

# Ischemic Heart Disease; An Overview of Atypical Presentation & Misdiagnosis

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## Abstract:

Cardiovascular disease is considered to be one of the main causes of death worldwide. The most common cardiovascular disease is ischemic heart disease (IHD). The cause of IHD is coronary blood flow reduction therefore also known as “coronary heart disease”.

Incidence of IHD has been increase worldwide. IHD symptoms and sign range from typical classic chest pain to atypical e.g., epigastric discomfort and seizure. Patients present with atypical picture been misdiagnosed, this lead in delay of providing the appropriate care and treatment which will lead to worse outcomes and even death.

In this review we are aiming to study the different clinical pictures of IHD mainly atypical presentation so patient can be treated earlier. Also, we are studying risk factors associated with IHD so can be managed as long as possible.

**Keywords:** ischemic heart disease (IHD); atypical presentation; coronary heart disease

## Introduction

In order to preserve the constant physiology missions of the heart such as blood supplying to other organs, adequately perfusion of tissues with oxygen. the cardiac muscle continues working like a living machine for power production that reflected in the form of hear rate, different stages of cardiac cycle.etc [1-2].

\_One of the most serious problems of modern times are cardiovascular diseases. Different studies was done in poland show increase age of population along with increase incidence of risk factors for ischemic heart disease, so ischemic heart disease is considered the most common cause of death in poland. According to the World Health Organization (WHO), the number of deaths due to ischemic heart disease will increase from 7,200, 000 in 2002 to 11, 000, 000 in 2020 (3). The incidence of angina pectoris in men between 45 and 54 increases from 2% up to 5% and in 56-74 year-olds grow from 11 to 20%. In women, they are at the level of 0.5-1% and 10-14%, respectively. After the age of 75, the frequency of diagnosing ischemic heart disease is comparable in both genders [3-4].

\_Epidemiological studies show that the elimination of harmful risk factors such as smoking, alcohol abuse, lack of physical activity, unhealthy and irregular nutrition, stress, lack of sleep, influences the behavior of health to a greater extent than genetic factors, quality of medical care or environmental conditions [5].

\_Sex differences exist in the presentation of IHD. Women less often report chest pain and diaphoresis and more often complain of back pain, jaw pain, epigastric pain, palpitations, and lightheadedness; the additional, nonspecific symptoms can mislead both patients and providers. The National Registry of Myocardial Infarction demonstrated that 42% of men vs 31% of women presented with chest pain in the setting of myocardial infarction(6). the VIRGO (Variation in Recovery: Role of Gender on Outcomes of Young AMI Patients) trial, the poorer 1-year outcomes among middle-aged women (age <55 years) were largely attributed to less frequent reporting of typical chest pain [7]. This atypical presentation in women as well as social and behavioral barriers contribute to delays in seeking care, diagnosis, and delivery of appropriate treatment strategies, resulting in worse outcomes.

\_ Age-standardized acute myocardial infarction (AMI) incidence and angina prevalence decreased globally between 1990 and 2010; ischemic heart failure prevalence increased slightly [8]. The global burden of IHD increased by 29 million disability-adjusted life-years (29% increase) between 1990 and 2010. About 32.4% of the growth in global IHD disability-adjusted life-years between 1990 and 2010 was attributable to aging of the world population. 22.1% was attributable to population growth, and the total disability-adjusted life-years were attenuated by a 25.3% decrease in per capita IHD burden (decrease rate). The number of people living with nonfatal IHD increased more than the number of IHD deaths since 1990 but 90% of IHD disability-adjusted life-year in 2010 were attributable to IHD deaths (8).

\_ Cardiovascular disease cause 1 in 6 deaths in US in 2006 and each year about 795,000 people will have stroke (9). Cardiac deterioration occurs in both acute and chronic fashion. Major modifiable risk factors include high lipid value, diabetes, overweight and obesity [9].

