

Chest Pain Management

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Abstract

Chest pain is a frequent symptom witnessed in Emergency (ER), internal medicine polyclinics, and family practice departments. The underlying reasons might range from myalgia, psychogenic pain to acute myocardial infarction and pneumothorax. If it is underestimated and not examined pain stakingly investigated, it can lead to serious morbidity and mortality. Therefore chest pain management is of utmost importance.

Keywords: Chest pain; Internal medicine; Pain; Ischemic heart disease

Pain has been defined as an unpleasant sensory or emotional experience with tissue existing or probable tissue damage. In case of chest pain, afferent pain fibers are either somatic or visceral. Whereas, skin and parietal pleura have somatic innervations, internal organs such as esophageal blood vessels have visceral ones. Pain receptors, largely present on the parietal pleura, lack or are few on visceral pleura. Impulses from the receptors are carried to the medulla spinalis to dorsal horn cells and from there to the brain via spinothalamic and reticular spinal tract. The most characteristic type of respiratory tract pain, pleuratic pain is caused by parietal pleura and endothoracic fascia is largely local, and sharp [1]. It may spread along the intercostal nerve of the effected zone. Deep inhalation, cough, laughter, and increase in the intercostal pressure might increase pain. Retention of breath following exhalation may reduce pleuratic pain as the diaphragmatic surface of parietal pleura is innervated with the phrenic nerve in its centre and with intercostals nerves at other sites. When the centre of the diaphragmatic pleura is affected, pain may spread to shoulders and neck.

Ischemic heart disease, according to the World Health Organization (WHO), ranks first as a cause of death in the leading diseases necessitating an effective management of chest pain. In chest pain management, discriminating between high risk and low-risk patients is of utmost importance. Hence, a detailed history in distinctive diagnosis of chest pain is very important. The onset and duration of chest pain, location and radiation, intensity, influence of movement and breathing to intensity, and other symptoms associated must be determined. In emergency, patients' medical history must be taken briefly and directly and a review of basic findings/symptoms such as general view, vital symptoms, and the status of jugular vein, chest auscultation and peripheral artery palpation might be sufficient for a clinic assessment leading to an appropriate intervention [2]. After stabilizing the condition of the emergency case, patient's history can be detailed and physical examination thorough. Chest pain constitutes approximately 5% of emergency department visits [3]. Although comorbid diseases are considered first, they constitute only 30%.

Musculoskeletal diseases, gastrointestinal diseases, stable coronary artery disease, panic disorder and other psychiatric disorders, respiratory system diseases are mostly the underlying diseases of people consulting the family physicians with chest pain complaints in the first step [4].

In those aged over 40 with a smoking history of and suffering from comorbid diseases such as diabetes mellitus and hypertension, chest pain should not be underestimated and preliminary survey definitely conducted for further diagnoses.

An accurate diagnosis of chest pain necessitates experienced

medical personnel able to comment on laboratory findings thoroughly and properly and accurate laboratory tests answering individual patient's needs.

On asking for medical advice, patient's history should be taken quickly and properly, physical examination conducted appropriately, Electrocardiogram (ECG) and Posterior to Anterior (PA) Chest X-Ray images must be obtained very quickly. In pain history, an inquiry dubbed as "OPQRST inquiry" should be made. Hereby, each letter stands for the following: O-What (onset, origin) were you doing at the time of pain? Have you ever had similar complaints) P-What provokes your symptoms? What makes it better? What makes its worse? Q-(Quality) what does the pain feel like? Is it sharp, obtuse, or a tearer in its nature? (R Region) Where is your symptom and where does it radiate? Is there more than one point? S (Severity) if scoring the pain, on a scale of 1 to 10, how would you rate your level of pain? T (Time) when did the pain first begin? When did it finish? How long did it take? [5]. ECG 12 derivations should be taken. It has to be considered that the first one can be normal. Therefore, if myocardial infarction is suspected, utmost care has to be taken. Myocarditis, cardiomyopathy, pneumonia, esophagospasm, are among the diseases not including ST segment elevation following acute coronary syndrome. It has also to be considered that patients with acute coronary syndrome, with ST elevation MI, Non ST elevation, and unstable anginamay sometimes seek medical services for atypical symptoms such as indigestion, dyspnea and stinging chest pain [6,7].

First of all, a P-A Chest X-Ray is required from chest pain patients visiting the emergency department or chest disease outpatient's clinic. If X-ray image is inconclusive for diagnosis, computed tomography CT-Scan will be required. In case of a contraindication for CT-Scan, MRI can be preferred for imaging [8].

Cardiac pain might be categorized as ischemic and non-ischemic pain. Coronary artery diseases, aortic stenosis, hypertrophic cardiomyopathy, systemic and pulmonary hypertension are the main reasons leading to ischemia. Aortic dissection; however, is the leading non-ischemic reason. It is followed by pericarditis, aortic aneurysm and mitral valve prolapse. In ischemic angina, there is an obtuse,

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pressure pain, initially substernal and fastly progressing to the left arm and/or back responsive to nitroglycerin. In non-ischemic angina, there is a sharp-pleuratic pain beginning suddenly on the lateral chest wall and not responding to nitroglycerin. Nausea, pain on the left arm, gnathalgia, dyspnea and perspiration are accepted as symptoms equivalent to angina. Acute coronary syndrome is classified as q wave myocardial infarction, non q wave myocardial infarction, unstable angina pectoris and acute sudden cardiac death. Clinicians should consider the possibility of microvascular dysfunction or coronary spasm in patients who present typical angina symptoms despite the presence of normal coronary angiography image [9]. An important laboratory test finding is the increase of troponin-t or troponin-i 5-72 hours after myocardial infarction. As an alternative to troponin, the use of new biomarkers such as miRNAs is yet on trial [10].

