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LECTURER

ICON

PERIPHERAL VASCULAR DISEASE

INTRODUCTION

Peripheral vascular disease (PVD) is a nearly pandemic condition that has the potential to cause loss of limb or even loss of life. Peripheral vascular disease manifests as insufficient tissue perfusion caused by existing atherosclerosis that may be acutely compounded by either emboli or thrombi. Many people live daily with peripheral vascular disease; however, in settings such as acute limb ischemia, this pandemic disease can be life threatening and can require emergency intervention to minimize morbidity and mortality.

DEFINITION

Peripheral vascular disease includes disorder of the arteries and veins .peripheral artery disease is term used to describe a wide variety of conditions affecting arteries in the neck, abdomen, and extremities. Venous disease primarily affects the lower extremities and be categorized into venous thrombosis and chronic venous insufficiency.

INCIDENCE

The prevalence of peripheral vascular disease in the general population is 12–14%, affecting up to 20% of those over 70;70%–80% of affected individuals are asymptomatic; only a minority ever require revascularization or amputation. Peripheral vascular disease affects 1 in 3 diabetics over the age of 50.

In the USA peripheral arterial disease affects 12–20 percent of Americans age 65 and older. Approximately 10 million Americans have PVD. Despite its prevalence and cardiovascular risk implications, only 25 percent of PAD patients are undergoing treatment.

The incidence of symptomatic PVD increases with age, from about 0.3% per year for men aged 40–55 years to about 1% per year for men aged over 75 years.

PERIPHERAL ARTERY DISEASE

DEFINITION

Progressive narrowing degeneration of arteries of the neck, abdomen, and extremities

ETIOLOGY

- + Atherosclerosis
- + Cigarette smoking
- + Hyperlipidemia
- + Hypertension
- + Diabetes mellitus

RISK FACTOR

- + Obesity
- + Hypertriglyceridemia
- + Hyperuricemia
- + Family history
- + Sedentary lifestyle
- + Strees

PATHOPHYSIOLOGY

Due to atherosclerosis



Arteries gradual thickening



Narrowing of the

ARTERIOSCLEROSIS

DEFINITION

Arteriosclerosis is an abnormal condition associated with thickening and loss of elasticity in the walls of arteries

INCIDENCE

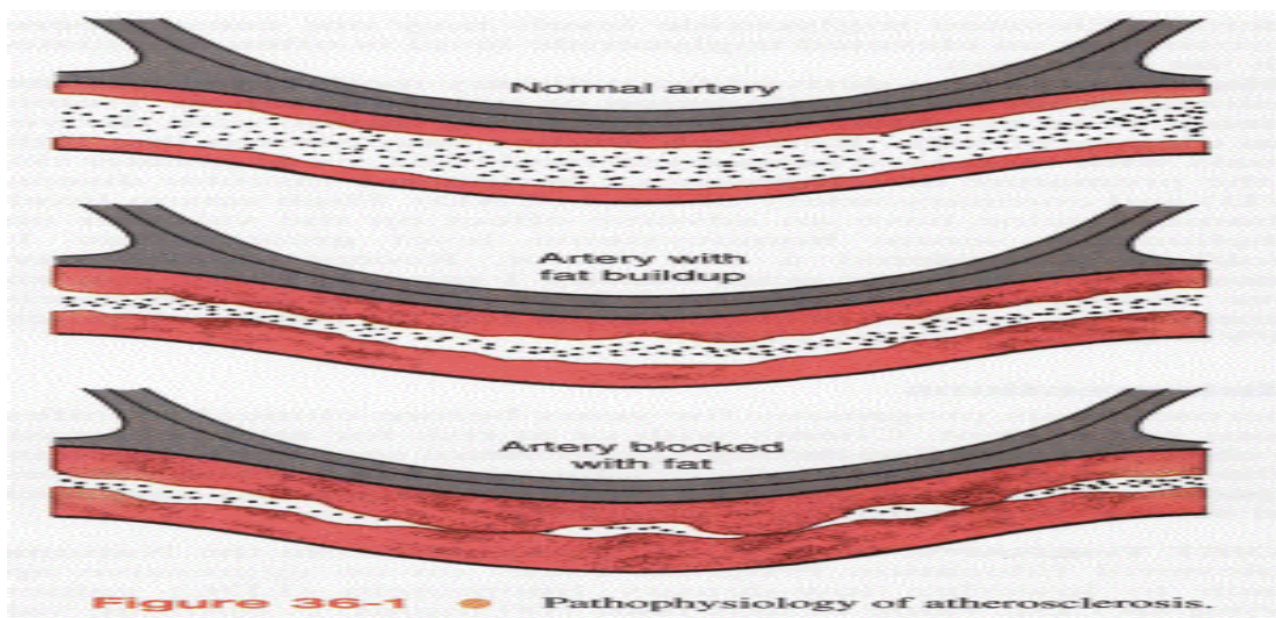
Atherosclerosis is 4 to 5 times more prevalent in men than in women, although heart disease from atherosclerosis is the leading cause of death in women as well as men. Through

menopause, women are protected because of female hormones. After menopause, however, the number of heart attacks and strokes increases in women

RISK FACTORS

- Increased plasma cholesterol,
- Cigarette smoking,
- Hypertension,
- Diabetes,
- Obesity,
- Age,
- Sedentary lifestyle,
- Male Sex
- Heredity

PATHOPHYSIOLOGY



A fatty streak appears on the intimal surface (inner lining) of the artery. At this stage, the fatty streak may appear flattened or elevated, but it generally does not affect the integrity of the arterial wall. Next, a fibrous plaque develops. This plaque is described as a white, glistening, fibrous elevation that covers a lipid core. At this stage, the plaque is elevated enough to partially

or completely occlude the blood flow of an artery. In the final stage, the fibrous lesions become calcified, hemorrhagic, ulcerated, or thrombosed.

CLINICAL MANIFESTATION

- Hardening of the arteries does not cause symptoms until blood flow to part of the body becomes **slowed or blocked**.
- If the arteries to the heart become narrow, blood flow to the heart can slow down or stop. This can cause chest pain (**stable angina**), **shortness of breath**, and other symptoms
- If the arteries supplying the legs are affected (see **Peripheral Vascular Disease**), the person may have **severe pain in the legs**. The pain typically comes when a person is walking and goes away when he or she stops walking (**intermittent claudication**). When the disease is severe, the pain may come on at rest and/or at night. If the skin breaks down, the wound may become infected and never heal, **potentially leading to amputation**.
- If the arteries supplying the **kidneys are affected**, the person can have symptoms of **high blood pressure** or may develop **kidney failure**.

