2023 MID-ATLANTIC CONFERENCE

11th ANNUAL CURRENT CONCEPTS IN

VASCULAR THERAPIES

2023

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Peripheral Arterial Disease

Claudication:

My legs cramp when I walk.

Claudication

- Reproducible ischemic muscle pain that occurs during physical activity and is relieved after a short period of rest, is one of the most common manifestations of peripheral arterial occlusive disease caused by atherosclerotic disease.
- Pain is due to inadequate blood flow.
- (I walk for certain distance then my legs hurt, give up on me, cramp or discomfort)

Claudication

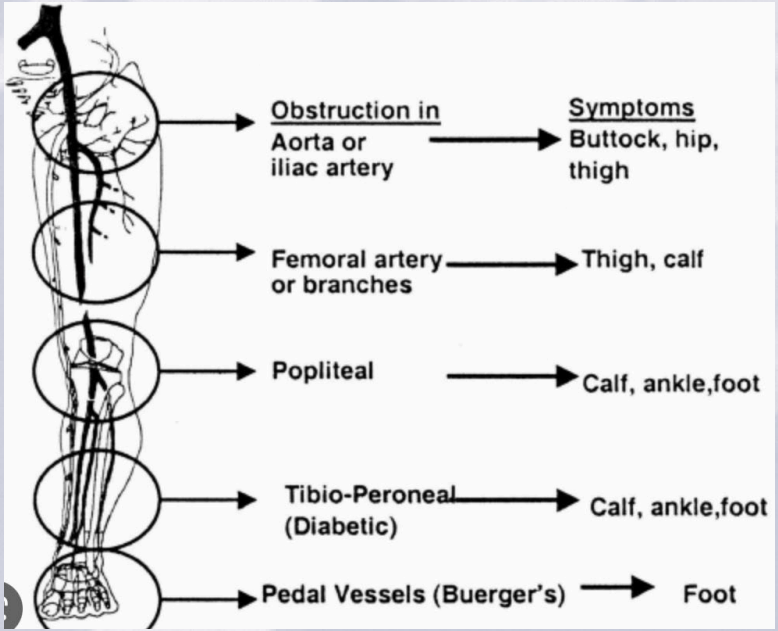
- The pain (Discomfort) is usually in the same muscle group. Ceases after 2-5 mins of resting.
- **Location :** Proximal Muscle group

(Buttocks and thighs) with Aortoiliac disease. Usually reduced femoral artery pulses on exam.

- **Location:** Distal Muscle group

(calves and rarely feet)

femoral popliteal arterial disease.



Claudication

- Physiology : At rest, the flow to lower extremity muscle group is around 400 cc a min. Upon exercise this flow should be up by 10 folds to meet the oxygen demand in that muscle group.
- Claudication pathophysiology: pressure reduction in the muscle group distal to fixed stenosis prevents that increase (10 folds) upon exercise, which then can not meet the increased oxygen demand and claudication symptoms start.
- From patients' perspective: The blockages are preventing the oxygen from reaching an actively burning energy muscles due to mismatch in demand and supply. After resting , no more need for that demand and discomfort goes away.

Claudication

- From patients' perspective (but I am hurting) : We assure the patient that this discomfort(hurt) is not actually harming the patients or causing physical injury. It’s just mismatch between demand and supply.
- Now this demand we can measure by distance (How far can you walk? How many blocks?)
- Is that distance limiting to their daily activities, or they can do their daily work without significant interruption (can they buy their grocery, get their mail, walk their dogs. Etc..)

Claudication

- Risk factors: (what caused it)

Smoking:

7 fold increase in ex-smokers compared to never smoker. And 16 folds comparing current smokers to never smokers.

Smoking 2 cigs withing 10 mins results in acute decrease in the ABI in chronic smoker. Beside the Carbon monoxide effects in reducing exercise tolerance.

Diabetes Mellitus:

Microvascular(capillaries , arterioles that affect kidneys, retina and nerves)

Macrovascular(Peripheral Vascular disease and coronary)

Higher amputation rate by 7 folds.

Claudication

- Risk factors:

Hyperlipidemia: around 50% of patients with PAD have hyperlipidemia.

1.7 times increase risk for PAD in patients with hypertriglyceridemia

2 times increase risk for PAD in patients with hyperlipoproteinemia.

Gender : incident of PAD is the same between both male and females however women suffer faster functional decline. Autopsies also concluded females have more fatty streaks in the aortoiliac system and less in coronary arteries than men.

Claudication

Am I going to lose my leg? (Prognosis)

Answer:

PAD is an an indicator of other cardiovascular disease like stroke and coronary artery disease. More than 90% of patient will have coronary artery disease.

