



TRANSITION SERIES  
**TOPICS FOR THE EMT**

TOPIC **26**  
**Cardiovascular Emergencies:  
Hypertensive and Vascular  
Emergencies**

ALWAYS LEARNING

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## Objectives

- Review frequency of hypertensive and other vascular emergencies.
- Understand pathophysiology of vascular diseases.
- Compare and contrast various conditions.
- Discuss assessment findings and management for vascular emergencies.

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Discuss objectives.



# Introduction

- Cardiovascular disease results in multiple pathologies.
- Previous topics dealt with the effects on the heart; now discussion is on blood vessels.
- Emergencies relating to blood vessels, although less frequent, can create the same degree of urgency.

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In this topic, the focus is on three different emergencies that are caused by cardiovascular disease specifically as it affects the vascular system.

These diseases are:

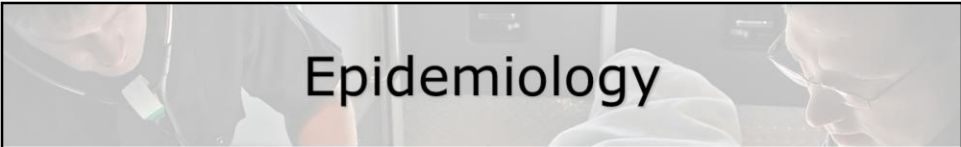
- Hypertensive emergency
- Aortic dissection
- Aortic
- 

Any of these three conditions, if left untreated, can lead to:

- Rapid deterioration
- Death of the patient

This underscores the importance of the EMT understanding of these specific medical conditions:

- Pathophysiology
- Presentation
- Management



## Epidemiology

- 40,000 people in U.S. have hypertension.
- Only 68% are aware they have hypertension, and only 58% receive medical care for it.
- 15,000 people die each year from aortic aneurysm.
- Aortic dissections occur twice as often as aneurysms and are more fatal.

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Discuss frequency.

## Pathophysiology

- Genesis for all vascular diseases starts with lifestyle.
- Chronic damage to blood vessels causes hypertension, and can weaken the vessels as well.
- Often the disease progression goes on unnoticed until a catastrophic vascular event occurs.

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The genesis for almost all diseases of the arteries starts with cardiovascular risk factors.

Because of lifestyle choices (such as diet, smoking, inactivity) genetics (gender, ethnicity, concurrent disease states), and age (risk increases with age), cardiovascular disease and damage to the intimal layers of the large blood vessels develop slowly, often insidiously, without clinical presentation until a catastrophic event, such as a ruptured aneurysm or hypertensive crisis, occurs.

# Pathophysiology

- Hypertensive emergency
  - Hypertension is common, but hypertension emergencies are rare
  - Defined as systolic >160 mmHg and/or diastolic >100 mmHg
  - Types include primary and secondary hypertension
  - Typically a constellation of findings accompany a hypertensive emergency

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Hypertension occurs for the same basic reason as other cardiovascular disease (damage to blood vessels, loss of elasticity, narrowing of vessel lumen).

As blood pressure rises, it starts to wear on other body systems until an “event” occurs from the hypertension (e.g., MI, stroke, seizure).

Primary hypertension does not have an identifiable cause, but the patient will probably be taking medications for it.

Secondary hypertension comes from failure of some other organ system, for example a patient with renal disease or endocrine disorders may have an associated rise in blood pressure.

# Pathophysiology

- Aortic aneurysm (thoracic and abdominal)
  - Weakening of vascular layers
  - Due to arterial pressure, the damaged blood vessel start to bulge
  - If rupture occurs, hemorrhage of arterial blood results in hypovolemia, poor systemic perfusion, organ failure, and death

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A generally accepted definition of an aortic aneurysm is a focal spot that dilates greater than 50 percent of normal diameter.

Clinically speaking, however, given the size of the aorta, a focal dilation of 3 cm or greater is also a commonly accepted definition of an aortic aneurysm.

The most disastrous clinical manifestation of an aortic aneurysm is a rupture.

When this event occurs, it allows arterial blood to spill into the mediastinum, retroperitoneum, or abdominal cavity (depending on the aneurysm site), rapidly leading to an internal hemorrhage that results in:

- Hypovolemia
- Poor systemic
- Perfusion
- Organ failure
- Death

# Pathophysiology

- Aortic aneurysm
  - More common in abdomen than thorax

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Discuss pathophysiology of development and results of rupture.

