Assessment and management of patients with vascular disorders

**Peripheral arterial disease**

- A common manifestation of atherosclerosis.
- Increased risk of mortality, MI, and cerebrovascular disease
- Pain is usually below the affected area, achy cramps with exercise
- They will have cool pale extremities, as disease progresses, purple indicates advanced
- Compare both limbs for temperature, loss of hair, brittle nails, muscle atrophy
- Pain may disturb the sleep cycle

**Intermittent Claudication**

- Cramp like pain in the muscle
- Consistently reproduced with the same exercise, relieved by stopping muscle use, pain occurs in muscle groups distal to the vessel
- Site of arterial disease can be determined by the location of claudication
- 70-80% of patients do not have worsening symptoms
- 1-2% will progress to critical ischemia
- Defendant positions reduce pain, hang legs over bed, raising legs up will cause pain
- Chronic limb ischemia can cause ulcers or gangrene
- Acute limb ischemia can cause new or worsening sx and decreased perfusion
- Possible not to have a pulse post exercise, may hear a bruit in area
- Elevating legs will increase pain, dangle them over the bed

**Aortoilleac disease**

Narrow or blocked iliac cases by atherosclerosis.
- Decreased O2 to the leg, pain, cramps. Fatigue in butt, thighs and legs with exercise
- Smaller amounts increase pain
- Pain at rest, men may experience ED
- S/sx severe pain coolness and numbness sores, scales, weak muscles, gangrene.
- Tx: aortoiliac graft is done if too severe, #1 assess pulse and perfusion #2 monitor renal fx due to hyperperfusion, monitor labs and paralytic ileus 3 days post op.
- Liquid stool prior to 3rd day = bowel ischemia.

**Ankle brachial index**

Systolic ankle pressure with systolic brachial rate. Diabetics may have a false reading
- Pt should be supine 5 min before taking
- Pressures should be the same
- 0.5-0.9 is a mild insufficiency
- <.40 is severe ischemia
- Normal is 1
Procedures to determine vascular sufficiency

Exercise Testing
Exercise testing is used to determine how long a patient can walk and to measure the ankle systolic blood pressure in response to walking. The patient walks on a treadmill at 1.5 mph with a 12% incline for a maximum of 5 minutes.

Duplex Ultrasonography
Duplex ultrasonography involves B-mode grayscale imaging of the tissue, organs, and blood vessels (arterial and venous) and permits estimation of velocity changes by use of a pulsed Doppler.

Computed Tomography Scanning
Computed tomography (CT) scanning provides cross-sectional images of soft tissue and visualizes the area of volume changes to an extremity and the compartment where changes take place.

Angiography
An arteriogram produced by angiography may be used to confirm the diagnosis of occlusive arterial disease when surgery or other interventions are considered. It involves injecting a radiopaque contrast agent directly into the arterial system to visualize the vessels. The location of a vascular obstruction or an aneurysm (abnormal dilation of a blood vessel) and the collateral circulation can be demonstrated.

Magnetic Resonance Angiography
Magnetic resonance angiography (MRA) is performed with a standard magnetic resonance imaging (MRI) scanner and special software programmed to isolate the blood vessels. The resulting images resemble a standard angiogram, but the images can be rotated and viewed from multiple angles.

Contrast Phlebography (Venography)
Also known as venography, contrast phlebography involves injecting a radiopaque contrast agent into the venous system. If a thrombus exists, the x-ray image reveals an unfilled segment of vein in an otherwise completely filled vein. Injection of the contrast agent may cause brief but painful inflammation of the vein. The test is generally performed if the patient is to undergo thrombolytic therapy;

Lymphoscintigraphy
Lymphoscintigraphy involves injection of a radioactively labeled colloid subcutaneously in the second interdigital space. The extremity is then exercised to facilitate the uptake of the colloid by the lymphatic system, and serial images are obtained at preset intervals. Inserted sub q, exercise the area and watch it move though the lymph. May stain. Takes 1 1/2 to 2 hours.

