

An Overview on Chest Pain Diagnostic Approach in Primary Health Care Centre

Abdulaziz Fahad Aljaiban^{1*}, Fahad Obaidallah B Alharbi², Mohammed Saad Al Audah³, Haya Hamad H Alshehri⁴, Ibrahim Hassan Almousaedi⁴, Gehan Ahmed Abdulaziz⁵, Almalki Abdulrahman Mohammed M⁵, Mohammed Meshari Alharthi⁶, Abeer Mohammed Aljebreen⁷, Ethar Ahmad Boudal⁸, Hassan Saadullah Gary Aziz², Shamalah Musa Rifdan⁹

¹Faculty of Medicine, King Faisal University, Al Ahsa, KSA. ²Faculty of Medicine, King Abdulaziz University, Jeddah, KSA. ³Faculty of Medicine, King Faisal University, Al Ahsa, KSA. ⁴Faculty of Medicine, King Khalid University, Abha, KSA. ⁵Faculty of Medicine, Taif University, Taif, KSA. ⁶Faculty of Medicine, Bisha University, Bisha, KSA. ⁷Faculty of Medicine, Almaarefa University, Riyadh, KSA. ⁸Faculty of Medicine, Medina General Hospital, Medina, KSA. ⁹Family Medicine Department, Alqabel PHC, Abha, KSA.

Abstract

Chest pain can be a diagnostic challenge in medical practice. Noncardiac causes are prevalent, yet it is significant not to miss critical presentations such as acute coronary syndrome, pulmonary embolism, and tension pneumothorax. Nonthreatening etiologies of chest pain that should be considered include pneumonia, gastric reflux, and costochondritis. Patients with exertional chest pain and electrocardiographic abnormalities should undergo cardiac stress testing and cardiac enzymes measurement. A systematic approach to evaluate chest pain will result in an appropriate diagnosis and treatment plan. The objective of this review is to discuss chest pain different presentations and management plans with the outcome. PubMed database was used for articles selection, and the following keys were used in the mesh (“Chest pain”[Mesh]) AND (“assessment”[Mesh]) OR (“Management”[Mesh])). In regards to the inclusion criteria, the articles were selected based on the inclusion of one of the following topics: chest pain, non-invasive assessment. Exclusion criteria were all other articles, which did not have one of these topics as their primary endpoint. Chest pain is a very common presentation. The earlier the diagnosis and treatment, the better the outcomes, and the more likely that serious life-threatening conditions would be ruled out.

Keywords: Chest pain, Myocardial infection, Life-Threatening, Missed diagnosis

INTRODUCTION

Despite many innovations over the past thirty years, the assessment of chest pain is still challenging. The proportion of patients that present at an emergency room with acute chest pain and are to be admitted to a hospital is increasing [1]. In ambulatory care, approximately 15 % of the patients with chest pain are diagnosed with coronary artery disease, which includes myocardial infarction and angina pectoris, and this percentage rises to 28 % in cardiology outpatient clinics and 22 % in emergency departments [2]. The admission of patients who present with chest pain and are at low risk for myocardial infarction costs an average of \$2,000 to \$5,000 at most hospitals and can lead to unneeded procedures and blood tests, in addition to their consequent costs and complications [3]. As a result, with rising economic pressures on the health care system, medical institutions, most physicians, and health insurance plans are looking forward to enhancing the efficiency of care for patients with acute chest pain [2].

The purpose of this review is to discuss the chest pain and differential diagnosis that the physician in primary care can face the doctor.

MATERIALS AND METHODS

PubMed database was used for articles selection, and the following keys were used in the mesh (“Chest pain”[Mesh]) AND (“assessment”[Mesh]) OR (“Management”[Mesh])).

In regards to the inclusion criteria, the articles were selected based on the inclusion of one of the following topics: chest pain, non-invasive assessment.

Exclusion criteria were all other articles, which did not have one of these topics as their primary endpoint.

Address for correspondence: Abdulaziz Fahad Aljaiban, Faculty of Medicine, King Faisal University, Al Ahsa, KSA. Abdul2ziiz @ hotmail.com

This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 3.0 License, which allows others to remix, tweak, and build upon the work non commercially, as long as the author is credited and the new creations are licensed under the identical terms.