Therefore, Cardiac ischemia causes complex interactions between ionic, metabolic and neurohormonal factors with deleterious effects on cardiac cellular electrophysiology. The end result is the induction and maintenance of supraventricular and ventricular tachyarrhythmias, and conduction disturbances. Despite improvements in the management of myocardial infarction, the arrhythmias generated during myocardial ischemia contribute significantly to the morbidity and mortality seen in the peri- and post-infarction periods [10].

### Pathophysiology and epidemiology of cardiovascular diseases

-The cause of cardiac ischemia involves a mix of factors like elevated levels of blood pressure, blood sugar, and cholesterol, and inflammation. When such components affect the arterial walls, they induce leukocytes to adhere, resulting in plaque development. As inflammation continues, muscle cells move inside the walls of the arteries, creating a complex structure. Enzymes known as matrix metalloproteinases (MMPs) play a role, responding to signals like oxidative stress and inflammation. The plaques progress, and cells within them may die, forming a fatty "necrotic" core. Arterial remodeling is now seen as a crucial part of IHD development, challenging the old focus on narrowing. Understanding that plaques often grow outward rather than causing significant narrowing changes how we see the disease. Knowing that substantial plaques can exist without narrowing has implications for understanding heart attacks. In summary, IHD origin involves a complex interplay of risk factors, cellular responses, and inflammation in the artery walls.[1]

### Risk factors of IHD

#### Elevated blood pressure

Heart disease is significantly influenced by elevated blood pressure. Its impact is complex, involving accelerated plaque development, damage to blood vessels, and altered coronary circulation. Lowering blood pressure has a critical effect in reducing the risk of coronary events. Therapeutic strategies targeting blood pressure, enhancing the function of endothelium, and preventing complications contribute to mitigating hypertension's impact on coronary artery disease (CAD).[2]

#### Diabetes mellitus

Diabetes mellitus elevates the chance of developing heart illness, especially ischemic heart disease (IHD). The complex interplay involves mechanisms like coronary stenosis, microvascular disease, ion channels, and genetic variants, especially those related to ATP-dependent potassium channels. Understanding these intricacies is vital for comprehending the pathophysiology of IHD in diabetic individuals.[3]

#### Obesity

Being overweight or obese significantly contributes to (IHD) by means of conventional and unconventional risk variables. Obesity is acknowledged as a separate cardiac disease risk factor, particularly heart vessel disease, and is associated with central obesity in the metabolic syndrome. While epidemiologic studies support the link between excess weight and CHD, the consequences of purposeful weight loss on cardiovascular outcomes in overweight and obese individuals remains an area with limited information.[4]

#### Lipids (Cholesterol and Fats) [5]

##### Low-density lipoprotein and total cholesterol

Similarities in cholesterol levels are seen between men and women until around 20 years of age, after which men experience a more pronounced rise.

- Postmenopausal women could show greater amounts, raising the chance of coronary artery disease.

- Cholesterol-lowering therapy significantly reduces coronary events in both genders.

##### HDL Cholesterol

- HDL levels correlate inversely with the risk of CHD.

- Women generally have higher HDL levels.

- Postmenopausal decrease in HDL may contribute to increased coronary risk in women.

##### Triglycerides

- Elevated triglycerides are connected to an elevated chance of cardiac disease in the coronary artery.

- Females could encounter a greater increase in cardiovascular risk with elevated triglycerides.

##### Apolipoproteins A-I and B

- Both Apo B and Apo A-I are regarded as better markers for CHD risk than traditional lipids.

- They may be better suited for determining cardiovascular risk in either gender.

##### Lipoprotein(a)

- Lipoprotein(a) is an independent CHD risk factor.

- Levels increase after menopause.

- Clinical relevance of gender-related differences in lipoprotein(a) impact requires further investigation.

