

EVALUATION OF CHEST PAIN AS A PRESENTING COMPLAINT WITH ACUTE CORONARY SYNDROME

Nikul K Patel¹, Jay C Patel², Maharshi B Pandya³, Aharnish K Shah⁴

¹ Assistant Professor, Department of Anaesthesiology, Dr. M. K. Shah Medical College and Research Center, Ahmedabad, Gujarat, India

² Assistant Professor, Department of Critical Care Medicine, Dr. M. K. Shah Medical College and Research Center, Ahmedabad, Gujarat, India

³ Assistant Professor, Department of Emergency Medicine, Dr. M. K. Shah Medical College and Research Center, Ahmedabad, Gujarat, India

⁴ Consultant Intensivist, Jivraj Mehta Hospital, Ahmedabad, Gujarat, India

*Corresponding Author: Aharnish K Shah

Abstract

Introduction: An acute coronary syndrome (ACS) needs to be distinguished from a variety of other cardiac and non cardiac diseases that may cause chest pain. The challenge in the ED is not only to identify patients at the highest risk, but also to identify patients with non-urgent diseases. These patients may be discharged immediately with minimal testing or intervention. In addition, this causes the occupation of hospital beds through admission of such patients and associated increase in medical costs.

Aims and Objectives: The aim is to identify the elements of the chest pain history and to assess the likelihood ratio of each symptom in predicting ACS.

Materials and Methods: This cross sectional study was a conducted in the emergency department of VS hospital after getting approval from Institutional ethical committee. Total 500 patients presenting to the emergency department of VS Hospital with chest pain were included. Information was obtained regarding basic characteristics of chest pain, associated symptoms, past medical history, previous medications. Characteristics of ischemic chest pain and non ischemic chest pain were compared using chi square test. P value less than 0.05 was considered as significance.

Results: Of the 500 patients presenting with chest pain to emergency department, 216 patients (43.2%) had ischemic chest pain while the rest 284 patients (56.8%) had non ischemic chest pain. It was found that chest pain is more likely to be due to myocardial ischemia if it is heavy in nature [LR-5.05], retrosternal in location [LR-1.82], radiating to both shoulders [LR-17.09], back [LR-2.007], epigastrium [LR-3.94] or left shoulder +/- left hand [LR-3.39]. Features of chest pain like throbbing in nature [LR- 0.31], burning in nature [LR- 0.39], constricting in nature [LR- 0.41], gnawing in nature [LR- 0.09], pin-pricking in nature [LR- 0.55], stretching in nature [LR- 0.4], right sided chest pain [LR-0.22], epigastric pain [LR-0.4], non radiating chest pain [LR- 0.43], and that associated with local tenderness [LR-0.12] , decreases the likelihood of chest pain being ischemic in nature.

Conclusion: Thus despite the recent advances & technology (bedside 2D ECHO, bedside troponin I measurements etc.), proper history taking is still the most vital component in evaluating and managing chest pain in emergency department. There is a need for spreading awareness in community about early & appropriate consultation for chest pain.

Keywords: Acute coronary syndrome, chest pain, emergency department, ischemia

INTRODUCTION:

Chest pain is one of the most common reasons for patients to present to the emergency department (ED). An acute coronary syndrome (ACS) needs to be distinguished from a variety of other cardiac and non cardiac diseases that may cause chest pain.[1] A variety of other diseases may mimic ACS, such as pleural and pericardial irritations, gastro-intestinal reflux, pulmonary embolism, hyperventilation, musculoskeletal pain and cholecystitis. [2-3] The challenge in the ED is not only to identify patients at the highest risk, but also to identify patients with non-urgent diseases or even the absence of disease. These patients may be discharged immediately with minimal testing or intervention. In addition, this causes the occupation of hospital beds through admission of such patients and associated increase in medical costs.[2] Despite diagnostic advances, missed acute myocardial infarction (AMI) and ACS remain problematic, with estimates ranging between 2% and 10%. [4] Conversely, a large proportion of patients with chest pain who are admitted do not turn out to have ACS. [5] Regarding patients with ACS, the diagnosis is confirmed in the vast majority of cases where significant ECG changes such as STEMI and/or increased levels of myocardial markers in plasma are present. However, absence of such abnormalities doesn't exclude ACS. Therefore, the diagnosis of ACS is felt to be difficult to exclude in the early stage of the diagnostic process. [3]

This study was carried to identify the elements of the chest pain history that may be most helpful to the clinician in identifying ACS in patients presenting with chest pain and to assess the likelihood ratio of each symptom in predicting ACS.