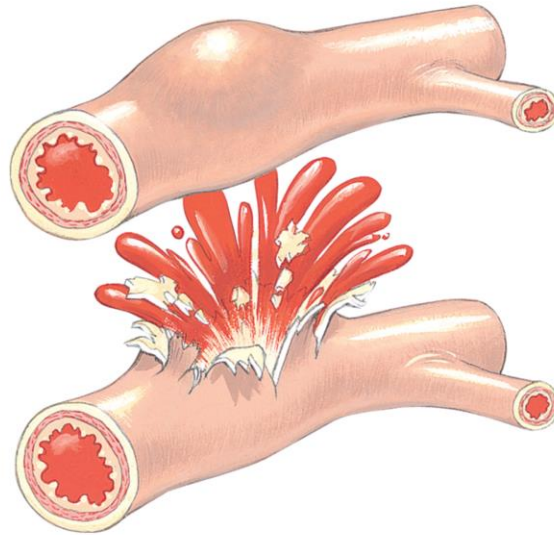
A generally accepted definition of an aortic aneurysm is a focal spot that dilates greater than 50 percent of normal arterial diameter.

Clinically speaking, however, given the size of the aorta, a focal dilation of 3 cm or greater is also a commonly accepted definition of an aortic aneurysm.

Abdominal aorta is more susceptible to this as the aorta is “weaker” (fewer elastin fibers in the abdomen and thinner muscular layer).



**Figure 26-1** A weakened area in the wall of an artery will tend to balloon out, forming a saclike aneurysm, which may eventually burst.



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# Pathophysiology

- Aortic dissection
  - Tear to the intimal layer
  - Arterial blood splits through muscular layer
  - Dissection results in “false lumen”
  - Deranged perfusion to organs

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Dissection occurs when there is damage and a tear to the intimal layer.

Arterial blood then starts to split the intimal wall from the muscular wall of the blood vessel resulting in a “false passage” that prevents normal blood flow to the organs.

Typically occur to the ascending aorta or descending aorta.

Tears in the ascending aorta may dissect frontward or backward and is a surgical emergency.

Descending aorta dissections are also an emergency, but are usually treated pharmacologically first unless surgery is the only option.

## Assessment Findings

- Not all chest pain is cardiac in nature
  - Look for known hypertension or aneurysms in patient history
  - Uncontrolled use of nitro can be detrimental to patients with vascular emergencies

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Stress that the EMT must remain aware of the patient's entire clinical picture.


Not all chest pain is cardiac just as not all wheezing is asthma.

Avoid the pigeonhole approach to treatment.

**TABLE 26-2** Assessment Findings of Aortic Aneurysm and Aortic Dissection

	Aortic Aneurysm	Aortic Dissection
<b>Pain location</b>	Primarily abdominal	Primarily thoracic
<b>Vital signs</b>	Tachycardia and hypotension with rupture	Tachycardia or bradycardia, hypertension, pulse deficits
<b>Important clinical symptoms</b>	Clinically silent till rupture, abdominal fullness, abdominal pulsations, back pain	Sharp, "tearing" chest pain, pulse deficits, neurologic dysfunctions





## Assessment Findings

- Hypertension
  - Strong bounding pulse
  - Severe headache
  - Ringing in the ears
  - Nausea, vomiting
  - Elevated blood pressure
  - Dyspnea, possible chest pain
  - Seizures or focal neuro deficits

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With patients who have a history of hypertension, a high blood pressure reading may well be normal for them.

Therefore, always attempt to find out the patient's normal blood pressure before interpreting the significance of the current blood pressure.

If however, the patient has a blood pressure that is significantly higher than their normal pressure, consider the findings to be related to the hypertension.



## Assessment Findings

- Aortic aneurysm
  - May be asymptomatic till rupture
  - Possible pulsatile mass in abdomen
  - Back pain, flank pain, abdominal pain
  - Diminishment in distal pulses of legs
  - Triad of “pain, hypotension, mass”

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Aortic aneurysms may remain asymptomatic indefinitely, meaning that they are clinically silent until they rupture.

Once an aneurysm reaches about 5 cm in size, there is a high risk of rupturing; however, some aneurysms may reach more than 15 cm in diameter before rupturing.

## Assessment Findings

- Aortic dissection
  - Severe “sharp” and “tearing” chest pain
  - Anterior location is often ascending dissection
  - Posterior location is often descending dissection
  - Hypertension often present
  - Pulse pressure differences in upper arms
  - Mental status changes, stroke-like symptoms

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Occasionally the pain from a dissection may be confused with the pain of either myocardial ischemia or infarction.

Dissections, however, are not commonly associated with the other clinical findings consistent with an acute coronary syndrome, such as congestive heart failure, diaphoresis, and changes to the electrocardiogram, except that in some cases the dissection may dissect proximally and occlude the coronary arteries, leading to a myocardial infarction.



## Emergency Medical Care

- Ensure an open airway
- Provide supplemental oxygen
- Position the patient (consider blood pressure)
- Ensure rapid transport to the ED

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In the prehospital setting, the delineation between patients with a vascular emergency versus some other pathology caused by cardiovascular disease may be difficult to make without additional diagnostic tests available only in the emergency department.

As such, the EMT may find themselves treating multiple abnormal pathologies.

Regardless, always remember to support lost functions to the components in these patients:

- Airway
- Breathing
- Circulatory





## Case Study

A patient presents to you with severe chest pain. “A pain,” he states, “I’ve never felt Before.” He says it feels like someone is “ripping” his chest off the front of him. The patient was located at his desk at work where he is an accountant. “It started suddenly.....and keeps ripping,” he adds.