How to cite this article: Aljaiban A F, Alharbi F O B, Al Audah M S, Alshehri H H H, Almousaedi I H, Abdulaziz G A, et al. An Overview on Chest Pain Diagnostic Approach in Primary Health Care Centre. Arch. Pharm. Pract. 2021;12(4):65-8. <https://doi.org/10.51847/quGut8KI8v>

Around 90 publications were chosen as the most clinically relevant out of 1,202 articles indexed in the previous two decades, and their full texts were evaluated. A total of 31 of the 90 were included after a thorough examination. Additional research and publications were found using reference lists from the recognized and linked studies. Expert consensus recommendations and commentary were added where relevant to help practicing physicians assess chest pain most simply and practically possible.

RESULTS AND DISCUSSION

It is usually of great benefit to consider all the various differential diagnoses of pain. The visceral pain can often present in an unclear way which means that the patient is will not be able to localize the pain to a particular point. Pressure, dull, deep, and squeezing are common words used to describe visceral pain [4]. Furthermore, due to the nerves coursing through somatic nerve fibers when they reach the spinal cord, the other parts of the body may be affected by visceral pain [4]. For example, an ischemic cardiac pain can be transferred to the left or right shoulder, left or right arm, or jaw. Some symptoms of visceral pain could include vomiting and nausea. Furthermore, the shoulders and neck might be affected by diaphragmatic irritation. Compared to visceral pain, somatic pain is more precise [4]. Patients will often be capable of pointing to a specific area of pain. Somatic pain also does not usually refer to other parts of the body. Common patient words used to describe somatic pain are sharp, stabbing, and poking [4].

Differential Diagnosis

The second most common presenting symptom making approximately 5% of all emergency department presentations is chest pain. During the evaluation of the chest pain, the physician has to always screen for life-threatening etiologies of chest pain. The following list shows the percent of the occurrence in patients presenting to the emergency department with chest pain.

- Acute coronary syndrome, 31%
- Pericarditis 4%
- Pulmonary thromboembolism, 2%
- Aortic dissection, 1%
- Pneumothorax, unreported
- Pericardial tamponade, unreported
- Esophageal perforation

Chest pain has other causes with a close percent of occurrence in patients visiting the emergency department and they include [5];

- Gastrointestinal reflux, 30%
- Musculoskeletal etiologies, 28%
- Pneumonia/pleuritis, 2%
- Herpes Zoster/Shingles 0.5%
- Pericarditis

Clinical Presentation

A chest pain which radiates to a single or both arms or shoulders, chest pain which appears or increases with physical effort, chest pain accompanied with vomiting and nausea, chest pain associated with sweating or diaphoresis, or a chest pain that feels like "pressure," is more likely to be related to acute coronary syndrome [6]. Chest pain that is described to be "sharp" or "stabbing", chest pain that is pleuritic or positional, or chest pain that can be reproduced with palpation lower the suspicion of cardiac causes of chest pain [7]. However, an estimated 33% of persons with myocardial infarction in the United States do not usually have chest pain, and have greatly higher mortality as a consequence of the delayed treatment [8].

History Taking

Similar to all workups, chest pain evaluation begins with taking a comprehensive history. Begin with fully understanding their complaint [5].

- Onset: Patients should be asked what they were doing when the pain started. It should be established whether the pain started at rest or during exertion.
- Location: The patient should be asked if he/she can localize a single point of pain with one finger or does the pain has a diffuse pattern?
- Duration: Each episode of pain lasts for how long?
- Character: Ask the patients to give a description of what the pain feels like in their own words.
- Aggravating/ relieving factors: It is critical to determine if there is something that makes the pain worse. For instance, is it related to or increase with exertion, or is it related to eating or breathing? Is there a posture the exacerbates or relieves the pain? Asking about new lifestyle changes is crucial, for example, are there any new workout plans or extra effort exerted in shopping or working? Patients also should be asked if they tried any medications in recent time, or if they use any medications for relieving the pain.
- Radiation/Referred pain: If there is referred pain, this may indicate visceral pain.
- Timing and frequency: How frequently do they experience pain episodes? Is there a specific time in the day when the pain episodes start?