DIAGNOSIS STUDIES

- History collection
- Physical exam . [Hardening of the arteries can create a whooshing or blowing sound ("bruit") over an artery.]
- **Lipid profile** to check levels of total blood cholesterol; low density lipoprotein (LDL), or bad cholesterol; high density lipoprotein (HDL), or the good cholesterol; and triglycerides, especially in people with diabetes.
- Stress ECG is exercise on a treadmill or a stationary bicycle with the person's ECG, blood pressure, and respiration continuously recorded. In persons who have atherosclerosis, this test may show evidence of decreased blood supply to the heart created by the increased demand for blood and oxygen by the exercise. If the patient is not able to exercise, a chemical stimulation test can be performed.
- Doppler tests use ultrasound or sound waves.
- Magnetic resonance arteriography (MRA) is a special type of MRI scan
- Special CT scans called CT angiography
- **Arteriograms or angiography**

An angiogram or arteriogram is an X-ray test that uses an injection of dye (or contrast) to examine blood vessels of the head, neck, arms, legs or other organs of the body. The tests

identify the area and extent of any artery blockage or narrowing. The contrast solution allows the blood vessels to be seen more clearly.

MANAGEMENT

MEDICAL MANAGEMENT

Cholesterol medications. Aggressively lowering your low-density lipoprotein (LDL) cholesterol, the "bad" cholesterol, can slow, stop or even reverse the buildup of fatty deposits in your arteries.

Anti-platelet medications. such as aspirin, to reduce the likelihood that platelets will clump in narrowed arteries,

Angiotensin-converting enzyme (ACE) inhibitors. These medications may help slow the progression of atherosclerosis by lowering blood pressure and producing other beneficial effects on the heart arteries.

SURGICAL PROCEDURES & TREATMENT

- **Angioplasty and stent placement.** In this procedure, inserts a long, thin tube (catheter) into the blocked or narrowed part of your artery. A second catheter with a deflated balloon on its tip is then passed through the catheter to the narrowed area. The balloon is then inflated, compressing the deposits against your artery walls. A mesh tube (stent) is usually left in the artery to help keep the artery open.
- **Endarterectomy.** In some cases, fatty deposits must be surgically removed from the walls of a narrowed artery. When the procedure is done on arteries in the neck (the carotid arteries), it's called a carotid endarterectomy.
- **Thrombolytic therapy.** If you have an artery that's blocked by a blood clot, your doctor may use a clot-dissolving drug to break it apart.
- **Bypass surgery.** may create a graft bypass using a vessel from another part of your body or a tube made of synthetic fabric. This allows blood to flow around the blocked or narrowed artery.

SELF-CARE AT HOME

If a person has arteriosclerosis, he or she will need to make the following lifestyle changes:

- Eat food that has low saturated fat and low cholesterol.
- Restrict the salt-intake in the diet if one has high blood pressure.
- Increase the consumption of food that has high fiber content (vegetables and fruits).
- Eat fish at least twice a week.
- Quit smoking.
- Lose weight if overweight.

- Exercise under the supervision of a health care provider.
- If the patient has elevated blood glucose, he or she will have to regularly monitor blood glucose levels and glycosylated hemoglobin (HbA1c) levels.

DISORDER OF THE AORTA

The aorta is largest artery & responsible for supplying oxygenated blood to essential vital organ in the body. The most common vascular problems that affect the aorta are aneurysms ,aortoiliac occlusive disease and aortic dissection .

AORTIC ANEURYSMS

DEFINITION

Aneurysms are out pouching or dilations of the arterial wall

ETIOLOGY AND RISK FACTOR

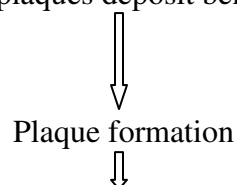
- Atherosclerosis is the main cause for aneurysms

Can be classified into degenerative,congenital, mechanical, inflammatory, or infection.

1. Degenerative, of vascular elastic tissue [Marfan syndrome]
2. Congenital including specific defects collagen [e,g Ehlers –danlos syndrome]
3. Mechanical includes penetrating or blunt trauma from motor vehicle accident
4. Inflammatory, or infection. Aortitis and human immunodeficiency virus infection

PATHOPHYSIOLOGY

Atherosclerosis plaques deposit beneath the intima[inner layer]

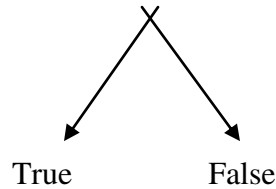


Degenerative changes in the media [middle layer]

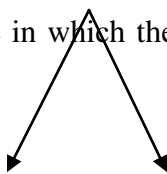


Loss of elasticity, weakening and aortic dilation

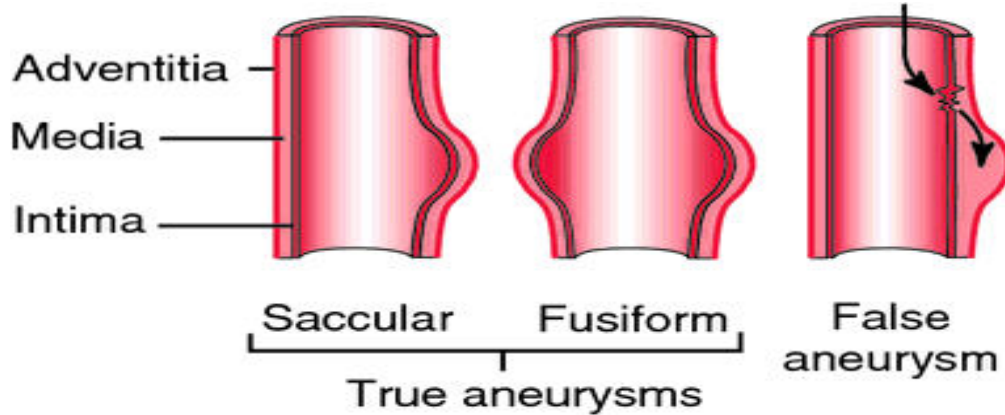
CLASSIFICATION OF ANEURYSMS



True aneurysms is one in which the wall of the artery forms the aneurysms, with at least one vessel layer still intact



i] Fusiform aneurysms ii] saccular aneurysms



Dissecting aneurysm

False aneurysms or pseudo aneurysms, is not an aneurysm but a disruption of the layer of the arterial wall resulting in bleeding that is contained by surrounding structure. May result from trauma or infection.