MATERIALS & METHODS:

It was a cross sectional study conducted in the emergency department of VS hospital from 1st April 2012 to 31st March 2013 after getting approval from Institutional ethical committee. Total 500 patients presenting to the emergency department of VS Hospital with chest pain were included with prior written consent. Information was obtained regarding basic characteristics of chest pain, associated symptoms, past medical history, previous medications. Basic investigations like serial ECG, CXR, cardiac specific troponin I (serial estimation when required), haemoglobin etc., if required were ordered & results entered. A provisional diagnosis was made and the treatment given. Patients were observed until disposition.

Cases of chest pain/ discomfort with elevation of ST segment of at least 1mm in limb leads and 2mm in chest leads, in two contiguous electrocardiographic (ECG) leads were categorized as STEMI. Cases of angina at rest without ST segment elevation were categorized as NSTEMI if their cardiac Troponin I (Trop I) levels exceeded 0.4 nanogram/ml and as UA if patients had dynamic and new changes i.e ST segment depression and/or T wave inversion on initial or serial ECG monitoring and even if their Trop I levels were lower. Patients without any of the above mentioned features were diagnosed to have non ischemic chest pain, however consultation with a cardiologist done.

Data was entered in Microsoft excel worksheet and analyzed using trial version of SPSS. Qualitative data was compared using chi square test. Statistical significance was chosen at p value <0.05.

RESULTS

Table 1: Characteristics of patients with Ischemic chest pain and Non ischemic chest pain

Characteristics	Ischemic chest pain (IHD)	Non ischemic chest pain	p value
No of patients (%)	216 (43.2%)	284 (56.8%)	NA
Mean age	53.48 ± 12.10	43.9 ± 10.21	< 0.001
Gender			
Male	181 (83.8%)	164 (57.7%)	< 0.001
Female	35 (16.2%)	120 (42.3%)	
Duration of chest pain			
0-6 hrs	86 (39.8%)	88 (31.0%)	0.008
6-24 hrs	32 (14.8%)	28 (9.9%)	
>24 hrs	98 (45.4%)	168 (59.2%)	

Of the 500 patients presenting with chest pain to emergency department during the study period, 216 patients (43.2%) were diagnosed to have ischemic chest pain (IHD) and 284 patients (56.8%) were diagnosed to have non ischemic chest pain. The mean age of patients presenting with ischemic chest pain was 53.48 yrs. The highest incidence of ischemic pain was in the age group of 56-65 yrs (33.3%), followed by 46-55 yr age group (30.5%). The mean age of patients presenting with non ischemic chest pain was 43.9 yrs. The highest incidence was in 46-55 yr age group (32.4%) followed by 36-45 year age group (26.8%). Proportion of male was higher in ischemic chest pain group (84.3%) as compared to non ischemic chest pain group (57.7%). Patients with chest pain more than 24 hours was higher in non ischemic chest pain group (59.2%) than ischemic chest pain group (45.4%, p – 0.008).

Table 2: Likelihood ratio, p-value, sensitivity, specificity, PPV & NPV of characteristics of pain in patients presenting with chest pain.

Symptom/characteristic	Likelihood ratio	p value	Sn	Sp	PPV	NPV
Type of pain						
Heaviness	5.05	< 0.0001	67.59%	86.62%	79.35%	77.85%
Throbbing	0.31	< 0.0001	5.50%	82.39%	19.35%	53.42%
Burning	0.39	0.0018	5.50%	85.71%	23.08%	54.05%
Constricting	0.41	0.004	5.50%	86.43%	24%	54.26%
Gnawing	0.09	0.0001	0.92%	90.14%	6.67%	54.47%
Pin pricking	0.55	0.04	7.40%	86.62%	29.63%	55.16%
Stretching pain	0.40	0.0004	7%	82%	24	54%
Site of pain						
Retrosternal	1.82	<0.0001	56.48%	69.01%	58. 1%	67.59%
Left side	0.80	0.06	33.33%	58.45%	37.89%	53.55%
Right side	0.22	< 0.0001	2.77%	87.32%	14.29%	54.15%
Back	0.97	1	2.77%	97.18%	42.86%	56.15%
Both side of chest	0.33	0.1991	0.97%	97.18%	20%	56.35%
Epigastric	0.40	0.0191	3.70%	90.82%	23.53%	55.36%
Radiation of pain						

Back	2.01	0.0002	2.68%	86.62%	60.42%	60.89%
Both shoulders	17.09	< 0.0001	12.04%	99.30%	92.86%	59.75%
Epigastrium	3.94	0.04	2.77%	99.30%	75.00%	57.32%
Left shoulder+/- left hand	3.39	< 0.0001	2.87%	91.55%	72.09%	62.80%
Non radiating	0.43	< 0.0001	28.70%	33.80%	24.80%	38.40%
Right side	0.33	0.1991	0.97%	97.18%	20%	56.33%

The typical heaviness type of pain had the highest likelihood ratio [5.05] with sensitivity of 67.59% and specificity of 86.62%. Retrosternal pain had a positive likelihood ratio (LR- 1.82) in predicting ischemic chest pain with sensitivity of 56.48% and specificity of 69.01%. Pain located on right side [LR- 0.22] or in epigastrium [LR-0.40] decreased the probability of it being due to myocardial ischemia. In our study chest pain radiating to both shoulders [LR- 17.09], epigastrium [LR-3.94], left shoulder+/- left hand [LR-3.39], and back [LR-2.007] had a significantly positive likelihood ratio, whereas non radiating chest pain decreased the likelihood [LR- 0.43] of myocardial ischemia.