Edema

Screen for other symptoms like

- Shortness of breath

Cough or Sore Throat

- Nausea and vomiting
- Fever
- Diaphoresis or chills
- Dyspepsia or heartburn
- Recent sickness or infection

Calf Swelling or Pain

Evaluate for the risk factors for each of the following conditions [5]:

- Acute coronary syndrome risks: Any history of previous myocardial infarction, family history of heart disease, smoking history, diabetes mellitus, hyperlipidemia, and hypertension.
- Pulmonary thromboembolism risks: history of pulmonary embolism or deep venous thrombosis or supplementation (which includes oral contraceptives) or hormone use, cancer history, periods of non-ambulation/bed rest, or recent surgeries.
- The contemporary gastrointestinal procedure, such as endoscopy.
- Stimulant/drug abuse (cocaine or methamphetamines)

Check the patient's past medical history for coagulopathies thoroughly, kidney disease, and cardiac disease history. If life-threatening causes are ruled out, consider screening for risk factors of other conditions. Pneumonia should be suspected in patients that have a cough with expectorations or a recent upper respiratory infection. GERD is considered to be a very common cause of chest pain; hence patients should be asked about any reflux symptoms. If the patient was recently involved in a new exercise regimen or has a history of recent trauma, which supports a musculoskeletal etiology [5].

Physical Exam

The physical exam should include the following [5]:

- Vitals signs
- General appearance; look for diaphoresis and distress

Heart Exam

- Complexion and skin exam; the existence of herpetic lesions (shingles)
- Jugular venous distension assessment on the neck, specifically with inspiration (Kussmaul sign)
- Extremities examination for any unilateral swelling, calf pain or tenderness, edema, and check for symmetric and equal pulses

Abdominal Exam

Chest examination; palpate for reproducible pain or crepitus

Lung exam

Investigations

Each institution has its protocols to evaluate for chest pain, but most providers order the following tests [9]:

- In the first 10 minutes of arrival, an electrocardiogram is recommended. Serial ECGs should be considered.
- The basic metabolic panel, complete blood count, lipase level, troponin level (consider serial troponin levels 4 hours apart),

Chest radiograph

- If pulmonary embolism is suspected, consider computed tomography pulmonary angiography. If pulmonary angiography is contraindicated, consider a ventilation-perfusion scan.
- Echocardiography if pericardial tamponade is suspected

Treatment/Management

Acute Coronary Syndrome (ACS)

Determine if the patient is using a cardiac monitor, then the intravascular access should be identified, 162 mg to 325 mg of chewable aspirin should be administered, ticagrelor or clopidogrel (except if bypass surgery is unavoidable), pain medications should be administered and oxygen therapy should commence, if needed [10]. Nitroglycerin had been proven to lower the mortality, target for lowering the blood pressure by 10% mean arterial pressure (MAP) in normotensive patients and by lowering the MAP by 30% in hypertensive patients; and never to be used in patients with inferior ST elevation and hypotensive patients [10]. Reperfusion therapy must be carried out on patients with ST-elevation on ECG promptly. They must either undergo thrombolytics or be transferred to the catheterization unit for percutaneous coronary intervention (PCI). The gold standard is PCI and it has to be started 120 minutes if transferred to the outside institution or within 90 minutes onsite [11]. Thrombolytics have to be initiated within 30 minutes if PCI is not available. Patients with unstable angina and non-ST elevation myocardial infarction (NSTEMI) should be admitted to the hospital to see a cardiologist for consultation and evaluation. The candidates for outpatient management patients with stable angina. Senior patients and with multiple comorbidities should be admitted to the hospital for further cardiac evaluation observation [11].

Pulmonary Embolism (PE)

The gold standard is CT pulmonary angiography (CTPA). A VQ scan can be a substitute, but it is not as accurate as CT pulmonary angiography (CTPA) in patients with chronic pulmonary disease. Thrombolytics should be carried out on hemodynamically unstable patients and anticoagulants should be given to stable patients [12].

Pneumothorax (PTX)

Decompression with a chest tube is considered the definitive treatment of pneumothorax, however, there are many details about the size and type of pneumothorax that is considered in the emergency department [13].

Pericardial Tamponade

After establishing the diagnosis with ultrasound, administer a fluid bolus as a temporizing step. Needle pericardiocentesis or surgical pericardial window is the definitive treatment to relieve pressure inside the pericardial sack [14].

Aortic Dissection

Most of the times emergency surgery will be performed. A cardiothoracic surgery should be carried out as early as possible. To evaluate the extent of dissection, CT angiography is the gold standard. The next step will be promptly decreasing the patient's blood pressure to systolic between 100 mmHg to 130 mmHg after placing two large-bore IV accesses. To prevent reflux tachycardia, initiate patient on beta-blocker therapy [14].

Esophageal Perforation

Esophageal rupture may be indicated by a pleural effusion on the left chest radiograph. The best definitive test is the contrast esophagram. Prompt surgical consultation is warranted as it is a surgical emergency [9].