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Present case study.



## Case Study

- Scene Size-Up
  - Standard precautions taken
  - Middle-age male, 290 pounds, appears to be in distress from pain
  - No sign of struggle or trauma
  - Patient located on 2nd floor of business
  - NOI is chest pain
  - No additional resources needed

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Present case study.



## Case Study

- Primary Assessment Findings
  - Patient alert, responds appropriately
  - Complains of “tearing” chest pain in the front of his chest
  - Airway patent with clear speech pattern
  - Breathing tachypneic, breath sounds present
  - Peripheral perfusion intact, radial pulse tachycardic and weak

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Present case study.



## Case Study

- Is this patient a high or low priority? Why?
- Why is the pulse tachycardic?
- What is different from this chest pain and traditional ACS chest pain?

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The patient could probably be considered a “stable but potentially unstable” patient at this time since there are no gross disturbances to vital functioning (airway, breathing, circulation). However, a patient though with any type of chest pain could rapidly deteriorate into cardiac arrest.

Tachycardia is secondary to sympathetic discharge, which is being stimulated in part due to severe pain, and possible changes in:

- Blood pressure
- Cardiac output (as detected by baroreceptors)

This patient's chest pain is “tearing” and its anterior radiation suggests a pathology that is not cardiac in nature.

A further assessment of the patient's history and physical exam is warranted to refine the differential diagnosis any further.



## Case Study

- Medical History
  - Hypertension and hypercholesteremia
- Medications
  - Hydrochlorothiazide
  - Lipitor
- Allergies
  - None known

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Discuss case study.



## Case Study

- Pertinent Secondary Assessment Findings
  - Patient alert and well oriented
  - Airway and breathing intact
  - Pulse to left wrist notably weaker than right
  - Pulse oximeter reads 94% on room air

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Discuss case study.



## Case Study

- Pertinent Secondary Assessment Findings
  - Never had chest pain before of any type
  - Skin cool and clammy, moist
  - B/P 180/104, Pulse 122, Respirations 24
  - Patient's vision in one eye diminishing

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Discuss case study.



## Case Study

- What would be your differentials for chest pain in this patient?
- What is your final differential for this patient?
- Why would this patient be prescribed these medications by his physician?

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For this type and severity of chest pain, differentials would include:

- Ischemia
- Infarction
- Dissection
- Thoracic aneurysm
- Musculoskeletal
- Pulmonary

Final differential would be ascending dissection because:

- Of the type of pain
- The radiation of the pain
- The changes in pulse amplitude from one arm to the other
- The subtle changes in vision

This collection of findings is not consistent with any other etiology of chest pain.

The patient is on medications designed to lower their blood pressure (history of HTN), and lower their cholesterol.





## Case Study

- Care provided:
  - Positioning maintained
  - High-flow oxygen administered by nonrebreather mask
  - ALS intercept initiated
  - Patient packaged and transported in ambulance

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Discuss care rendered.



## Case Study

- What would be the likely assessment findings should the patient continue to deteriorate despite treatment?

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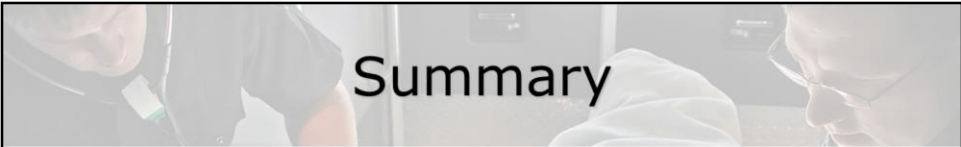
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Worsening of the following:

- Mental status
- Blood pressure
- Pulse oximeter
- Breath sounds
- Chest pain
- Skin characteristics

If dissection is cause, the patient would probably develop abnormal heart tones and rapid onset of pulmonary edema and death (if the ascending dissection propagates backwards, it causes the aortic semilunar valve to fail which then causes blood to back up into the left atria and lungs).



## Summary

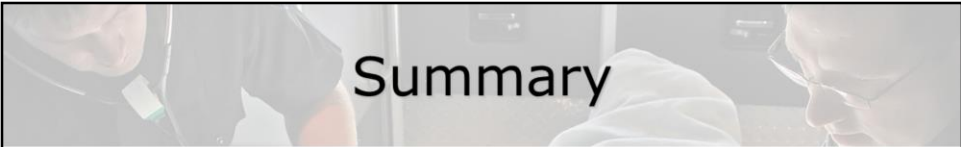
- Vascular emergencies often do not present themselves until a catastrophic organ failure occurs.
- The patient may present initially stable, but suddenly decline into cardiac arrest without prompt intervention.

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Review as appropriate.



## Summary

- Goal is to recognize early the disturbance and transport efficiently to improve patient outcomes.

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Review as appropriate.