retrosternal pain for more than 20 minutes, with or without radiation, especially when accompanied by diaphoresis, nausea, or vomiting [6]. Chest pain described as sharp or stabbing in quality, affected by respiration or change of position, or reproducible by palpation of the area makes ACS less probable [5]. Because the diagnostic performance of chest pain characteristics is limited, an ECG should be performed on every patient presenting with acute prolonged chest pain [5].

MI

MI can be diagnosed based on clinical history, 12-lead ECG, and elevated biochemical markers, preferably cardiac troponin (Figure 1) [1]. In order to diagnose MI, a rise or fall of cardiac troponin values (with at least one value above the 99th percentile) should be present as well as at least one of the following criteria [1]:

- Symptoms of myocardial ischaemia;
- New ischaemic ECG changes: ST-segment-T wave changes or new left bundle branch block;
- Development of pathological Q waves;
- Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischaemic aetiology;
- Identification of a coronary thrombus by angiography or autopsy (not for type 2 or 3 MIs).

Panic attack and PD

According to the Diagnostic and Statistical Manual of Mental Disorders, a panic attack is accompanied by four or more symptoms (Table 1) and is considered to be a limited-symptom panic attack when less than four symptoms are present [9]. The psychiatric differential diagnosis should contain PD, generalised anxiety disorder, post-traumatic stress disorder, major depressive disorder, illness anxiety disorder and somatic symptom disorder [7]. Nevertheless, a profound evaluation of more acute causes of chest pain should not be excluded in the evaluation of underlying psychiatric disorders, as patients can have atypical presentations of MI [3].

A panic attack does not require an underlying diagnose in order to occur. However, if attacks are recurrent and unexpected, PD might be the underlying disorder [10]. In order to get diagnosed with PD, the patient's panic attacks cannot directly or physiologically result from substance use, medical conditions, or any other psychiatric disorder [9]. Additional

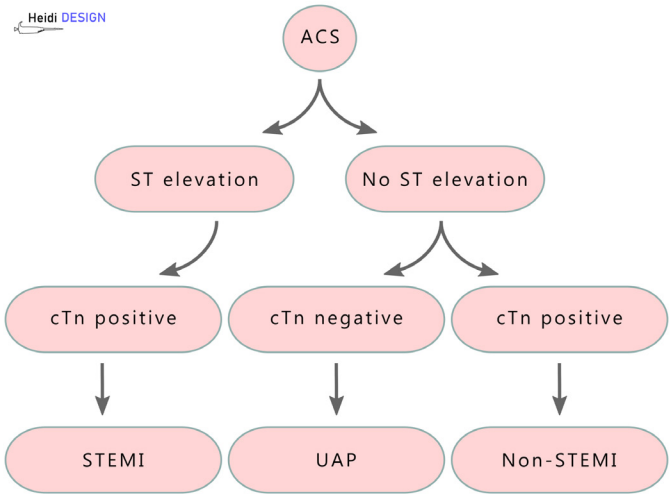

Figure 1: Interpretation of ST-segments and cardiac troponin (cTn)
Based on ST-segment characteristics and cTn levels, acute coronary syndromes (ACS) can be classified into unstable angina pectoris (UAP), non-ST elevation myocardial infarction (non-STEMI) and ST elevation myocardial infarction (STEMI).

criteria include that attacks must also be linked with persistent worry (for a minimal duration of 1 month) about (1) experiencing another attack or consequences of an attack, or (2) significant changes in behaviour in relation to the attack [2, 9].

Treatment
Patients with STEMI have to be treated with reperfusion therapy as soon as possible, preferably by means of percutaneous coronary intervention (PCI) within 90 minutes from the first medical contact [11]. PCI is a non-surgical procedure that utilises a catheter to open up cardiac blood vessels using a small device known as a stent without previous fibrinolytic treatment [11]. Current guidelines recommend performing PCI in patients presenting with symptoms of less than 12 hours duration or in patients presenting with cardiogenic shock or develop acute severe heart failure irrespective of time delay from onset of symptoms [11]. If PCI cannot be performed within the recommended timelines, fibrinolytic therapy should be given if it is not contraindicated [11].