CLINICAL MANIFESTATION

Deep, diffuse chest pain [extend to the interscapular area]

Aneurysms located in the ascending aorta less to **angina** from disruption of blood flow to the coronary arteries and **hoarseness** may result of recurrent laryngeal nerve.

Pressure on the esophagus cause **dysphagia**

Aneurysms pressure on the superior vena cava , decreased venous return can result of **distended neck veins and edema of the head and arms.**

DIAGNOSTIC STUDIES

- ❖ Chest x rays [widening of the thoracic aorta]
- ❖ Electrocardiogram [ECG] rule out evidence of myocardial infarction.
- ❖ Echocardiography [diagnosis of aortic valve insufficiency related to ascending aorta dilation
- ❖ Ultrasonography [screening for aneurysms & size]
- ❖ Ct scan [to diagnose of accurate]
- ❖ Magnetic resonance imaging [MRI] to diagnose the location and severity of aneurysms.
- ❖ Angiography [To determine aneurysms diameter or length]

MANAGEMENT

MEDICAL MANAGEMENT

Watchful waiting

If your AAA is small, your physician may recommend "watchful waiting," which means that you will be monitored every 6-12 months for signs of changes in the aneurysm size. May schedule you for regular CT scans or ultrasounds to watch the aneurysm. This method is usually used for aneurysms that are smaller than about 2 inches (roughly 5.0 to 5.5 centimeters) in diameter. If you also have high blood pressure, may prescribe blood pressure medication to lower the pressure on the weakened area of the aneurysm. If you smoke, you should obtain help to stop smoking. An aneurysm will not "go away" by itself. It is extremely important to continue to follow up with your physician as directed because the aneurysm may enlarge to a dangerous size over time. It could eventually burst if this is not detected and treated.

No medical management only careful watching

To prevent the aneurysm from rupturing

To determine its exact size and location

SURGICAL MANAGEMENT

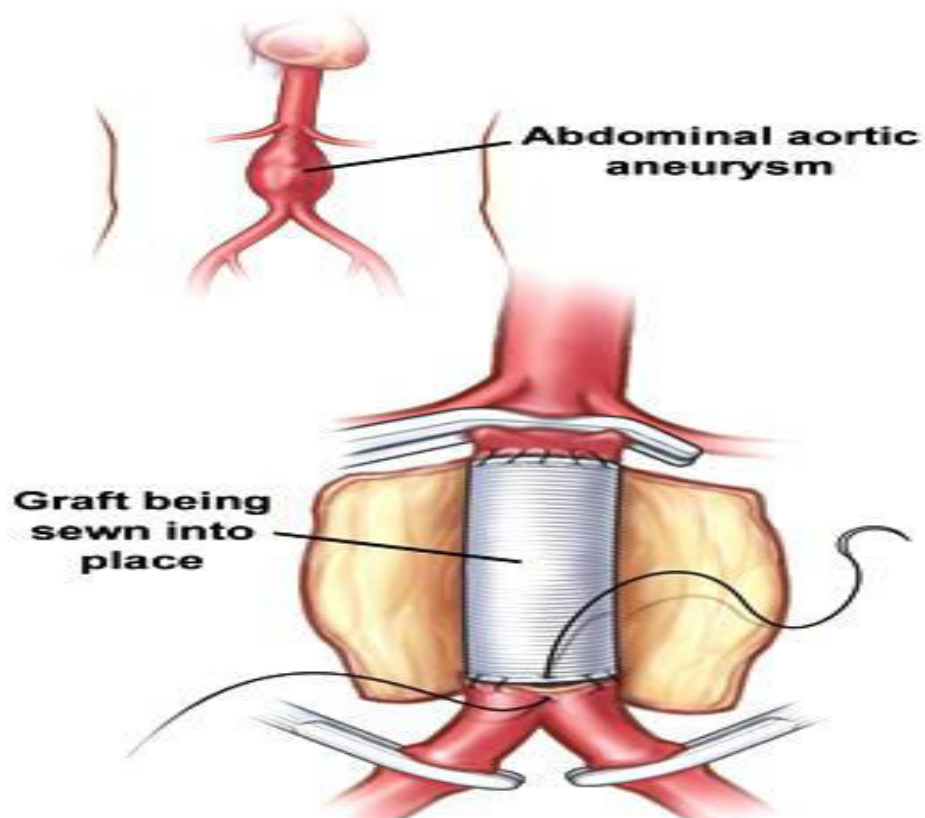
Pre operatively ,the patient is hydrated and any electrolyte ,coagulation ,and hemotocrit abnormalities are corrected

The surgical technique involves

1. Incising the diseased segment of the aorta
2. Removing intra luminal thrombus or plaque
3. Inserting a synthetic graft [decron or polytetrafluoroethylene
4. Suturing the native aortic wall around the graft so that it will act as a protective cover.

Open Surgical aneurysm repair

A vascular surgeon may recommend that you have a surgical procedure called open aneurysm repair if your aneurysm is causing symptoms, or is larger than about 2 inches (roughly 5.0 to 5.5 centimeters), or is enlarging under observation. During an open aneurysm repair, also known as surgical aneurysm repair, your surgeon makes an incision in your abdomen and replaces the weakened part of your aorta with a tube-like replacement called an aortic graft. This graft is made of a strong, durable, man-made plastic material, such as Dacron®, in the size and shape of the healthy aorta. The strong tube takes the place of the weakened section in your aorta and allows your blood to pass easily through it. Following the surgery, you may stay in the hospital for 4 to 7 days. Depending upon your circumstances, you may also require 6 weeks to 3 months for a complete recovery. More than 90 percent of open aneurysm repairs are successful for the long term.