Arteriosclerosis and Atherosclerosis

Arteriosclerosis (hardening of the arteries) is the most common disease of the arteries. It is a diffuse process whereby the muscle fibers and the endothelial lining of the walls of small arteries and arterioles become thickened.

Atherosclerosis involves a different process, affecting the intima of large and medium-sized arteries. These changes consist of the accumulation of lipids, calcium, blood components, carbohydrates, and fibrous tissue on the intimal layer of the artery. These accumulations
Peripheral Arterial Occlusive Disease

Arterial insufficiency of the extremities occurs most often in men and is a common cause of disability. The legs are most frequently affected; however, the upper extremities may be involved. The age of onset and the severity are influenced by the type and number of atherosclerotic risk factors.

Clinical Manifestations of peripheral arterial occlusive disease

The hallmark symptom is intermittent claudication. This pain may be described as aching, cramping, or inducing fatigue or weakness that occurs with the same degree of exercise or activity and is relieved with rest. The pain commonly occurs in muscle groups distal to the area of stenosis or occlusion. As the disease progresses, the patient may have a decreased ability to walk the same distance as before or may notice increased pain with ambulation. When the arterial insufficiency becomes severe, the patient has rest pain. This pain is associated with critical ischemia of the distal extremity and is described as persistent, aching, or boring; it may be so excruciating that it is unrelieved by opioids and can be disabling.

Tx: Pentoxifylline increases erythrocyte flexibility, lowers blood fibrinogen concentrations, and inhibits neutrophil adhesion and activation. Cilostazol, a phosphodiesterase III inhibitor, is a vasodilator that inhibits platelet aggregation. This agent is contraindicated in patients with a history of congestive heart failure or an ejection fraction less than 40% (Olin & Sealove, 2010). Antiplatelet agents such as aspirin or clopidogrel (Plavix) prevent the formation of thromboemboli, which can lead to myocardial infarction and stroke. Aspirin has been shown to reduce the risk of cardiovascular events (e.g., myocardial infarction, stroke, and cardiovascular death) in patients with vascular disease; however, adverse events associated with aspirin use include gastrointestinal upset or bleeding.

Upper Extremity Arterial Occlusive Disease

Arterial occlusions occur less frequently in the upper extremities (arms) than in the legs and cause less severe symptoms because the collateral circulation is significantly better in the arms. The arms also have less muscle mass and are not subjected to the workload of the legs. Also caused by vasospasm and restrictive disorders.

S/sx: Stenosis and occlusions in the upper extremity result from atherosclerosis or trauma. The stenosis usually occurs at the origin of the vessel proximal to the vertebral artery, setting up the vertebral artery as the major contributor of flow. The patient typically complains of arm fatigue and pain with exercise (forearm claudication), inability to hold or grasp objects (e.g., combing hair, placing objects on shelves above the head), and occasionally difficulty driving.

- Pt may experience vertigo syncope, pallor, CRT, greater than 20+ mmhg difference in BP in the arm

subclavian steal syndrome characterized by reverse flow in the vertebral and basilar artery to provide blood flow to the arm. This syndrome may cause vertebrobasilar (cerebral) symptoms, including vertigo, ataxia, syncope, or bilateral visual changes retrograde blood flow that steals blood from vital organs to perfuse other parts and limbs.
Thoracic Aortic Aneurysm

Approximately 85% of all cases of thoracic aortic aneurysm are caused by atherosclerosis. They occur most frequently in men between the ages of 50 and 70 years, and are estimated to affect 10 of every 100,000 older adults. The thoracic area is the most common site for a dissecting aneurysm.

Management

Treatment is based on whether the aneurysm is symptomatic, is expanding in size, is caused by an iatrogenic injury, contains a dissection, and involves branch vessels. General measures such as controlling blood pressure and correcting risk factors may be helpful. It is important to control blood pressure in patients with dissecting aneurysms. Preoperatively, the systolic pressure is maintained at approximately 90 to 120 mm Hg in order to maintain a mean arterial pressure at 65 to 75 mm Hg with a beta-blocker such as esmolol (Brevibloc) or metoprolol (Lopressor). Occasionally, antihypertensive agents such as hydralazine (Apresoline) are used for this purpose. Sodium nitroprusside (Nipride) may be used by continuous IV drip to emergently lower the blood pressure, as it has a rapid onset and short action of duration and is easily titrated.