#### Smoking

Smoking is strongly associated with ischemic heart disease, with smokers facing about twice the risk of non-smokers. The risk increases with the amount of smoking, especially in myocardial infarction. Although the excess risk decreases with age, no significant difference may exist among people who smoke and those who don't, over 60 years old.[6]

#### Family History

The risk of heart disease caused by ischemia is increased by a positive coronary heart disease in the family history in both genders. Women who have had a myocardial infarction in their parents prior to turning 60 years old are at higher risk. While family history is valuable for identifying at-risk individuals, ongoing genetic research may offer targeted prevention approaches.[7]

## Infections

An elevated proportional risk of heart disease is linked to cytomegalovirus (CMV) infection. Despite inconsistencies, meta-analyses support this link. Additionally, survivors of tuberculosis are more common to develop IHD, emphasizing the need for strategies to address IHD in TB survivors.[8][9]

Scientists have looked into whether heart disease has been associated with a stomach bacteria *H. pylorus*, also known as *Helicobacter pylori*. a common reason for passing away in developed countries. Even following twenty-five years of research, it's still unclear if *H. pylori* plays a role, this bacterium triggers the body's immune responses, affecting markers related to heart disease and making blood more likely to clot.

Some think *H. pylori* might cause heart issues through molecular mimicry, but efforts to use antibiotics to prevent heart problems have had mixed results. Additional research is required to understand the connection between *H. pylori* and heart disease.[10]

## Age and gender

Globally, about 1.72% of the population is affected by cardiac ischemia, with men more frequently impacted than women. Incidence starts in the fourth decade, rising with age. Gender and age are crucial factors in understanding global IHD epidemiological trends.[11]

- Risk elements specific to women

Several factors specific to females, such as pregnancy-related conditions, hormonal influences, and age-related changes, contribute to an enhanced risk of cardiac ischemia. Understanding these factors is crucial for tailored preventive strategies in women.[12]

**Different clinical presentation of IHD****stable angina**

Heart pain, known as angina, happens to about half of those with chest pain. It occurs when factors like adenosine, lactate, and H<sup>+</sup> stimulate nerve endings near the heart. People report the pain as being comparable to indigestion and feeling tight, squeezing, or like pressure on the chest. The exact spot where it hurts can vary depending on the individual. Things like exercise, strong emotions, or extreme temperatures can bring on angina. Rest and medications like nitroglycerin can usually make the pain better. It might also come with sweating, paleness, nausea, or a feeling of alarm. Certain patterns, like happening at certain times of the day or getting better with repeated activity, can help diagnose it.[13]

**Unstable angina**

- Unstable angina leads to more than a million hospital visits each year.

- It's part of the wider range known as "acute coronary syndromes," which also includes non-Q-wave and Q-wave heart attacks.

- Symptoms include sudden chest pain at rest, chest pain that's getting worse, or new-onset intense chest pain.

- It happens in different situations and might or might not show up on electrocardiograms.

- Patients often seem alike, making it hard to tell them apart early on.

- Unstable angina usually begins with a crack or break in a plaque, a fatty deposit in the arteries.

- This often occurs in arteries with little blockage, causing complete or near-complete blockage.

- Plaques usually have a fatty center and a fibrous cap, often breaking where stress is high.

- After plaque breaks, blood clotting and platelet gathering occur, starting a chain reaction.

- Platelets release substances that make clotting worse, narrow blood vessels, and create clots.

- Systemic factors and inflammation add to changes in how blood clots.

- Although not central, sudden tightening of coronary vessels might contribute to the instability.

- Another way it happens is when a plaque wears away without breaking, involving rapid growth of muscle cells.[14]

**Atypical presentation of IHD:**

Not everyone with a heart issue experiences classic chest pain symptoms, making it challenging to diagnose and resulting in delays or incorrect treatment. Diabetes and the absence of usual chest discomfort during heart issues are related, with women more frequently experiencing fewer common symptoms compared to men. People with specific heart issues might display different symptoms than those with severe heart attacks. Unusual symptoms are more common in older individuals, irrespective of gender. Those with other health problems like heart failure, kidney disease, lung disease, or stroke may not feel chest pain during heart issues.[15]