Endovascularstentgraft

Instead of open aneurysm repair, your vascular surgeon may consider a newer procedure called an endovascular stent graft. Endovascular means that the treatment is performed inside your artery using long, thin tubes called catheters that are threaded through your blood vessels. This procedure is less invasive, meaning that your surgeon will usually need to make only small incisions in your groin area through which to thread the catheters. During the procedure, your surgeon will use live x-ray pictures viewed on a video screen to guide a fabric and metal tube, called an endovascular stent graft (or endograft), to the site of the aneurysm. Like the graft in open surgery, the endovascular stent graft also strengthens the aorta. Your recovery time for endovascular stent grafting is usually shorter than for the open surgery, and your hospital stay may be reduced to 2 to 3 days. However, this procedure requires more frequent follow-up visits with imaging procedures, usually CT scans, after endograft placement to be sure the graft continues to function properly. Also, the endograft is more likely to require periodic maintenance procedures than does the open procedure. In addition, your aneurysm may not have the shape that is suitable for this procedure, since not all patients are candidates for endovascular repair because of the extent of the aneurysm, or its relationship to the renal (kidney) arteries, or other issues. While the endovascular stent graft may be a good option for some patients who have suitable aneurysms and who have medical conditions increasing their risk, in some other cases, open aneurysm repair may still be the best way to cure AAA. Your vascular surgeon will help you decide what is the best method of treatment for your particular situation.

AORTIC DISSECTION

DEFINITION

It occurs most commonly in the thoracic aorta, is the result of a tear in the intimal lining of the arterial wall.

INCIDENCE

It affects men more often than women and occurs most frequently between the fourth and seventh decade of life.

ETIOLOGY

- Older age
- Chronic hypertension
- Person with marfan syndrome [a premature degeneration of vascular elastic tissue]
- Pregnancy [increased blood volume ,decreased peripheral vascular resistance and increased aortic compliance].
- Blunt trauma Atherosclerosis
- Existing thoracic aneurysm

PATHOPHYSIOLOGY

Artery allows blood track between the intima and media



Creates a false lumen of blood flow



When heart contracts, each systolic pulsation increased pressure on the damaged area



Increases the dissection.

CLINICAL MANIFESTATION

Severe pain in the anterior of the chest

Pain is the most common symptom of aortic dissection and is often described as tearing or ripping and often begins suddenly. If the aortic dissection occurs in the chest, the pain is usually centered in the chest and radiates directly into the upper back. If the dissection occurs in the abdominal aorta, the pain may occur in the mid back or low back and radiate to the flanks.

Neurologic and cardiovascular symptoms also present

Neurologic symptoms

- ❖ Altered level of consciousness
- ❖ Dizziness
- ❖ Weakened absent carotid and temporal pulses

Cardiovascular symptoms

- ❖ Dyspnea

- ❖ Orthopnea

DIAGNOSTIC STUDIES

- ❖ Health history and physical examination
- ❖ Chest x ray [widening of the mediastinal and pleural effusion]
- ❖ Echocardiogram
- ❖ TEE[transesophagealechocardiogram] to identify dissection that are closest to the aortic root
- ❖ Ct scan
- ❖ MRI [magnetic resonance image]

MANAGEMENT

Conservative therapy

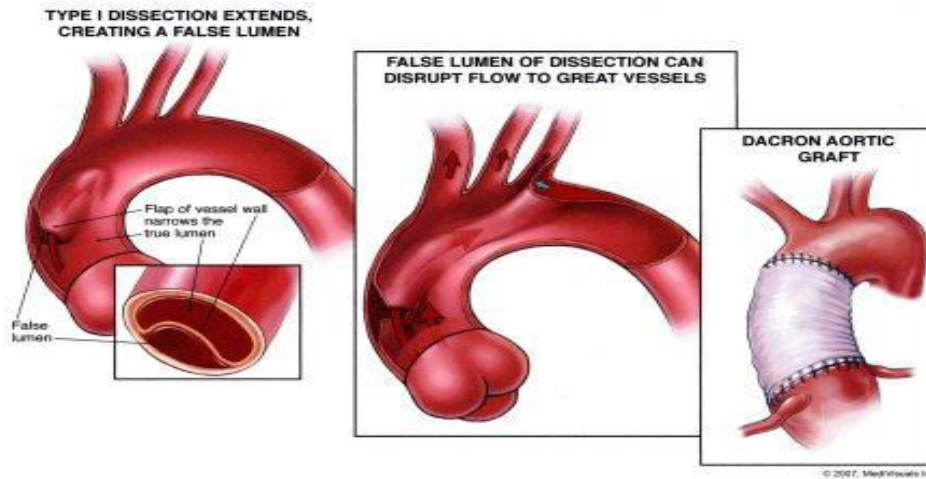
- ❖ Bed rest
- ❖ Pain relief
- ❖ Blood transfusion
- ❖ Control blood pressure

Surgical therapy

Surgery on the aorta has similarities to open-heart surgery. Specifics as to the size and location of the incision, the use of the heart-lung machine and other techniques vary depending on the type of aortic surgery being performed.

When a portion of diseased aorta needs to be removed through surgery the procedure is called aortic resection. A synthetic graft made of Dacron® is used to replace the diseased aortic tissue. Because the graft is tolerated so well by the body rejection and calcification do not occur. Over time the body deposits its own tissue into the flexible and durable graft.

Aortic Dissection and Surgical Repair



POSSIBLE COMPLICATIONS

- Aortic rupture causing rapid blood loss, shock
- Bleeding from the aorta
- Blood clots
- Cardiac tamponade
- Heart attack
- Not enough blood flow past the dissection
- Permanent kidney failure
- Stroke

PREVENTION

Proper treatment and control of atherosclerosis (hardening of the arteries) and high blood pressure may reduce your risk of aortic dissection. Tight control of blood pressure in patients at risk of dissection is very important. Drugs such as angiotensin receptor blockers, ACE inhibitors, and beta-blockers may reduce the likelihood of dissection.

Take safety precautions to prevent injuries, which can cause dissections.

Many cases of aortic dissection cannot be prevented.

RAYNAUD'S PHENOMENON

DEFINITION

Raynaud's phenomenon is a condition in which cold temperatures or strong emotions cause blood vessel spasms that block blood flow to the fingers, toes, ears, and nose.

CAUSES

- Diseases of the arteries, such as atherosclerosis and Buerger's disease, which is associated with smoking
- Cigarette smoking
- Age in women (Raynaud's tends to occur between the ages of 20 - 40, although secondary Raynaud's tends to occur later)
- Occupation (for example, using vibrating tools such as chain saws and jackhammers)
- Using some medications, including some cancer drugs, narcotics, and over-the-counter cold medications
- Previous frostbite
- Repetitive physical stress (for example, typing or playing the piano)
- Carpal tunnel syndrome
- Other medical conditions, such as rheumatoid arthritis, scleroderma, systemic lupus erythematosus (SLE or lupus), and carpal tunnel syndrome.