For patients with non-STEMI or UAP, the approach to revascularisation differs from that in STEMI and is less urgent [12]. Once the diagnosis has been made, either an invasive or an ischaemia-guided strategy is applied [12]. For most patients, an invasive strategy (angiography or PCI) is favoured [12]. Urgent PCI is performed in patients whose condition is unstable. [3] Depending on the presence or absence of high-risk features, angiography is performed within 12 to 24 hours, or within 25 to 72 hours [12]. Fibrinolytic therapy may be harmful in non-STEMI patients and is therefore contraindicated [12]. Regardless of the strategy, both entail aggressive utility of medications such as anticoagulants, antiplatelet agents, beta-blockers, statins and possible use of angiotensin-converting enzyme inhibitors for appropriate patient populations [12].

After acute treatment in terms of medication and PCI, patients undergo long term pharmacotherapy to reduce morbidity and prevent complications. Pharmacological treatment usually includes aspirin, simvastatin, a beta-blocker, an angiotensin-converting enzyme inhibitor and a P2Y12 inhibitor, such as ticagrelor or clopidogrel [12].

PD therapy typically involves cognitive-behavioural therapy as a psychological intervention [2]. Cognitive-behavioural therapy is the first choice of treatment and can also be beneficial for people who experience panic attacks, but are not diagnosed with PD. The treatment can also be combined with pharmacotherapy to help reduce symptoms associated with panic attacks [2]. Selective serotonin reuptake inhibitors, a type of antidepressants, are the first choice of medication [2]. Other options include serotonin-norepinephrine reuptake inhibitors, monoamine oxidase inhibitors and benzodiazepines [2]. In respect to negative adverse events, benzodiazepines are only prescribed when several antidepressants and behavioural therapy are proven not to be effective [2].

Conclusion

The diagnostic performance of chest pain characteristics is limited, but several discriminative differences between acute MI and panic attacks exist. Chest pain from MI and panic attack differs in character (typical anginal pain versus non-anginal pain) and duration (more than 20 minutes versus less than 10 minutes). Chest pain described as sharp or stabbing in quality, affected by respiration or change of position, or reproducible by palpation of the area makes ACS (and therefore MI) less probable.

Back pain as a part of chest pain radiation is not associated with panic attacks, whereas chills, heat sensations, derealisation and depersonalisation are not associated with MI. Fatigue is distinctive for MI but is not linked to panic attacks.

On the grounds that PD and ACS can co-occur and symptoms of both MI and panic attacks have an interindividual presentation, acute causes of chest pain should not be excluded in the evaluation of psychiatric disorders. Further diagnostic testing (for example an ECG) should be performed in every patient presenting with acute prolonged chest pain.

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CORRECT ANSWERS TO THE EXAM QUESTIONS

Answer question 1
A. Frontal lobe

The primary motor cortex is one of the principal brain areas involved in the motor function. It is located in the frontal lobe of the brain, next to the precentral gyrus. The function of the primary motor cortex is to generate neural impulses that control the execution of movement.

For further reading:
Moore, K.L., *et al. Chapter 8: Head* in Clinically Oriented Anatomy, Vol. 8e. (Wolters Kluwer, Philadelphia, 2018)

During the exam, 77% of the participants answered this question correctly.

Answer question 2
B. Medulla oblongata

Vital sensibility, consisting of the sensation of temperature and pain, crosses to the contralateral side immediately upon entering the central nervous system, therefore crossing at the spinal cord. Gnostic sensibility, encompassing touch and motor skills, crosses to the contralateral side much higher in the central nervous system, in the medulla oblongata.

For further reading:
Siegel, A. *et al.* Chapter 14: Somatosensory Systems in Essential Neuroscience, 4th edition. (Wolters Kluwer, Philadelphia , 2018)

During the exam, 46% of the participants answered this question correctly.

The exam questions can be found back on page 13 in this journal.