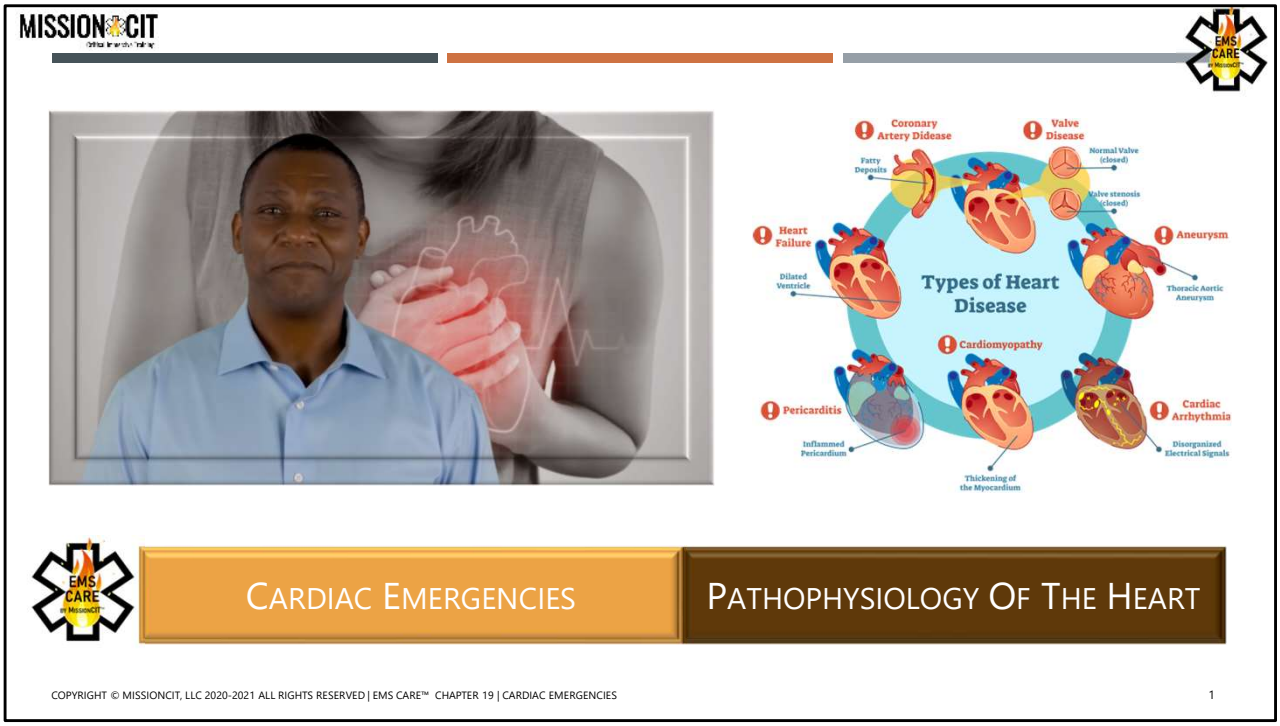


Thank you Missah!

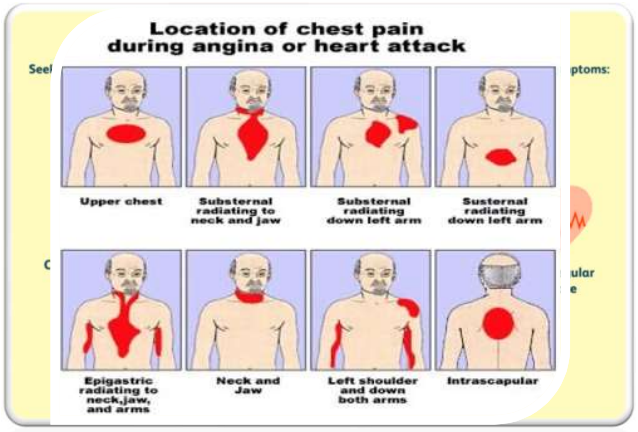
In this second lesson, we discuss the pathophysiology of the heart. Content includes Atherosclerosis, Thrombo-embolism, Coronary Artery Disease, ending with a discussion on Aortic Aneurism

So, let's get started!