5 year mortality in claudicant can be close to 30% with majority of deaths related to cardiovascular event and strokes. (60% of deaths from MI and 15% from stroke)

Now regarding limb loss if we follow the patients with claudication for 5 years:

50% to 75% will be stable no changes .

25% will progress

5% will require intervention

Less than 2% will need amputation.

Claudication

So what should we do? And when can I get my surgery scheduled?

Answer:

Life , limb then cosmetics.

First life style modification by smoking cessation consultation and pharmacology help.

Diabetes control .

Those Two have the worst outcomes if not fixed regarding death and limb amputations.

Claudication

Cont Answer:

Regarding surgery for claudication, lets hold on this a bit!

Exercise program (the moment we start talking about it the patient usually respond by “ I can’t walk and you want me to exercise!?” “ I should have went to Dr. Milligan instead of coming to you”)

Actually, multiple studies showed that exercise program is very useful in treating claudication by doubling and some time tripling the distance!! And in only 12 weeks! Not only this it can make your live longer too!

Claudication

This study in Japan showed that exercise program patients (with PAD and claudication) had 5 year cardiovascular event-Free survival rate of 80.5% compared to 56.7% untreated match controls.

Also the American heart association made a level 1A recommendation that exercise in the shape of walking for 45 mins per session 3 to 4 times a week , for a period of 12 weeks in claudicants.

Walk till discomfort then rest and walk again then rest till the 45 mins of walking is over for each session.

Limitations: other disease that can prevent patients from walking, and compliance (supervised vs self).

Claudication

Patients ask how does that work? Would that increase my numbers and flow(ABI)

Answer:

I have no CLUE!!! And NO it will not increase your numbers.

But, trust me even though you are hurting when walking but you are not physically Hurting or damaging your body. It's the other way you are getting healthier.

To explain it better (If the patient stays in the room and not decide to leave the office and head to Dr. Milligans office)

The current belief is that adaptation of the muscle cells, likely by enzyme induction, to the relatively decreased oxygen delivery in an ischemic limb is largely responsible for the improved muscle performance seen with exercise training. Other possible mechanisms include improved hemorheologic blood cell characteristics, changes in gait with more efficient use of muscle groups, better fatty acid metabolism, and an increased ratio of muscle fibers to capillaries after regular exercise.

Claudication

Patients ask how does that work? Would that increase my numbers(ABI)

Answer:

In other words the muscle can do more work with same amount of oxygen.

Claudication

But my pain is more in the knees when I walk!

Differential diagnosis :

Not all pain or discomfort in the legs while walking is due to Vascular claudication there are other reasons for patients to have pain in the lower extremities with walking or standing or even sitting and standing for long time.

Lets go over some

Claudication

DDX:

Osteoarthritis: pain more in the joints and varies from day to day and weather , rest does not relieve the pain.

Venous disease: dull, aching especially by the end of the day or after standing for long time usually not worse during exercise.

Neurospinal disease: pain usually in the morning and not relieved by short resting times , relieved usually by leaning forward or sitting.

Diabatic Neuropathy: due to peripheral neuritis differentiating this from vascular claudication is hard but usually the pain is all the time and can increase with walking.

Claudication

DDX:

Venous claudication: due to venous thrombosis it's associated with swelling and alleviated by leg elevation.

Chronic compartment syndrome: usually due to significant increase in the compartment pressure while doing strenuous exercises (athletics and young) but usually the resting period is longer here compared to claudication.

Popliteal entrapment syndrome: compression of the popliteal artery by muscle or other structures. Usually happens while walking in young people or climbing stairs or ladders more than running.

(loss of pedal pulses with knee full extension)

Claudication

Diagnosis :

Physical exam: pulse check including femoral pulses popliteal pulses and pedal pulses.

Look for signals with doppler if no palpable pulse.

Evaluate the skin and hair distribution (hair needs a lot of blood to grow)

Skin texture (dry shiny skin and thick toenails may indicated signs of PAD)

Look for wounds in the bone prominent areas (heals tip of toes and lateral ankle , shoes can cause also wounds on lateral small toe and medial large toe)

Check for carotid bruit.

Swelling in legs to evaluate for CHF and JVD.

Claudication

Diagnosis :

Imaging:

ABI (Ankle brachial index) :highest brachial pressure to highest ankle pressure (DP or PD) should be equal if less 0.9 consider abnormal.

Arterial Duplex: More beneficial in the diabetics due to hard compressible arterial to perform ABI.

CTA runoff: If femoral pulses can not palpate, to evaluate for inflow (Aortic iliac disease)

Angiogram : Invasive diagnostic and therapeutic.