PATHOPHYSIOLOGY

In individuals with Raynaud phenomenon, one or more body parts experience intense vasospasm with associated color change and subsequent hyperemia. Patients often describe **3 phases** of change with initial **white (vasoconstriction)**, followed by **blue (cyanosis)**, and then **red (rapid blood reflow)**. The affected body parts are usually those most susceptible to cold injury.

CLINICAL MANIFESTATION

- Changes in skin color in the fingers or toes and sometimes in the nose, legs, or earlobes (may occur in three phases: white, blue, then red)
- Throbbing, tingling, numbness, and pain
- Deterioration of the pads on fingertips or toes
- Gangrenous ulcers near fingertips

DIAGNOSTIC STUDIES

- ✚ Health history
- ✚ vascular ultrasound and a cold stimulation test for Raynaud's phenomenon may be done to confirm the diagnosis.
- ✚ Different blood tests may be done to diagnose arthritic and autoimmune conditions that may cause Raynaud's phenomenon.

MANAGEMENT

Medications to relax the walls of the blood vessels. These include topical nitroglycerin, **calcium channel blockers**, such as nifedipine and diltiazem.

Alpha blockers -- help counteract the effects of norepinephrine, a hormone produced by the body that causes blood vessels to narrow. Alpha blockers include:

- Prazosin (Minipress)
- Doxazosin (Cardura)

Vasodilators -- open up blood vessels

SURGICAL PROCEDURES

In severe cases, a surgical procedure called sympathectomy, which cuts the nerves that open and close blood vessels, may be used.

lifestyle changes may help people with Raynaud's phenomenon:

- Stop smoking
- Avoid caffeine
- Stop and avoid medications that cause tightening or spasms of the blood vessels
- Keep the body warm. Avoid exposure to cold in any form. Wear mittens or gloves outdoors and when handling ice or frozen food. Avoid getting chilled, which may happen after any active recreational sport.
- Wear comfortable, roomy shoes and wool socks. When outside, always wear shoes.

THROMBOANGITIS OBLITERANS

DEFINITION

Thromboangiitisobliterans is a rare disease in which blood vessels of the hands and feet become blocked

INCIDENCE

Incidence of thromboangiitisobliterans is 8 to 12 per 100,000 adults in the United States (0.75% of all patients with peripheral vascular disease).

Thromboangiitisobliterans mostly affects men ages 20 to 40 who have a history of heavy smoking or chewing tobacco. Only 1 out of 10 patients are women.

CAUSES

Thromboangiitis obliterans (Buerger's disease) is caused by **vasculitis** (inflammation of the blood vessels).

The blood vessels of the hands and feet are especially affected. They tighten or become totally blocked. The average age when symptoms begin is around 35 years. Women and older adults are affected less often.

The condition may also be related to a history of **Raynaud's disease**.

This disorder is very uncommon in children, but it may occur in children with **autoimmune diseases**.

PATHOPHYSIOLOGY

Inflammatory process damage the arterial wall



Lymphocytes and giant cell infiltrate the vessel wall



Fibroblast proliferation



Thrombosis and fibrosis occur inside the vessel



Tissue ischemia

CLINICAL MANIFESTATION

- Hands or feet may be pale, red, or bluish
- Hands or feet may feel cold
- Pain in the hands and feet
 - Acute, severe
 - Burning or tingling
 - Often occurring at rest
- Pain in the legs, ankles, or feet when walking (intermittent claudication)
 - Often located in the arch of the foot
- Skin changes or ulcers on hands or feet

DIAGNOSTIC STUDIES

History and physical examination

[The hands or feet may have large, red, tender blood vessels. The pulse in the affected hands or feet may be low or missing.]

EXTREMITY ANGIOGRAPHY

Extremity angiography, or peripheral angiography is a test used to see the arteries in the hands, arms, feet, or legs.

- Numbing medicine (anesthetic) is injected into the skin over an artery, and a needle is inserted into that artery.
- A thin plastic tube called a catheter is passed through the needle, into the artery. It is guided up into the area of the body being studied. The doctor can see live images of the area on a TV-like monitor, and uses them as a guide.
- The dye flows through the catheter. X-ray images are taken of the artery.

Certain treatments can be done during this procedure. Items are passed through the catheter to the area in the artery that needs treatment. These treatments include:

- Dissolving a blood clot with medicine
- Opening a partially blocked artery with a balloon
- Placing a small tube called a stent into an artery to help hold it open

The health care team will check your pulse (heart rate), blood pressure, and breathing during the procedure.

After the x-rays are taken, the catheter is removed. Pressure is immediately applied at the site of insertion for 10 - 15 minutes to stop the bleeding. After that time, the area is checked and a bandage is applied.

The arm or leg where the needle was placed should be kept straight for 6 hours after the procedure. You should avoid strenuous activity, such as heavy lifting, for 24 - 48 hours.

DOPPLER ULTRASOUND EXAM OF AN ARM OR LEG

This test uses ultrasound to examine the blood flow in the major arteries and veins in the arms and legs.

How the Test is performed

The test is done in the ultrasound or radiology department or in a peripheral vascular lab.

A water-soluble gel is placed on a handheld device called a transducer, which directs the high-frequency sound waves to the artery or veins being tested.

When examining the arteries, the following will also be done:

Blood pressure cuffs may be put around different parts of the body, including the thigh, calf, ankle, and different points along the arm. A paste is applied to the skin over the arteries being examined. Images are created as the transducer is moved over each area.

MANAGEMENT

There is no cure for thromboangiitisobliterans. The goal of treatment is to control symptoms.

The patient must stop using tobacco and should avoid cold temperatures and other conditions that reduce circulation to the hands and feet.

Applying warmth and exercising gently may help increase circulation.

Cutting the nerves to the area (surgical sympathectomy) may help control pain. Aspirin and vasodilators may also be used. It may be necessary to amputate the hand or foot if infection or widespread tissue death occurs.