MISSION CIT

CHEST PAIN

- When the heart does not get enough oxygen-rich blood
- Types: Stable angina, unstable angina, variant angina and microvascular angina
- Other causes: Pulmonary embolism, aortic dissection, lung infection, panic attack, heart muscle, and inflammation of tissues
- Accompanied by shortness of breath, dizziness, fatigue, anxiety, and chest pressure



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When your heart muscles do not get enough oxygen-rich blood, it leads to discomfort, or chest pain.

It occurs like a squeeze or pressure, and can spread to the neck, arms, and shoulders as well.

This chest pain is also called angina, and the most prevalent ones are:

Stable angina or angina pectoris, that occurs due to coronary heart disease.

The next one is, Unstable angina which is an acute coronary syndrome, occurring due to blood clots.

Variant or Prinzmetal angina, is caused due to spasms in the coronary arteries.

And Microvascular angina, is due to coronary microvascular disease, that impacts the smallest arteries of the heart.

Besides these reasons, chest pain can also occur due to,

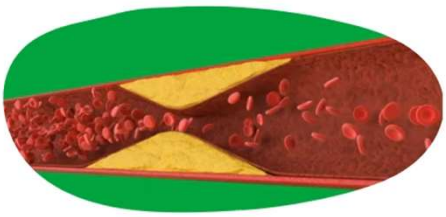
- Pulmonary embolism,
- Aortic dissection,
- Lung infection,
- Panic attack,
- Inflammation of tissues in the heart,
- and Heart muscle disease

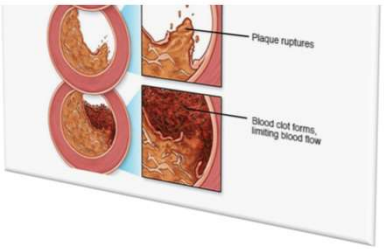
This chest pain is often accompanied by shortness of breath, dizziness, fatigue, anxiety, and chest pressure.

ATHEROSCLEROSIS

- Build-up of fat, cholesterol, and plaque
- Restricts the flow of blood
- Can occur in any part of the body
- No symptoms for mild condition
- Chest pain and a feeling of pressure – Moderate and severe symptoms
- Treatable and preventable







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Atherosclerosis, refers to the build-up of fat, cholesterol, and plaque in your arterial walls, that block the smooth flow of blood through it.

This condition, also results from a hardening of the arterial walls.

Though it can occur in any artery in your body, it is commonly associated with the heart.

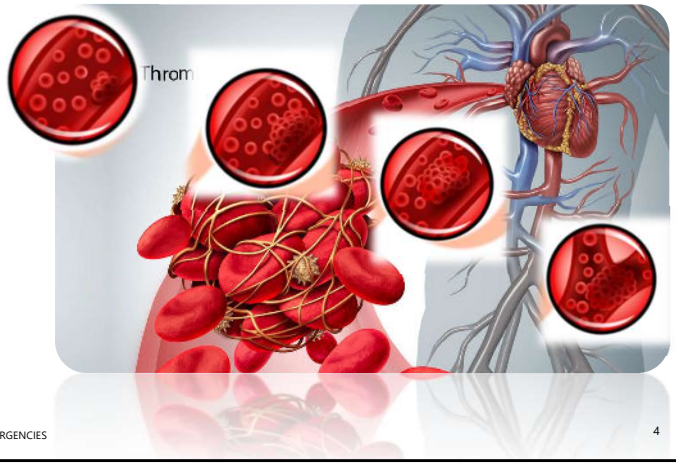
Mild conditions present no visible symptom, while moderate to severe stages, are result in chest pain and a

feeling of pressure in the heart.

This condition is treatable, and also preventable with a healthy lifestyle.

THROMBOEMBOLISM

- Clot that originates in one part of the body and travels to another
- Blocks the flow of blood
- VTE originates in a vein and travels to the heart
- Causes heart attack and stroke
- Triggers: cancer, surgery, immobilization, and hospitalization



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Thromboembolism, commonly refers to a clot, that originates from one part of the body and travels to the other, thereby blocking the flow of blood at the destination.