Abdominal Aortic Aneurysm

The most common cause of abdominal aortic aneurysm is atherosclerosis. This condition affects men two to six times more often than women, is two to three times more common in Caucasian versus black men, and is most prevalent in older adult patients. Most of these aneurysms occur below the renal arteries (infrarenal aneurysms). Untreated, the eventual outcome may be rupture and death.

Manifestations:

Only about 40% of patients with abdominal aortic aneurysms have symptoms. Some patients complain that they can feel their heart beating in their abdomen when lying down, or they may say that they feel an abdominal mass or abdominal throbbing. If the abdominal aortic aneurysm is associated with thrombus, a major vessel may be occluded or smaller distal occlusions may result from emboli. Small cholesterol, platelet, or fibrin emboli may lodge in the interosseous or digital arteries, causing cyanosis and mottling of the toes.

Pharmacologic Therapy:

If the aneurysm is stable in size based on serial duplex ultrasound scans, the blood pressure is closely monitored over time, because there is an association between increased blood pressure and aneurysm rupture. Antihypertensive agents, including diuretics, beta-blockers, ACE inhibitors, angiotensin II receptor antagonists, and calcium channel blockers, are frequently prescribed to maintain the patient’s blood pressure within acceptable limits.

Surgical Management:

An expanding or enlarging abdominal aortic aneurysm is likely to rupture. Surgery is the treatment of choice for abdominal aortic aneurysms more than 5.5 cm (2 inches) wide or those that are enlarging; the standard treatment has been open surgical repair of the aneurysm by resecting the vessel and sewing a bypass graft in place. The mortality rate associated with elective aneurysm repair—a major surgical procedure—is reported to be 1% to 4%.
**Care of patients with endovascular repairs**

The patient who has had an endovascular repair must lie supine for 6 hours; the head of the bed may be elevated up to 45 degrees after 2 hours. The patient needs to use a bedpan or urinal while on bed rest. Vital signs and Doppler assessment of peripheral pulses are performed initially every 15 minutes and then at progressively longer intervals if the patient’s status remains stable.

The nurse assesses for bleeding, pulsation, swelling, pain, and hematoma formation. Skin changes of the lower extremity, lumbar area, or buttocks that might indicate signs of embolization, such as extremely tender, irregularly shaped, cyanotic areas, as well as any changes in vital signs, pulse quality, bleeding, swelling, pain, or hematoma, are immediately reported to the primary provider.

The patient’s temperature should be monitored every 4 hours, and any signs of postimplantation syndrome should be reported. Postimplantation syndrome typically begins within 24 hours of stent graft placement and consists of a spontaneously occurring fever, leukocytosis, and, occasionally, transient thrombocytopenia. This condition has been attributed to complex immunologic changes, although the exact etiology is unknown.

**Aneurysm**

- localized outpouring, saccular or dilation formed at a weak point in the artery wall
- abdominal aortic aneurysm is the most common type of aneurysm, caused by atherosclerosis, mostly asymptomatic and found by chance, could palpate beating mass in abdomen “pulsatile” may hear bruit, give p meds if actively expanding. May intervene with surgery and straining can cause an AAA.
- signs of impending rupture include severe back pain or abdominal pain which may be persistent or intermittent.
  - lower back pain pressure on the lumbar and is a sign the aneurysm is expanding
  - mycotic aneurysm tiny bubble

**Manifestations**

Onset of symptoms is usually sudden. Severe and persistent pain, described as tearing or ripping, may be reported. The pain is in the anterior chest or back and extends to the shoulders, epigastric area, or abdomen. Aortic dissection may be mistaken for an acute myocardial infarction, which could confuse the clinical picture and initial treatment. Cardiovascular, neurologic, and gastrointestinal symptoms are responsible for other clinical manifestations, depending on the location and extent of the dissection. The patient may appear pale. Sweating and tachycardia may be detected. Blood pressure may be elevated or markedly different from one arm to the other if dissection involves the orifice of the subclavian artery on one side.