DISCUSSION

Of the 500 patients presenting with chest pain to emergency department, 216 patients (43.2%) had ischemic chest pain while the rest 284 patients (56.8%) had non ischemic chest pain. This proportion of IHD among chest pain patients is higher as compared to other studies in primary care settings in which incidence was be 17%.[6] It may be because of rising incidence of CAD in India & also because of the fact that our hospital being a tertiary level hospital, we receive a referred & confirmed cases of IHD from primary physicians, for further management.

The mean age of patients presenting with ischemic chest pain was 53.48 yrs. This is significantly lower than the mean age of 60.4yrs, calculated in Keralian ACS registry.[7] It probably reflects the rising incidence of coronary artery disease among young patients. The proportion of ischemic heart disease was significantly higher in male patients presenting with chest pain to ED (84.26%) than females. This is comparable to other Indian studies. [8]

In the present study, the typical heaviness type of pain had the highest likelihood ratio [5.05]. Extensive meta-analyses by Chun and Magee[9] and Panju et al.[10] also determined that typical predictors of pain such as pressure like were associated with positive likelihood ratios of 1 to 2, which are values that are not robust enough to be independently useful in establishing a myocardial infarction (MI) diagnosis. This may be due to subjective nature of pain and the different population cohort.

In the present study, chest pain described as gnawing [LR- 0.09], pinpricking [LR-0.55], constricting [LR- 0.41], stretching [LR- 0.4], burning [LR-0.39] & throbbing [LR-0.31] in nature decreased the probability of chest pain being due to myocardial ischemia. Both Lee et al.[11] and Panju et al.[10] also found that pain described as sharp or stabbing significantly decreased the likelihood of chest pain representing an AMI.

In the present study, retrosternal pain had a positive likelihood ratio (LR- 1.82) for ischemic chest pain. Also pain located on right side [LR- 0.22] or in epigastrium [LR-0.40] decreased the probability of MI pain. This is in contrast to other studies where Everts et al.[12] concluded that a pain location of central or mid chest has little value for predicting AMI. The physiologic explanation for this may be that esophageal pathology typically induces retrosternal pain as well.[13]

In our study chest pain radiating to both shoulders [LR- 17.09], epigastrium[LR-3.94], left shoulder+/- left hand [LR-3.39], & back [LR-2.007] had a significantly positive likelihood ratio, whereas non radiating chest pain decreased the likelihood [LR- 0.43] of MI. Other similar study shows that pain radiation to the shoulder [LR-3.4] or both arms [LR-6], increases the probability that pain is due to AMI. The absence of these features reduces the probability of AMI but does not rule the diagnosis out.[14]

Alexander C et al.[15] included 58 high-quality studies in systematic review. Pain radiation to both arms (specificity, 96%; LR, 2.6 [95% CI, 1.8-3.7]), pain similar to prior ischemia (specificity, 79%; LR, 2.2 [95% CI, 2.0-2.6]), and change in pain pattern over the prior 24 hours (specificity, 86%; LR, 2.0 [95% CI, 1.6-2.4]) are most suggestive of ischemic chest pain.

CONCLUSION

It was found that chest pain is more likely to be due to myocardial ischemia if it is heavy in nature [LR-5.05], retrosternal in location [LR-1.82], radiating to both shoulders [LR-17.09], back [LR-2.007], epigastrium [LR-3.94] or left shoulder +/- left hand [LR-3.39]. Features of chest pain like throbbing in nature [LR- 0.31], burning in nature [LR- 0.39], constricting in nature [LR- 0.41], gnawing in nature [LR- 0.09], pin-pricking in nature [LR- 0.55], stretching in nature [LR- 0.4], right sided chest pain [LR-0.22], epigastric pain [LR-0.4], non radiating chest pain [LR- 0.43], and that associated with local tenderness [LR-0.12] , decreases the likelihood of chest pain being ischemic in nature. Thus despite the recent advances & technology (bedside 2D ECHO, bedside troponin I measurements etc...), proper history taking is still the most vital component in evaluating & managing chest pain in emergency department.

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