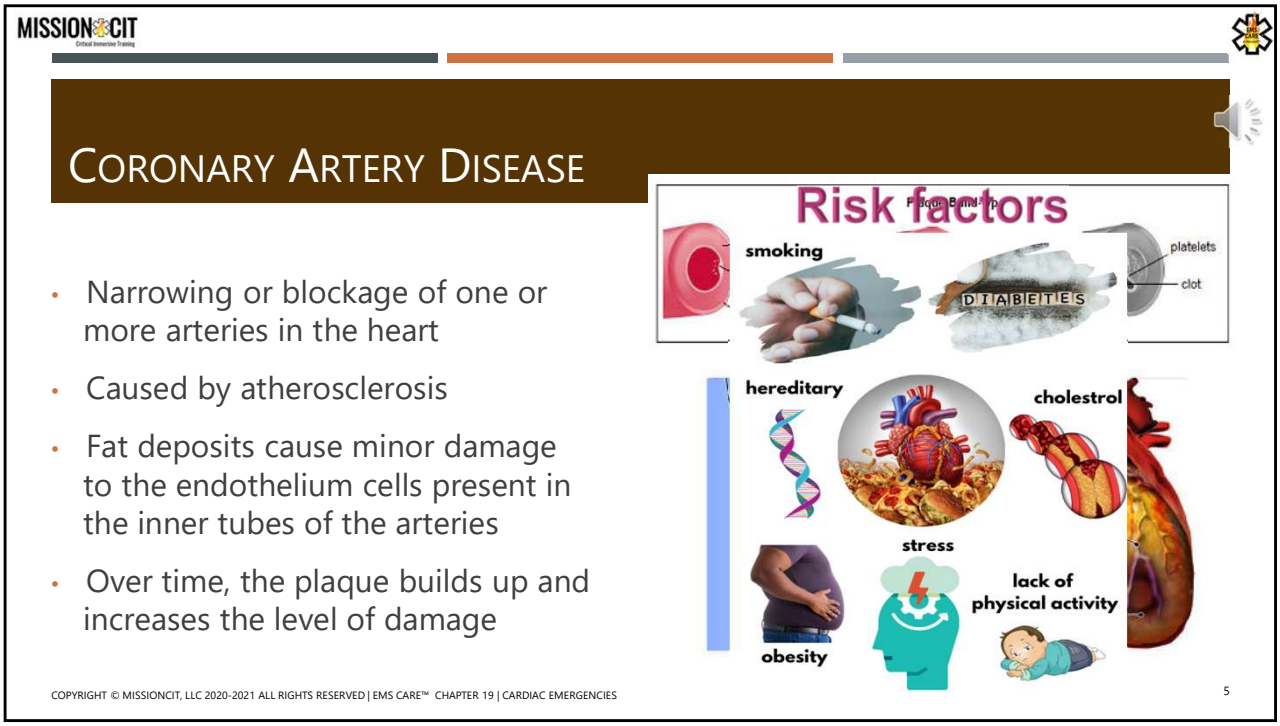
Venous Thromboembolism or V T E, in short, is a blood clot that originates in the vein and travels to the heart, thereby causing heart attack and stroke.

In fact, it is the third leading cause of death in the United States.

The common triggers for V T E are cancer, surgery, immobilization, and hospitalization.

It can, in particular, affect older people, those who are obese, people who have cancer or other autoimmune diseases, and people whose blood is thicker than normal.

Genetic factors are also believed to have a role in V T E.



Coronary artery disease is the narrowing, or blockage of one or more arteries in the heart.

It is mostly caused by atherosclerosis, where plaques, block the flow of blood.

Heart muscles tend to be smooth, and elastic.

The inner tubes are lined with endothelial cells, that keep the arteries working properly, so blood can flow through them.

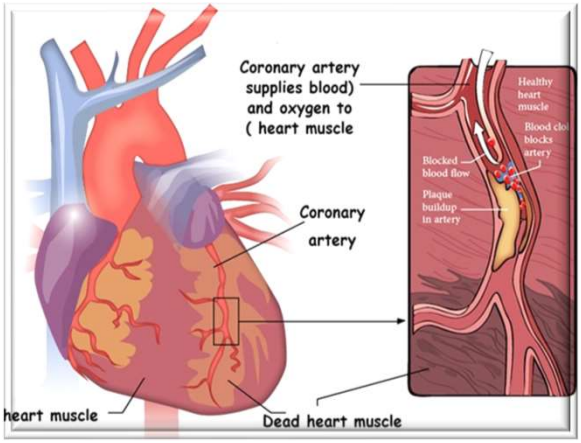
But, over time, fat deposits cause minor damage to these walls.

With time, the size of the plaque, and its level of damage, increases.

A healthy lifestyle is the best way to prevent this condition.