Gastrointestinal Reflux Disease

Patients with GERD and severe chest pain can be treated with viscous lidocaine mixed with antacids (also known as GI cocktails). However, ACS can present with dyspepsia that responds to GI cocktails. Therefore, it is extremely essential to rule out ACS before deciding that GERD is the final diagnosis. Proton pump inhibitors and H2 blockers can be used as a long-term treatment for GERD patients [6].

CONCLUSION

Chest pain is an extremely common presentation faced in medical practice by primary providers, internists, emergency medicine physicians, and surgeons. In the majority of cases, a comprehensive medical history will help reach a clue to the diagnosis. The approach of physicians should be centered around not missing life-threatening conditions such as an acute myocardial infarction or a tension pneumothorax. If the etiology of chest pain remains undecided, the patient should be referred to specialist care for further evaluation. Depending on the cause, the outcomes of patients with chest pain may vary.

ACKNOWLEDGMENTS: None

CONFLICT OF INTEREST: None

FINANCIAL SUPPORT: None

ETHICS STATEMENT: None

REFERENCES

1. Pozen MW, D'Agostino RB, Selker HP, Sytkowski PA, Hood WB, Jr. A predictive instrument to improve coronary-care-unit admission practices in acute ischemic heart disease. A prospective multicenter clinical trial. *N Engl J Med.* 1984;310(20):1273-8.
2. Bösner S, Becker A, Haasenritter J, Abu Hani M, Keller H, Sönnichsen AC, et al. Chest pain in primary care: epidemiology and pre-work-up probabilities. *Eur J Gen Pract.* 2009;15(3):141-6.
3. Rusnak RA, Stair TO, Hansen K, Fastow JS. Litigation against the emergency physician: common features in cases of missed myocardial infarction. *Ann Emerg Med.* 1989;18(10):1029-34.
4. Jänig W. Neurobiology of visceral pain. *Schmerz (Berlin, Germany).* 2014;28(3):233-51.
5. Fruergaard P, Launbjerg J, Hesse B, Jørgensen F, Petri A, Eiken P, et al. The diagnoses of patients admitted with acute chest pain but without myocardial infarction. *Eur Heart J.* 1996;17(7):1028-34.
6. Swap CJ, Nagurney JT. Value and limitations of chest pain history in the evaluation of patients with suspected acute coronary syndromes. *Jama.* 2005;294(20):2623-9.
7. Dezman ZD, Mattu A, Body R. Utility of the History and Physical Examination in the Detection of Acute Coronary Syndromes in Emergency Department Patients. *West J Emerg Med.* 2017;18(4):752-60.
8. Shiber JR, Fontane E, Ra JH, Kerwin AJ. Hydropneumothorax Due to Esophageal Rupture. *J Emerg Med.* 2017;52(6):856-8.
9. de Bliëk EC. ST-elevation: Differential diagnosis and caveats. A comprehensive review to help distinguish ST-elevation myocardial infarction from nonischemic etiologies of ST elevation. *Turk J Emerg Med.* 2018;18(1):1-10.
10. Solhpour A, Chang KW, Arain SA, Balan P, Zhao Y, Loghin C, et al. Comparison of 30-day mortality and myocardial scar indices for patients treated with prehospital reduced dose fibrinolytic followed by percutaneous coronary intervention versus percutaneous coronary intervention alone for treatment of ST-elevation myocardial infarction. *Catheter Cardiovasc Interv.* 2016;88(5):709-15.
11. Meyer G. Effective diagnosis and treatment of pulmonary embolism: Improving patient outcomes. *Arch Cardiovasc Dis.* 2014;107(6-7):406-14.
12. Habibi B, Achachi L, Hayoun S, Raoufi M, Herrak L, Ftouh ME. Management of spontaneous pneumothorax: about 138 cases. *Pan Afr Med J.* 2017;26:152.
13. Shokoohi H, Boniface KS, Zaragoza M, Pourmand A, Earls JP. Point-of-care ultrasound leads to diagnostic shifts in patients with undifferentiated hypotension. *Am J Emerg Med.* 2017;35(12):1984-e3.
14. Zhao DL, Liu XD, Zhao CL, Zhou HT, Wang GK, Liang HW, et al. Multislice spiral CT angiography for evaluation of acute aortic syndrome. *Echocardiography (Mount Kisco, NY).* 2017;34(10):1495-9.