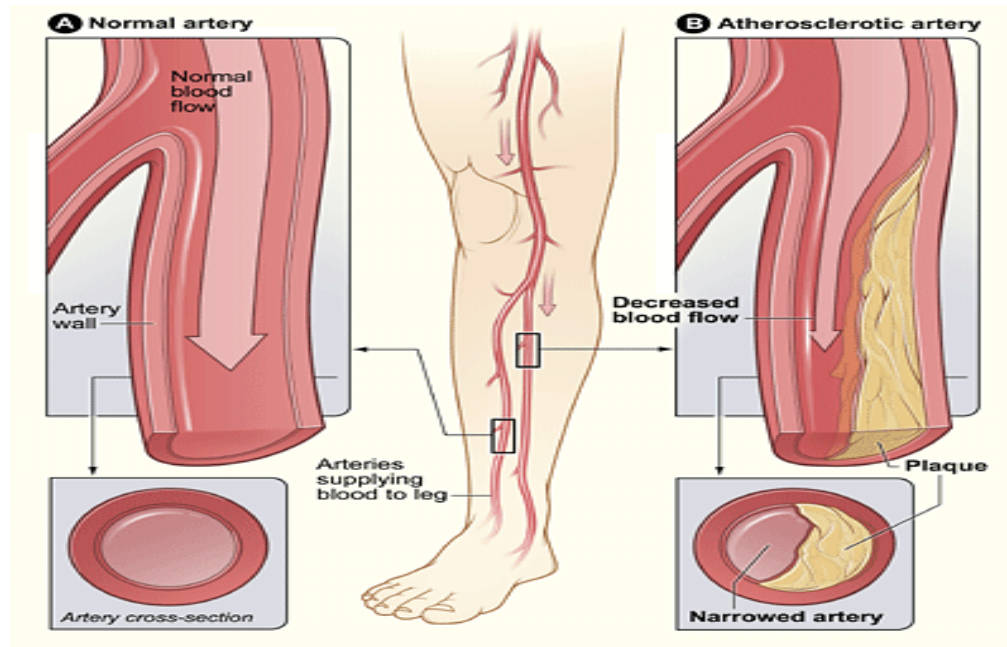
COMPLICATIONS:

- Amputation
- Gangrene (tissue death)
- Loss of circulation beyond the affected hand or foot

PERIPHERAL ARTERIAL DISEASE OF THE LOWER EXTRIMITIES

DEFINITION

Peripheral artery disease is a condition of the blood vessels that leads to narrowing and hardening of the arteries that supply the legs and feet.



The narrowing of the blood vessels leads to decreased blood flow, which can injure nerves and other tissues.

CAUSES

Peripheral artery disease is caused by **arteriosclerosis**, or "**hardening of the arteries**." This problem occurs when fatty material (plaque) builds up on the walls of your arteries. This causes the arteries to become narrower. The walls of the arteries also become stiffer and cannot widen (dilate) to allow greater blood flow when needed.

As a result, when the muscles of your legs are working harder (such as during exercise or walking) they cannot get enough blood and oxygen. Eventually, there may not be enough blood and oxygen, even when the muscles are resting.

Peripheral artery disease is a common disorder that usually affects men over age 50. People are at higher risk if they have a history of:

- Abnormal cholesterol
- Diabetes
- Heart disease (coronary artery disease)
- High blood pressure (hypertension)
- Kidney disease involving hemodialysis
- Smoking
- Stroke (cerebrovascular disease)

CLINICAL MANIFESTATION

- Pain and cramps at night

- Pain or tingling in the feet or toes, which can be so severe that even the weight of clothes or bed sheets is painful
- Pain that is worse when you raise the leg and improves when you dangle your legs over the side of the bed
- Skin that looks dark and blue
- Sores that do not heal

DIAGNOSTIC STUDIES

- History and physical examination
- Blood tests may show high cholesterol
- Angiography of the arteries in the legs (arteriography)
- Blood pressure measured in the arms and legs for comparison (ankle/brachial index, or ABI)
- Doppler ultrasound exam of an extremity
- Magnetic resonance angiography or CT angiography

MANAGEMENT

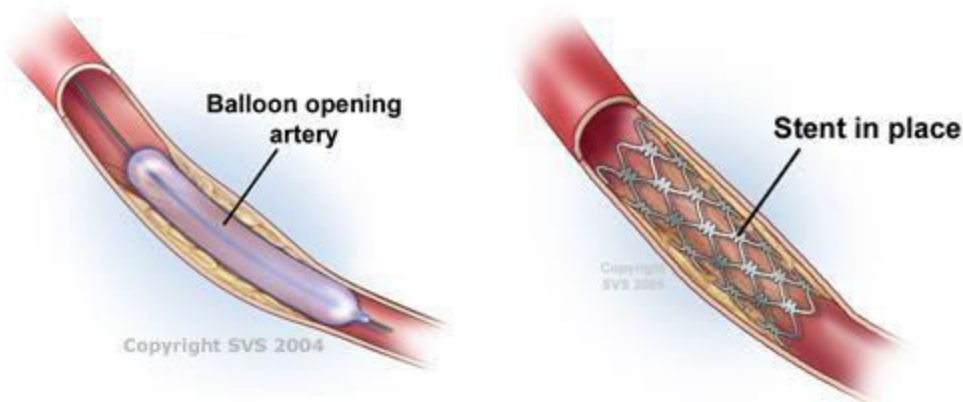
MEDICAL MANAGEMENT

- Aspirin or a medicine called clopidogrel (Plavix), which keeps your blood from forming clots in your arteries.
- Cilostazol, a medication to enlarge (dilate) the affected artery or arteries for moderate-to-severe cases that are not candidates for surgery
- Medicine to help lower your cholesterol
- Pain relievers

If you are taking medicines for high blood pressure or diabetes need to continue.