Acute Coronary Syndrome

- Sudden changes or blockage to the heart
- Caused by plaque rupture or clot formation
- Symptoms
  - ✓ Chest pressure
  - ✓ Shortness of breath
  - ✓ Dizziness
  - ✓ Nausea
  - ✓ Sweating
  - ✓ Pain or discomfort in neck, jaws, and shoulders
- Emergency and the patient requires medical help



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The acute coronary syndrome occurs due to sudden changes or blockages of blood flow to the heart. It is most often caused by plaque rupture or clot formation in the arteries of the heart.

The symptoms include,

- Chest pressure
- Shortness of breath
- Dizziness
- Nausea
- Sweating
- And also, Pain or discomfort in one or both arms,

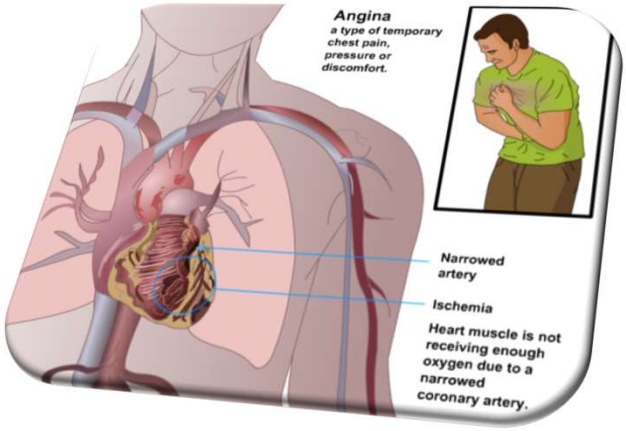
neck, jaw, and shoulders

This is an emergency and the patient requires immediate medical treatment.

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ANGINA PECTORIS

- Chest pain due to coronary heart disease
- Heart doesn't get enough blood
- Symptoms
  - ✓ Breathlessness
  - ✓ May feel like indigestion
  - ✓ Lasts for five minutes or less
- Triggers: Stress, exposure to hot or cold temperatures, heavy eating, and smoking



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Angina pectoris, is the chest pain that occurs due to coronary heart disease. It occurs when the heart, does not get enough blood, due to a narrowed or blocked artery.

The symptoms of angina pectoris are:

Breathlessness during physical exertion, or any other time, when the heart has to work harder,

Lasts for five minutes or less,

It is Relieved by rest or medicine,

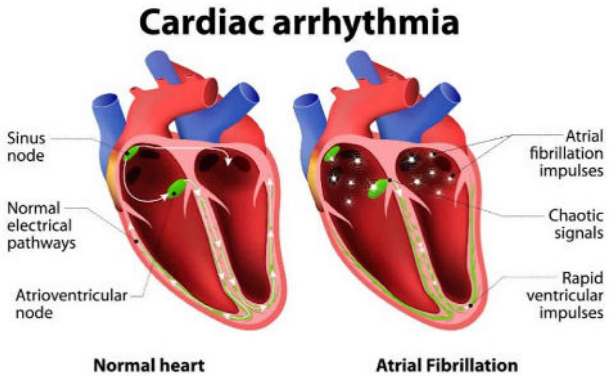
It May feel like indigestion,

The possible triggers include stress, exposure to very hot or cold temperatures, heavy eating, and smoking.

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DYSRHYTHMIA

- Abnormal heartbeat
- Life: threatening if the heart is unable to pump blood
- Causes : heart disease, electrolyte imbalance, changes to the heart muscle, injury from heart attack, recovery after surgery
- Symptoms: Chest pain, dizziness, fainting, palpitations, pounding in the chest, shortness of breath, and fatigue



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Dysrhythmia, also called arrhythmia, is the abnormal heartbeat rhythm of your heart. In this condition, your heart can beat slower or faster than normal, and can sometimes even be irregular.

It is a life-threatening situation, especially if the heart is unable to pump sufficient blood to the rest of the body.

The causes of dysrhythmia are:

- Heart disease
- Electrolyte imbalance
- Changes to the heart muscle

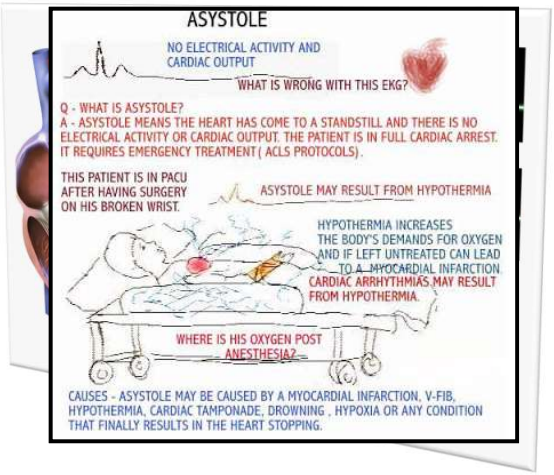
- Injury from a heart attack
- The healing duration after heart surgery.