**Most common are secular and dissecting.**

**Virchow’s triad** or the **triad of Virchow** (ˈvɪrkwə) describes the three broad categories of factors that are thought to contribute to thrombosis. Hypercoagulability. Hemodynamic changes (stasis, turbulence) Endothelial injury/dysfunction.
Deep vein thrombosis (DVT) and pulmonary embolism (PE) collectively make up the condition called venous thromboembolism. The incidence of VTE is 10% to 20% in general medical patients and up to 80% in critically ill patients. Studies suggest that 5% to 10% of all in-hospital deaths are a direct result of PE.

**Medical management of DVT/PE**

**HEPARIN:** FRACTIONATED, sub q to prevent clots, 1.5 to 2.5 baseline (25-35 baseline INR)

**LOW MOLECULAR WEIGHT HEPARIN:** IV to help treat clots, renal insufficiency “low dose” lovanox sub q longer half life, 1-2x day administration, also check liver fx ALT/AST

**THROMBOLYTIC THERAPY:** bleeding complications, BREAKS up clots TPA

**ORAL ANTI COAGULANTS:** lasts an hour administration is 2x a day.

**FACTOR X INHIBITORS:** interrup the clotting atraxia and xerelto 2 qd po

**SURGERY:** thromboectomy.

**Management of PAD**

Treatment of intermittent caudication: decrease sx,
- put the pt on an exercise program and encourage them to work through the pain, if too much wait until it ceases.
- no tobacco

**Thrombolysis:** an anti-clot medication is given to bust the clot (TPA)

**Endarterectomy:** remove the clot

**Arterial bypass:** graft below the knee, they harvest the great saphenous vein from the patient. If the graft is above the knee they can use synthetic veins.

**Angioplasty:** invasive non surgical procedure where a balloon is inserted to dilate the blood vessels and allow better arterial flow. May be used in combination with medications. Procedure may need to be repeated.
- may result in acute MI, embolization of plaque, or rupture of the vessel.
- have the patient remain NPO after midnight.
- obtain consent, assess allergies, withhold metformin.

**Nursing alert!**

Following arterial revascularization, monitor for a sharp increase in pain because pain is frequently the first sign of postoperative graft occlusion. If signs of occlusion occur notify PCP immediately.

**Pharmacological therapy of patients with PAD**

**Pentoxifyline:** (Trental) helps blood flow more easily by making erythrocytes (RBC) more flexible.

**Cilostazol:** (pletal) vasodilator that increases O2 and decreases platelet aggregation and clotting

**Aspirin:** decreases platelet aggregation,

**Clopidogrel:** (plavix): thins the blood 75mg, decreases platelet aggregation

**Statins:** may or may not help sx of intermittent claudication
Raynauds syndrome

Disease that causes vasospasm of the arterioles of upper and lower extremities
- more often in women over 60
- attacks are intermittent brought on by cold and stress (autoimmune disorders) scleroderma “hardening of the skin”.
- affects fingers, toes and ears primarily.
- can cause achrocyanoisis (more persistent)

Manifestations s/sx: sudden vasoconstriction results in color change to the skin, numbness tingling and burning pain. Colors: white, red, or blue

Patient education: avoid tobacco, avoid the cold, try avoid extremity injury

Tx: usually calcium channel blocker to relieve pain and cause vasodilation.
Arterial vs venous ulcers

**Arterial**

Cause: insufficient blood supply to the area causing ischemia / tissue death

**Risk factors:**
- vascular insufficiency
- uncontrolled blood sugars in DM2 patients
- limited joint mobility or mobility problem
- improper foot wear

**Characteristics:**
- Punched out appearance w/ smooth wound edges
- Pain at night relieved by elevating the leg
- Pain occurs anywhere but usually on the lateral leg
- Lower extremities will be cool to touch, pale shiny, thin skin w/o hair
- Minimal wound drainage.