\* A 45-year-old guy visited the emergency room eight days after experiencing stomach ache. initially overlooked as a heart problem. Even with odd symptoms and a late visit, further tests revealed a blocked artery. Unusual heart problem A seizure may be the only symptom or there may be no chest pain at all. Certain factors like being a woman, older age, having other health problems, or severe mental illness increase the chances of showing different symptoms. Particular procedures are essential for diagnosing heart problems without chest pain. Sometimes, doctors might miss the diagnosis when symptoms are unusual, the heart test doesn't show typical signs, or they don't catch subtle changes, heart issues without chest pain often don't get diagnosed or treated enough, leading to more problems and a higher chance of death while in the hospital. Understanding the different ways heart issues can show up is crucial for spotting the problem early, taking action on time, and improving patient outcomes.[16]

**myocardial infarction**

Myocardial infarction, frequently identified as a cardiac attack, is a significant health issue characterized by the demise of heart muscle tissue due to inadequate blood supply, representing a prominent global cause of sickness and mortality. ST-elevation myocardial infarction (STEMI) and non-STEMI (NSTEMI) are the two forms of acute myocardial infarction. The revised passage explores the epidemiology, fundamental scientific aspects, and clinical evidence guiding the contemporary treating a sudden myocardial infarction. It underscores the importance of tailored strategies in Countries that are both developed and underdeveloped to enhance outcomes for affected patients, emphasizing the need for comprehensive approaches. Myocardial infarction (MI) pathophysiology involves epicardial coronary artery occlusion by vulnerable plaques, causing about 70% of fatal events. These plaques lead to thrombotic processes, reducing microcirculatory perfusion. Fibrinolytic and antithrombotic therapies target this, and residual epicardial stenoses are managed through revascularization. Vulnerable plaques exhibit signs of inflammation. Platelet hyper-reactivity contributes to thrombotic disease. Infarction can occur without atherosclerosis due to coronary spasm, emboli, or artery dissection. Lifestyle factors play a role, emphasizing modifiable risks like smoking, dyslipidemia, hypertension,

abdominal obesity, and diabetes. Advanced imaging and genetic understanding refine risk assessment for targeted prevention [17]

### Myocardial infarction complications

#### Ventricular septal rupture:

Ventricular septal rupture, occurring in 5 percent of cases of sudden cardiac arrest deaths, typically manifests within the first week. It is linked to complete infarct-related arterial blockage and two-vessel coronary artery disease. It leads to clinically significant right ventricular damage. About 80% of patients suffer a sharp decline in hemodynamics, resulting in over 90% mortality with just using medical treatment. It's imperative to get surgery right away for those with compromised preoperative hemodynamic status. Contemporary diagnostic tools like color flow Doppler and echocardiography offer advantages, expediting diagnosis and management. Streamlining diagnostic processes can enhance survival rates.[18]

#### Papillary muscle rupture:

Papillary muscle rupture, a rare subacute consequence following an acute myocardial infarction, poses a fatal risk without treatment. Because of primary percutaneous coronary intervention, the death rate has dropped. Anterolateral rupture is less common than posteromedial. Dual blood supply minimizes the risk of total blockage of the front papillary muscle., lowering the rupture risk. Admission delay more than 24 hours after AMI is a survival risk. Patients show rapid cardiogenic shock and pulmonary edema. Transesophageal echocardiography (TEE) aids in diagnosis and damage evaluation, especially when transthoracic echocardiography is insufficient. Posterior papillary muscle rupture, affecting both mitral leaflets, requires emergency surgery for mitral valve repair or replacement. Swift diagnosis and intervention are crucial for successful management.[19]

#### Heart failure (HF)

Studies show that the occurrence of heart failure (HF) among individuals hospitalized for acute myocardial infarction (AMI) ranges from 14% to 36%. Killip class, a common HF descriptor, is an accurate indicator of mortality, and emphasizes HF severity. HF can manifest either upon arrival or as they emerge while in the hospital. Studies show a range: 4% presented with HF on admission, 39% developed it during hospitalization (1992- 1996), 13% had HF on admission, 5.6% developed it (1999-2001), and recent data (2007-2011) reveal 12% presented with HF, and 4% developed it. Comorbidities, like atrial fibrillation and hypertensive emergencies, play a role in HF development and management post-MI. [20]