Some of the common symptoms of this condition are:

- Chest pain or tightness
- Dizziness
- Fainting
- Palpitations
- Pounding in the chest
- Shortness of breath
- Weakness or fatigue

ASYSTOLE

- Most serious cardiac disease
- Cessation of electrical activity in the heart
- Lower chambers don't beat effectively and hence, no blood is pumped out
- Caused by ventricular defibrillation, pulseless ventricular tachycardia, and pulseless electrical activity
- Less than 2% survive



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Asystole, is the most serious cardiac disease, as it refers to the total cessation of electrical activity in the heart.

it is referred to as cardiac flatline, because of the straight line that is displayed in the E C G.

It is caused, by a defect in the heart's electrical system, due to which there are no signals from the ventricles.

As a result, the lower chambers don't beat effectively, and this prevents the blood from getting pumped to the rest of the body.

There are three conditions that most commonly lead to

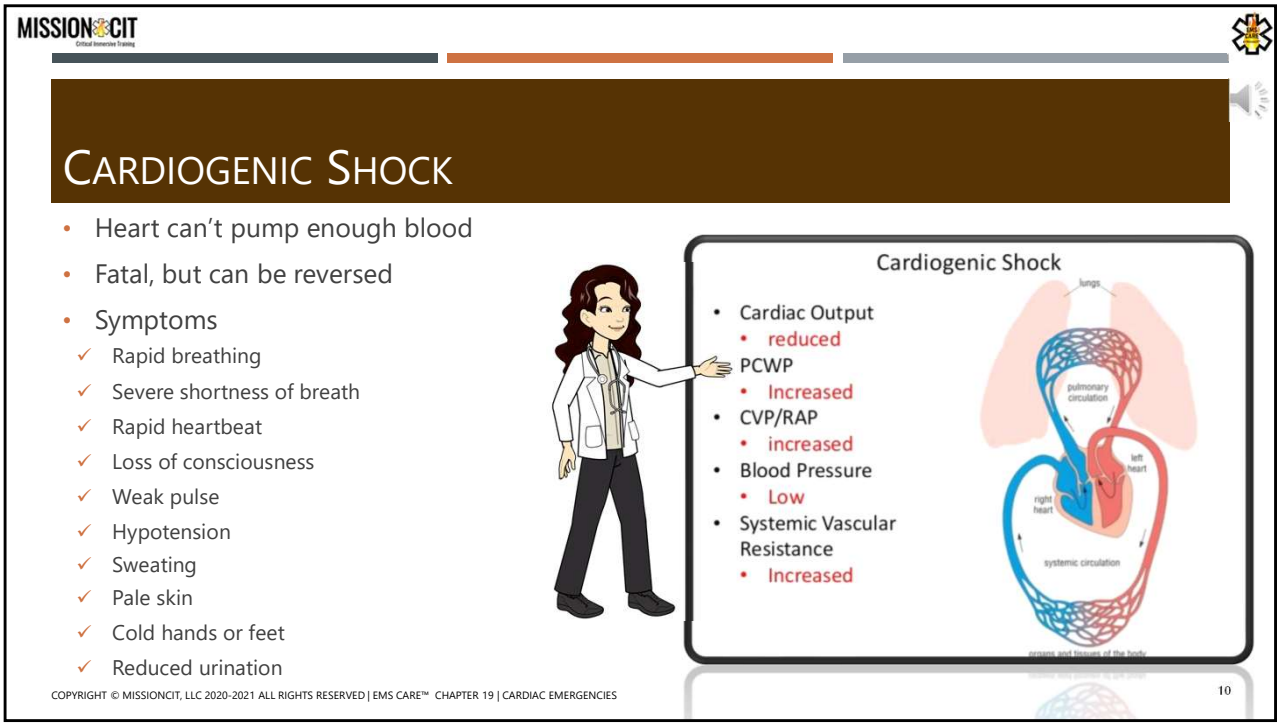
asystole. They are:

1. Ventricular fibrillation, where the lower chambers tremble, and don't contract normally. This can cause death within a few minutes.