SURGICAL MANAGEMENT

ANGIOPLASTY AND STENT PLACEMENT - PERIPHERAL ARTERIES

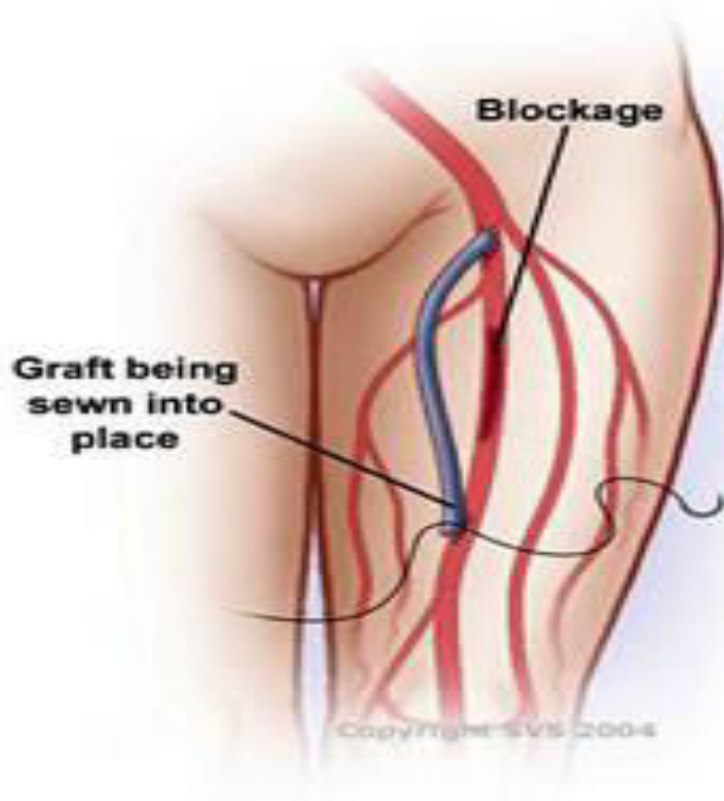


Angioplasty (ballooning) is a procedure to open narrowed or blocked blood vessels that supply blood to your legs. These arteries can become blocked with fatty material that builds up inside them. This is called atherosclerosis.

Description

In angioplasty, your blocked artery is widened with a medical "balloon." The balloon presses against the inside wall of your artery to open your artery and improve blood flow. To prevent the artery from narrowing again, a tiny metal stent is placed across the artery wall.

PERIPHERAL ARTERY BYPASS – LEG



Peripheral artery bypass is surgery to reroute the blood supply around a blocked artery in one of your legs. Your peripheral arteries can become blocked with fatty material that builds up inside them. This is called atherosclerosis

Description

Peripheral artery bypass surgery can be done in one or more of these arteries to treat a blockage:

- Aorta -- the main artery that comes from your heart
- Iliac artery -- in your hip
- Femoral artery -- in your thigh
- Popliteal artery -- behind your knee
- Tibial and peroneal artery -- in your lower leg
- Axillary artery -- in your armpit

Self-care:

- Balance exercise with rest. Walk or do another activity to the point of pain and alternate it with rest periods. Over time, your circulation may improve as new, small (collateral) blood vessels form. Always talk to the doctor before starting an exercise program.
- Stop smoking. Smoking narrows the arteries, decreases the blood's ability to carry oxygen, and increases the risk of forming clots (thrombi and emboli).
- Take care of your feet, especially if you also have diabetes. Wear shoes that fit properly. Pay attention to any cuts, scrapes, or injuries, and see your doctor right away. Tissues heal slowly and are more likely to get infected when there is decreased circulation.
- Make sure your blood pressure is well controlled.
- Reduce your weight, if you are overweight.
- If your cholesterol is high, eat a low-cholesterol and low-fat diet. See: Heart-healthy diet.
- Monitor your blood sugar levels if you have diabetes, and keep them under control.

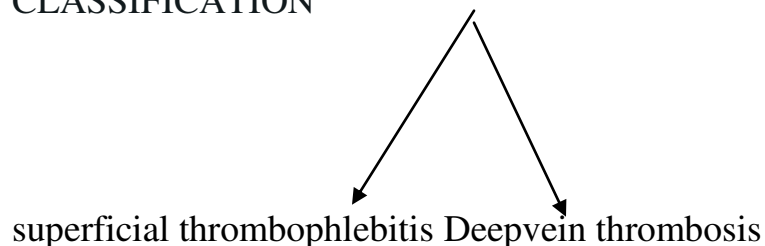
Complications

- Blood clots or emboli that block off small arteries
- Coronary artery disease
- Impotence
- Open sores (ischemic ulcers) on the lower legs
- Tissue death (gangrene) -- see gas gangrene

DISORDERS OF THE VEINS

VENOUS THROMBOSIS [The formation of a thrombus [clot]in association with inflammation of the vein]

CLASSIFICATION



ETIOLOGY

THREE IMPORTANT FACTORS

- I VIRCHOW'S TRIAD**1 Venous stasis

2 Damage of endothelium

3 Hypercoagulability

1 Venous stasis

Action of muscles in the extremities and the functional adequacy of venous valves, which allow unidirectional flow. Venous stasis occurs when the valves are dysfunctional or the muscles of the extremities are inactive.

- Advanced age
- Atrial fibrillation
- Chronic heart failure
- Obesity
- Orthopedic surgery
- Postpartum period
- Pregnancy
- Prolonged immobility
- Stroke
- Varicose vein

2 Endothelial damage

Vein may be caused by trauma or external pressure and occurs any time venipuncture is performed .Damaged endothelium has decreased fibrinolytic properties, predisposing to thrombus development.

- Abdominal and pelvic surgery
- Caustic or hypertonic intravenous medication
- Fracture of the pelvis ,hips, or legs
- History of DVT[deep vein thrombus
- Indwelling femoral vein catheter
- Intravenous drug abuse
- trauma

3 Hypercoagulability of blood .

Hypercoagulability of blood occurs in many hematologic disorders.

- Antithrombin III deficiency
- Cigarette smoking
- Elevated lipoprotein
- Hormone replacement therapy
- Malignancies

- Nephritic syndrome
- Polycythemia
- Protein C deficiency
- Sepsis

PATHOPHYSIOLOGY

Platelet aggregation and fibrin entrap RBC ,WBC



More platelets to form a thrombus



Thrombus formation is the valve cusps of veins



Venous stasis



Thrombus enlarges with increase size

Thrombus becomes covered by endothelial cells and the thrombotic process stops. If the thrombus does not become detached, it undergoes lysis or becomes firmly organized and adherent within 5 to 7 days.

CLINICAL MANIFESTATION

I.SUPERFICIAL THROMBOPHLEBITIS

DEFINITION

Superficial thrombophlebitis occurs when a superficial vein (usually the long saphenous vein of the leg or its tributaries), becomes inflamed and the blood within it clots

RISK FACTORS

The three cardinal risk factors (Virchow's triad) are:

- Damage to the blood vessel wall (as a result of trauma, infection, or inflammation).
- Stasis of blood flow.
- Hypercoagulability of blood.

