

# Peripheral Artery Disease

Tony Berardi

## 1. What is the pathophysiology?

- Think coronary artery disease. This is the same concept, atherosclerosis, or plaque build up, accumulates in the peripheral arteries. The legs are usually affected. The thrombus (occlusion) will sever the blood flow to the legs and this will lead to decreased functional capacity, decreased QOL, and limb dysfunction obviously.
- So it starts with the normal process of atherosclerosis with damage to the endothelium. This is called endothelium dysfunction. The rate of damage depends on the percentage of stenosis present (how much the arteries narrow) and the effect on the flow velocity of the blood. The biggest symptom is called intermittent claudications, and this is pain in the legs upon exercise, and is caused by the ischemia from the plaque buildup. This is a late stage of the process, so if you have this, its' pretty advanced

## 2. What are the risk factors for PAD?

- Smoking is the biggest modifiable risk factor for PAD or most cardiovascular and pulmonary diseases actually. Dylipidemia is one, because of this is just atherosclerosis in the legs instead of the heart like we have learned last exam. Type two diabetes and hypertension also raise ones risk. Age, gender, and race also predispose one.
- To go into more detail about why you should never smoke or stop smoking, it basically kills you slowly. It is a vasoconstrictor, increases platelet aggregation, promotes oxidation of LDL and CHL, and lowers lung function. All of these, minus the lung, increase risk for atherosclerosis. And lower lung function also sucks

## 3. What are the signs, symptoms, and how do you make the diagnosis for PAD?

- To spot an individual with PAD you have to look for obviously discomfort, but early fatigue with walking, and the absence of a pulse in the femoral or popletal artery. There will be an absence of a pulse because the plaque will occlude the artery. There are 4 possible "grades" of the disease
  - Grade 0 is asymptomatic.
  - Grade 1 is when the intermittent claudications start
  - Grade 2 is ischemia at rest also
  - Grade 3 is minor or major foot pain/tissue loss.
- To make the diagnose one has to look at a clients ankle to brachial index. This is the ratio between ankle pulse and the branchiel pulse. Normally this value will be high and it will decrease with the severity of the blockage.
  - Less than .95 means there is narrowing of at least one vessel in the leg.
  - Less than .8 signifies pain in leg with exercise (intermittent claudications)

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- Less than .4 means that the claudication can happen at rest
- Less than .25 means you are fucked. Amputation is possible

4. What are the management and medication?

- It is treated essentially the same as CAD, because it is the same pathology. Statins to lower CHL. Anti-platelets to prevent platelet aggregation, Hypertensive agent (ACE inhibitors, Diuretics, beta blockers) And possible medication for other symptoms they may have. If severe enough, surgery is an option Revascularization to move the arteries to bypass the buildup site. Laser assisted angioplasty. Angioplasty means to fix/remove the plaque
- STOP SMOKING! Control diet and lipid level

5. What is the protocol for exercise testing?

- First you have to determine the time when the claudication starts, and you want to obtain the ankle to brachial measurement before and after exercise, so you can see the affects.
- For aerobic the treadmill is the preferred test, because PAD affects walking capacity. You have to realize that they probably will not achieve their maximum level, because their PAD symptoms will force them to stop. Don't let them hold on to the rail either, since this relieves the pain a little. You want to see how much they can do and how much their PAD limits them. If you want to use a subjective scale to determine their pain, they should go to a 3 on the pain scale
- With muscular strength you could use an isokinetic (expensive machine) or isotonic (same tension, so free weights are a perfect example) exercises. You don't want to get a 1-RM.

6. What are the prescriptions?

- For aerobic, you want them at 3-5 days, 40-60% HRR, and greater than 15 min. You should increase the duration 5 min every four weeks. As you can tell, their symptoms can severely limit their exercise duration.
- For resistance, you want 2-3 days at 50-60% of their 1 RM at 1-2 sets of 10-12 reps.

7. What are some special considerations of PAD patients?

- The point of exercise for them is to relieve their pain and claudications. Of course, there is no cure for atherosclerosis, but you can slow it down. So as their capacity improves, their ischemia will lessen. One important thing to realize is that the plaque is aggravated in cold weather, so you need a longer warm up for exercising in the cold.

## HIV/AIDS

1. Give an overview of the immune system

- This a short review of how our body protects itself against any bacteria, or viruses. There are two main "defenses" that the body has; the innate system and the adaptive system.

- The innate is the first line of defense against pathogens. This includes the skin, mucous, inflammatory responses, and mast cells. This defense is non-specific to the pathogen and always happens
- The adaptive is specific to the pathogen and has a memory to the antigen, so one will not keep getting infected. The cells involved are called lymphocytes and the two are the B and T cells. The B cells are the “memory” cells that activate more defenses to attack the antigen. The T cells are the “Killer” cells that attack the antigens, and there are CD8 and CD4 cells. The CD8 are the actual killer cells and the CD4 help activate the CD8 and help proliferate cells to kill the antigen
- HIV attacks the CD4 cells, and without them, the CD8 cells cannot be called on, leading to an individual getting infections from pathogens that a healthy person would never get. These are called opportunistic diseases, and are what kills the patient. Not the actual HIV virus

## 2. What is the pathophysiology of HIV?

- HIV is known as a retrograde virus, meaning it contains RNA and it then converts it to viral DNA with an enzyme that the virus contains once it infects a host. That DNA is then incorporated in the cell's DNA and “hijacks” the cell to duplicate more and more of the viral DNA. As said before, its target is the CD4 cells of the immune system, and incorporates its DNA into these cells.
- HIV goes through a lysogenic cycle (don't need to know, just explaining the term) meaning it infects the cell's DNA, but it lays dormant for a while, up to years, before it decides to divide and attack. This is why people can have it for years before they get any symptoms.

## 3. What are the signs and symptoms of HIV?

- Since the virus goes through a lysogenic cycle, the disease progresses in stages. These stages were classified into a seroconversion stage, asymptomatic stage, symptomatic, then finally AIDS.
  - Seroconversion is the stage immediately after infection. There is a high concentration of the virus and thus an acute decline in CD4 cells. The immune system then fights back and regains control. Since the CD4 count is low, the patient can easily have flu-like symptoms. Possible myalgia (muscle pain)
  - The asymptomatic stage is next. The immune system fought back after the initial high concentration of HIV viruses, and the virus and the immune system continue to fight for years. This is that lysogenic cycle I mentioned. So the CD4 count is normal again, because the system fought back. Just as many viruses are dying as replicating, so there is balance and no symptoms are present.
  - The symptomatic stage happens when the virus starts to win that fight, and once this happens, the patient's survival starts to decline. Opportunistic diseases occur, because the CD4 count is below normal levels. These can include cancers and infections that most people never get. Shingles, diarrhea, taste distortions, and blisters happen often.