2. In pulseless ventricular tachycardia, the heart beats so fast, that it can't pump blood. This is also life-threatening if it lasts for more than a few seconds.

and the third kind is the pulseless electrical activity, where the heart has a pulse, but it doesn't pump normally. This can turn into asystole, any minute. The other conditions include low oxygen in the body, too much or too little potassium, low body temperature, air pressure or fluid build-up in the lungs, blood clot in the heart or lungs, and poisons in the body.

In general, less than 2% of people survive asystole. C P R, and epinephrine are the best emergency treatments.



Cardiogenic shock, is a condition in which your heart suddenly can't pump enough blood.

It is often caused by a severe heart attack.

It is fatal, but can be reversed with timely intervention.

The symptoms of cardiogenic shock are:

Rapid breathing,

Severe shortness of breath,

Rapid heartbeat,

Loss of consciousness,

Weak pulse,

Hypotension,

Sweating,

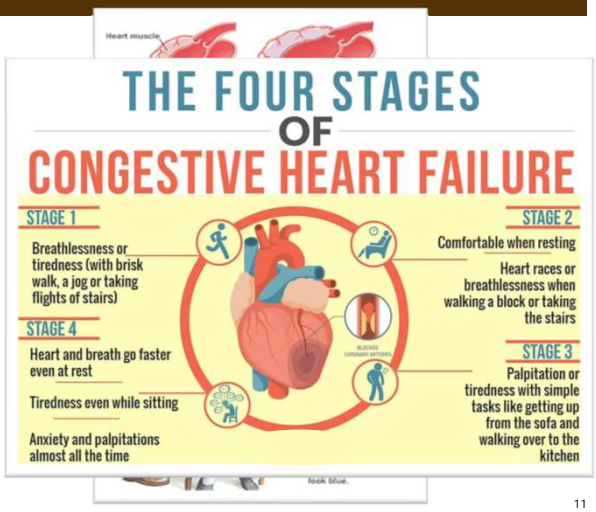
Pale skin,

Cold hands or feet,

and reduced urination

Congestive Heart failure

- Life-threatening condition
- Causes fluid to build-up and prevent the heart from pumping efficiently
- Symptoms
  - ✓ Rapid Breathing
  - ✓ Fatigue
  - ✓ Swelling
  - ✓ Weight gain
  - ✓ Increased need to urinate
  - ✓ Irregular heartbeat
- Symptoms
  - ✓ Cough
  - ✓ Wheezing
  - ✓ Shortness of breath
  - ✓ Blueish skin
  - ✓ Fainting
  - ✓ Rapid breathing
  - ✓ Chest pain



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Congestive Heart Failure, is a chronic progressive disease that impacts the ability of your heart, to pump blood.

Typically, it refers to the stage, where the fluid builds up in your heart, and causes it to pump inefficiently.

This is a life-threatening condition, as it can eventually cause fluid to build up in other organs, such as the lungs and liver.

The symptoms of this condition are:

Fatigue,

Swelling,

Weight gain,

Increased need to urinate,

Irregular heartbeat,

Cough,

Wheezing,

Shortness of breath,

Blueish skin,

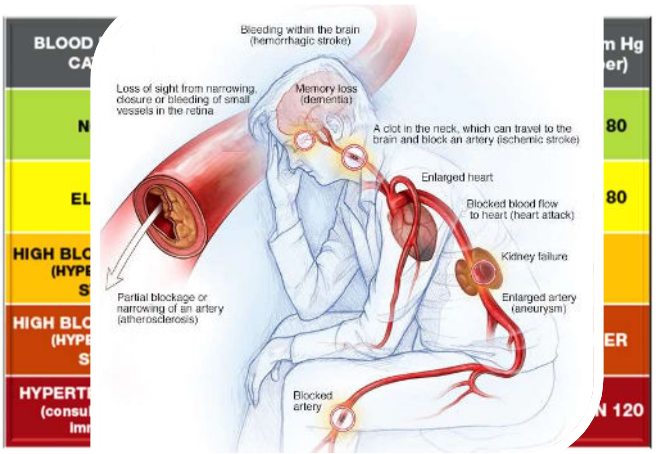
Fainting,

Rapid breathing,

Chest pain

Hypertensive Emergencies

- Severe increase in blood pressure
- Leads to stroke and organ damage
- Causes fluids to leak out
- Symptoms
  - ✓ Severe chest pain
  - ✓ Severe headache followed by confusion and blurred vision
  - ✓ Nausea and vomiting
  - ✓ Severe anxiety
  - ✓ Shortness of breath
  - ✓ Seizure
  - ✓ Unresponsiveness



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A hypertensive emergency, is a severe increase in blood pressure, that can lead to a stroke.