**Venous ulcer**

Cause: pooling of blood causing increased pressure of veins

**Risk factors:**
- varicose veins
- Deep vein thrombosis
- incompetent valves
- muscle weakness
- immobility
- pregnancy

**Characteristics**
- Shallow and superficial w/ irregular shape
- Painful from edema phlebitis or infection
- Usually in the lower leg or ankle.
nursing actions for ulcers: HX of the condition, HX of diabetes, collagen disease, varicose veins. Assess the pain, PERIPHERIAL PULSES, EDMA
Tx: depend on type of ulcer, assess for infection and assess for nutrition (high protein diet, VIT A/C, iron and zinc.
Many patients with PVD are older adults, iron should be given because they are usually anemic.)

Medical management of ulcers:
- anti-infective, wound culture and sensitivity,
- compression therapy (uniboots, sequential teds)
- debridement of the wound, dressings (sterile) wet to dry, enzymatic cream (SANTYL)
- wound vac microstrain bring wound edges together to promote healing.
**Vericose veins**

Abnormally dilated veins, twisted, and superficial caused by incompetent venous valves.

**Risk factors**

![Image of risk factors]

**Assessment:**
- pain in legs W/dull aching after standing
- full feeling in the leg
- angle edema

**Nursing actions**
- supine position legs elevated (trendelenburg)
- teach the patient to use TED stockings
- instruct patient to elevate legs
- avoid constrictive clothing
- prepare for sclerotherapy.

**Medical management**

**Ligation and Stripping**

Surgery for varicose veins requires that the deep veins be patent and functional. The saphenous vein is ligated high in the groin, where the saphenous vein meets the femoral vein.

**Thermal Ablation**

Thermal ablation is a nonsurgical approach using thermal energy. Radiofrequency ablation uses an electrical contact inside the vein. As the device is withdrawn, the vein is sealed. Laser ablation uses a laser fiber tip that seals the vein (decompressed).

**Sclerotherapy**

Sclerotherapy involves injection of an irritating chemical into a vein to produce localized phlebitis and fibrosis, thereby obliterating the lumen of the vein. This treatment may be performed alone for small varicosities or may follow vein ablation, ligation, or stripping. Sclerosing is palliative rather than curative.
**Lymphangitis/lymphadenitis/lymphedema (lymphatic disorders)**

Lymphangitis: R/T hemolytic strep AEB red streaks on the affected area. Acute inflammation of lymphatic channels.

Lymphedema: swelling in the extremities due to an accumulation of lymph

Primary: onset of 15-20 years old
Secondary: from breast cancer
Chronic: elephantitis

Treatment is focused on reducing the edema and preventing increased edema, prevent infection, and tissue damage.

- Active and passive exercises assists in moving lymph fluid
- Cellulitis is a possible complication

**Patient education lymphedema:**

Keep skin dry and clean
Wear compression support as prescribed

**Avoid:** BLOOD PRESSURE CUFFS, NEEDLE STICKS, INJECTIONS, OR ANY PROCEDURE ON AFFECTED LIMB.

**Report:** new swelling, redness, pain, heat, rash, blisters or fever to HCP immediately

Check feet with mirror for sores, rashes or cracks, this can increase the risk of infection

Avoid trauma: such as, pets Socrates, insect bites, burns, sports injuries, bruising.

Clean the cuts or bites with soap and water and apply antibiotic ointment (neosporin, Bacitracin)

Elevate limbs whenever possible.
**Lymphatic filariasis** is a parasitic disease caused by microscopic, thread-like worms. The adult worms only live in the human lymph system. The lymph system maintains the body's fluid balance and fights infections.

**Tx** People infected with adult worms can take a yearly dose of medicine, called diethylcarbamazine (DEC), that kills the microscopic worms circulating in the blood. While this drug does not kill all of the adult worms, it does prevent infected people from giving the disease to someone else.

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**Cellulitis**

Localized swelling or redness, fever, chills, sweating, painful maybe weepy.

Caused by staph or strep

Treat with oral or IV antibiotics based on severity

**Nursing considerations for cellulitis**

Elevate affected area

Warm moist packs to site q2-4h

Educate on prevention of reoccurrence

Reinforce proper foot care