#### Arrhythmias

Arrhythmias following myocardial infarction (MI) are common, and their incidence has reduced during the modern age of reperfusion. Intraventricular accelerated rhythm is linked to reperfusion, occurring in up to one third of STEMI patients. PVCs, or premature ventricular contractions, occur during the peri-infarct phase, may signal cardiac instability and are associated with increased mortality, especially in those with reduced ejection fraction. Ventricular tachycardia that is not sustained (NSVT) within 48 hours of admission for non-ST elevation ACS may not increase sudden cardiac death risk, but longer episodes in the subsequent year correlate with an increased danger. Ischemic ventricular tachyarrhythmias have declined, but VT or VF about forty-eight hours of MI admission is associated with increased short-term mortality. Early and late ventricular arrhythmias (VAs) both contribute to greater within the hospital and long-term mortality. Treatment depends on clinical stability, with pulseless ventricular tachycardia and ventricular fibrillation requiring immediate defibrillation according to ACLS guidelines. In the acute context, antiarrhythmic intravenous medications such as lidocaine and amiodarone can decrease unstable ischemia VAs.[21]

### Management of Ischemic heart disease:

Stable angina: mostly can be managed by lifestyle change

-Smoking cessation

- Regular exercise

-Take anti Ischemic which are equally effective but not reduce mortality or risk of myocardial infarction

First line (B.blocker ).

Second line ( nicoradil vanolazine trimetazidine ) [32-33].

Unstable angina:

-It's a dangerous condition which requires Immediate attention.

-Medical Management with anti-ischemic, aspirin thienopyridine clopidogril is indicated.

Platelet glycoproteins Indicated in high-risk patient undergo (PCI) intervention. but not indicated in lower risk patient.

-Recently there is benefits for catheterization follow by revascularization in high-risk patient and intermediate.

-Lower risk patient should undergo early noninvasive stress testing. [34]

### Discussion

The cause of ischemic heart disease (IHD) is a restricted blood flow to the heart muscle. Because coronary blood flow loss from coronary artery atherosclerosis accounts for about 95% of IHD cases, this illness is sometimes referred to as "coronary heart disease"[35].

-The study's most significant finding is that both young and old patients, particularly those with co-occurring conditions like diabetes and hypertension, frequently have unusual symptoms. The primary merit of this study is in demonstrating that unusual symptoms are frequently observed in both young and elderly patients, particularly in those with co-occurring conditions such as diabetes and hypertension. It is typical for these individuals to arrive without experiencing chest pain or with ambiguous symptoms, which can mislead clinicians and postpone the proper diagnosis. This may lead to a rise in ischemic heart disease morbidity and mortality rates [36]

-Ischemic heart disease, nonspecific chest discomfort, gastrointestinal disorders, musculoskeletal pain, and arrhythmias were the most frequently misdiagnosed initial conditions that were later shown to be AMI. Rather than an unusual presentation, misdiagnosis may be caused by improper interpretation of an ECG or by neglecting to request the necessary diagnostic testing. Hospitals with a low percentage of patients with classical chest pain who later developed AMI and those located in rural areas were more likely to overlook AMI cases.(37)

-Unfortunately, misdiagnosed AMI occurs often in clinical practice. However, the number of misdiagnosed IHD may be decreased with improved training in ECG interpretation and awareness of unusual IHD presentations (.37)

-Therefore, despite extensive prevention, there is a conflict between the patient's continued recommendations and the current guidelines. Effective communication between healthcare professionals and patients suffering from ischemic heart disease. coupled with an emphasis on education, serves as a fundamental assurance of therapeutic success, ultimately impacting health, social, and economic domains (35).

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