It can also cause the fluid to leak out of the arterial walls, because of the sustained high pressure.

Hypertensive emergencies can be urgent, or an emergency.

If there are no damages to the organs, it is considered urgent,

but if there is damage to the organs, it is life-threatening and hence, an emergency.

The life-threatening symptoms include,

Severe chest pain,

Severe headache, accompanied by confusion and blurred vision,

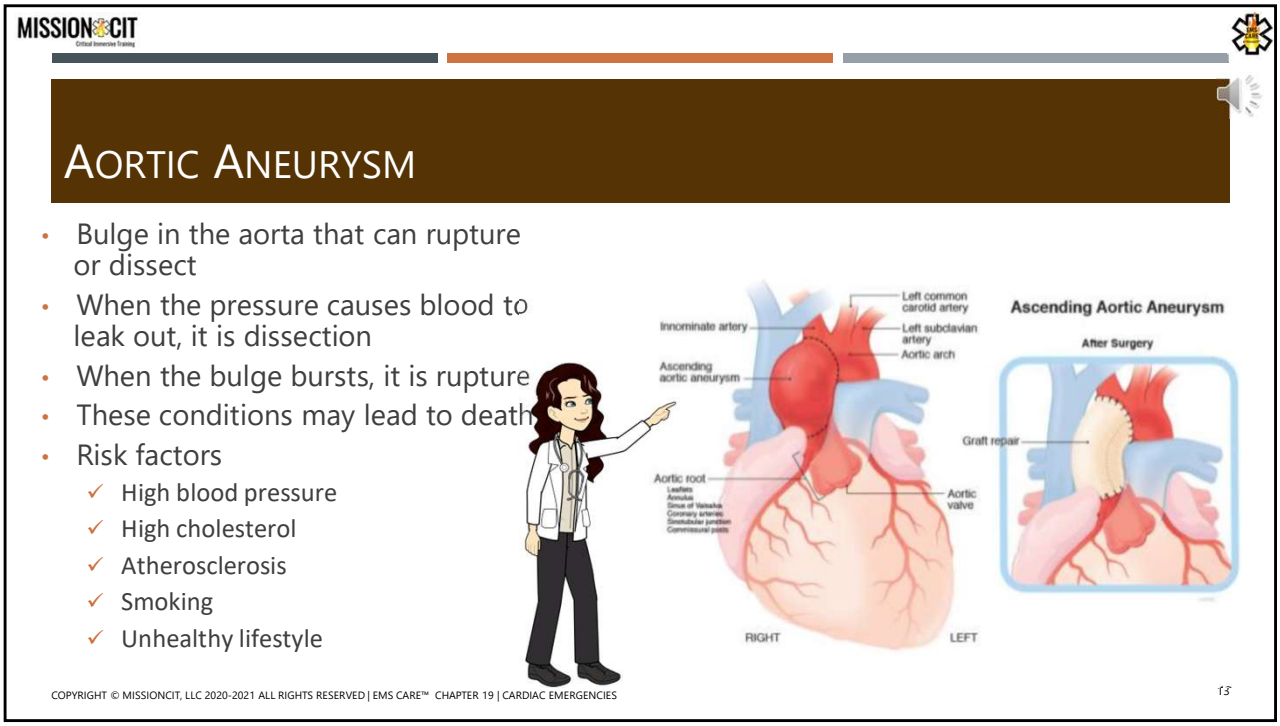
Nausea and vomiting,

Severe anxiety,

Shortness of breath,

Seizures,

Unresponsiveness,



An aortic aneurysm is a bulge in the aorta that can rupture or dissect.

When the blood's force splits the arterial walls' layers and allows the blood to leak out, it is called dissection. On the other hand, when the aneurysm bursts inside the heart, it is called a rupture. These conditions may lead to death.

The risk factors for an aortic aneurysm are:

- High blood pressure
- High cholesterol

- Atherosclerosis
- Smoking

And an Unhealthy lifestyle

With this, we come to the end of this lesson. In the next one, Missah will talk about how to care for patients during cardiac emergencies.