Pulmonary embolism is a blockage of the pulmonary artery and its branches with venous thrombosis coming from systemic veins. Pulmonary embolism is closely associated with Deep Venous Thrombosis (DVT). DVT makes up 90% of pulmonary embolism. Hypercoagulability, stasis, and vessel injury also known as Virchow's triad, lead to Venous Thromboembolism (VTE). 50% of VTE patients die in the first 30 minutes, 70% in the first 60, and 85% in the first 6 hours. Mortality rate reduces with early treatment initiation. Considering pulmonary embolism in patients with chest pain, dyspnea, pleuritic chest pain, and haemoptysis is vital. Pulmonary embolism has a wide range of clinical presentations, with chest pain only in 75% of the cases. Observation of Westermark sign on P-A Chest X-ray, an extension in the shade of pulmonary artery together with oligemia in the lung zone and of Hampton Hump, one or more pleural based, wedge-shaped densities, are evident in diagnosing pulmonary embolism. Another important lab test is the D-dimer measurement. It is a Fibrin Degradation Product (FDP), labeled thus as it contains two crosslinked D fragments of fibrin protein. Negative D-dimer result eliminates largely VTE diagnosis. However, VTE risk for the following 3-months is still high enough despite negative D-dimer test result (3.5%-21.4%) to warrant further imaging considering its life-threatening nature if left untreated. CT angiography (helical or multidetector CT imaging) has replaced ventilation-perfusion scanning as the preferred diagnostic test for pulmonary embolism due to a sensitivity rate of approximately 90-95% and a specificity rate of 95% in determining pulmonary embolism [11].

Chest pain in aortic dissection presents with sudden pain onset radiating to the back without an interruption and with possible associated neurologic symptoms. Unequal systolic blood pressure in the upper extremities and newly emerging murmur can be present in physical examination.

Pneumothorax is air collection in the pleural space due to several reasons. Pneumothorax may confront us spontaneously or traumatically. Chest pain in pneumothorax is of pleuritic type, has sudden onset, and is accompanied with dyspnea. It frequently occurs in the young, the tall, and the smokers. The most common symptoms are reduced breath sounds and tachycardia. There are also nonspecific symptoms related to pneumothorax; yet it can be decisively diagnosed with chest X-ray [12].

Pericarditis driven chest pain is positional and generally pleuritic. It is like a stitch and generally intensifies lying on the left side and back with each heartbeat. Adjacent pleura inflammation can lead to intensification of pericardial pain with respiration. Accompanied with typical ECG changes, it may be differentiated as pleural or skeletal pain.

Chest pain shall is a common symptom in lung cancers due to

primary tumor invasion of the chest wall and pleural. More than 50% of patients with lung cancer complain about chest pain. At the diagnosis stage, chest pain occurs in more than 20% patients with non-small cell lung cancer because of direct and metastatic involvement of thorax structure sensitive to pain [13]. The ratio of emergency department visits due to lung cancer related chest pain is approximately 2%. As there are no nerves causing pain in the lung parenchyma, chest pain does not occur in most lung cancers at the initial stages. However, as nerves perceiving pain at pleura that lines the inside of the rib cage are present, pain emerges due to chest wall led reasons. An obtuse, continuing side pain in different to respiration and coughing may generally develop depending on mediastinal pleura or chest wall involvement or rib metastasis. Pleuritic pain is seen in 8-15% of lung cancer patients and is supposed to be directly associated with pleural involvement and obstructive pneumonia. When pleural effusion develops, pleuritic chest pain shall disappear and dyspnea begins [14].

If other diseases causing chest pain are to be mentioned, reflux with a gastrointestinal origin is among the frequent reasons for emergency department visits. In reflux, substernal burning is accompanied by epigastric discomfort. It appears after meals and the pain, increasing lying on back, diminishes using antacid. Esophagospasm, reflux esophagitis, peptic ulcer and esophageal rupture are also among chest pain reasons of gastrointestinal origin [15]. Anxiety, depression and cardiac neurosis confront us among main psychogenic reasons. Chest pains are usually described as retrosternal. However, the pain described is not a typical chest pain as it is unrelated with exercise or movement accompanied with other symptoms of emotional disorders. They, together with chest pain, are usually treated by antidepressant drugs.

Furthermore banned substance use such as cocaine may lead to acute chest pain [16]. Sarcoidosis, secondary lymphadenopathy, mediastinitis, and lymphoma, among main reasons of mediastinal disease, also may lead to chest pain. In chest wall related pains, pain level increases with respiration like Tietze's syndrome and thoracic outlet syndrome. In thoracic herpes zoster, there is a dermatomal zone localized patch like chest pain with evident vascular rash. Desmoid tumor, located in the chest wall, can also lead to localized chest pain [17].

In conclusion, chest pain should not be underestimated. Moreover, it has to be examined in detail in high risk comorbid patients who are presented to emergency and outpatient clinics. Chest pain might be related to diseases with high morbidity and mortality rates. Therefore, further studies to establish protocols for rapid, safe, and conclusive chest pain differential diagnoses are to be made.

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