Other specific **risk factors** include:

- Obesity.
- Thrombophilia.
- Smoking.
- Oral contraceptives.
- Pregnancy.
- Intravenous drug abuse.
- Intravenous infusion (especially if an irritant substance was infused).

SIGNS

There is **redness** and **tenderness** along the vein with **swelling**

Systemic temperature elevation

Leukocytosis may present

INVESTIGATIONS

- Usually no further investigation is indicated.
- **Venography** is not usually required and should be avoided if possible, as the contrast medium may aggravate the condition.
- If a septic cannula is suspected, it should be removed and sent for culture.

MANAGEMENT

General measures

- Elastic support of the limb reduces swelling and eases discomfort.
- Severe thrombophlebitis requires bed rest with elevation of the extremity and the application of large, hot, wet compresses, although the evidence base for their effectiveness is limited. Care must be taken to avoid burning the patient.
- Exercise reduces pain and the possibility of deep vein thrombosis (DVT). Only in cases in which pain is very severe is bed rest necessary. DVT prophylaxis should be established in patients with reduced mobility.

Pharmacological

- Topical analgesia with nonsteroidal, anti-inflammatory creams applied locally to the superficial vein thrombosis/superficial thrombophlebitis area controls symptoms.
- Hirudoid® cream (heparinoid) shortens the duration of signs/symptoms, although there is some evidence to suggest that heparin gel 1,000 IU/g may be more effective.
- An intermediate dose of low molecular weight heparin for at least a month might be advisable, although data currently available are too limited to make clear

recommendations.^[8] Further research is needed to assess optimal doses and duration of treatment and whether a combination therapy may be more effective than a single treatment.

- **Fondaparinux**® at a dose of 2.5 mg once a day for 45 days has been reported to lower the risk of pulmonary embolism (PE) or DVT by 85%. It has also been shown to reduce the risk of extension of thrombophlebitis and recurrence. There were few adverse events and the number needed to treat was 88 (to prevent 1 PE or DVT).

Antibiotics are only required if there is evidence of infection.

Surgical

If there are recurrences of the thrombophlebitis associated with extensive varicose veins, they should be excised.

COMPLICATIONS

- Extension into the deep veins.
- Suppurative phlebitis can lead to metastatic abscesses and septicaemia.
- Hyperpigmentation over the vein.
- Persistent firm nodule in subcutaneous tissues at the affected site.

II. DEEP VENOUS THROMBOSIS

DEFINITION

Deep venous thrombosis is a blood clot that forms in a vein deep inside a part of the body. It mainly affects the large veins in the lower leg and thigh.

CAUSES & ETIOLOGY

THREE IMPORTANT FACTORS

I VIRCHOW'S TRIAD 1 Venous stasis

2 Damage of endothelium

3 Hypercoagulability

1 Venous stasis

Action of muscles in the extremities and the functional adequacy of venous valves, which allow unidirectional flow. Venous stasis occurs when the valves are dysfunctional or the muscles of the extremities are inactive.

- Advanced age
- Atrial fibrillation
- Chronic heart failure
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- Orthopedic surgery
- Postpartum period
- Pregnancy
- Prolonged immobility
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- Malignancies
- Nephritic syndrome
- Polycythemia
- Protein C deficiency
- Sepsis

DVTs are most common in adults over age 60. However, they can occur at any age. When a clot breaks off and moves through the bloodstream, this is called an embolism. An embolism can get stuck in the brain, lungs, heart, or other area, leading to severe damage.

Blood clots may form when something slows or changes the flow of blood in the veins. **Risk factors include:**

- A pacemaker catheter that has been passed through the vein in the groin
- Bedrest
- Family history of blood clots
- Fractures in the pelvis or legs
- Giving birth within the last 6 months
- Obesity
- Recent surgery (most commonly hip, knee, or female pelvic surgery)
- Too many blood cells being made by the bone marrow, causing the blood to be thicker and slower than normal

SYMPTOMS

DVT mainly affects the large veins in the lower leg and thigh, almost always on one side of the body. The clot can block blood flow and cause:

- Changes in skin color (redness)
- Leg pain
- Skin that feels warm to the touch
- Swelling (edema)

DIAGNOSE STUDIES

- physical exam

The two tests that are often done first to diagnose a DVT are:

- D-dimer blood test
- Doppler ultrasound exam of the legs

Blood tests

- Activated protein C resistance (checks for the Factor V Leiden mutation)
- Antithrombin III levels
- Antiphospholipid antibodies

- Complete blood count (CBC)
- Lupus anticoagulant
- Protein C and protein S levels

TREATMENT

The main goals of treatment for deep vein thrombosis are:

- To prevent the blood clot from becoming larger.
- To prevent the blood clot from traveling to the lungs (pulmonary embolism).
- To prevent post thrombotic syndrome, a condition that can cause pain, sores, and swelling of the affected leg.
- To prevent the recurrence of blood clots.

NONPHARMACOLOGIC MANAGEMENT

Bed rest

Elevation of legs

Application of warm compression

Compression sticking

PHARMACOLOGICAL THERAPY

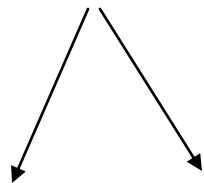
Vitamin k antagonist

e.g.Tab.Wararin ,acenocoumarol,dicumarol,

It will inhibits activation of vitamin k –dependent coagulation factor II,VII,IX,and X as well as the anticoagulant protein C and S.

Monitor INR

Indirect thrombin inhibitors



i]Unfractionated Heparin[UH] ii]Low molecular weight Heparin [LMWH]

i]UH e.g. Heparin sodium ,hepalean , lipo-Hepin

ii]LMWH e.g. Enoxaparin, tinzaparin, dalteparin,certoparin

Affects both the intrinsic and common pathways of blood coagulation by way of the plasma cofactor antithrombin .Antithrombin inhibits thrombin – mediated conversion of fibrinogen to fibrin by impacting factorsII,IX,X,XI,and XII.

Monitor PTT regularly

Direct thrombin inhibitors

e.g.Hirudin derivatives (lepirudin, bivalirudin, desirudin)

Synthetic thrombin inhibitors (argatroban)

Monitor aPTT, ACT

Factor Xa inhibitors

e.g.Fondaparinux

Factor Xa directly or indirectly proagulationoducing rapid anti

Thrombolytic drug

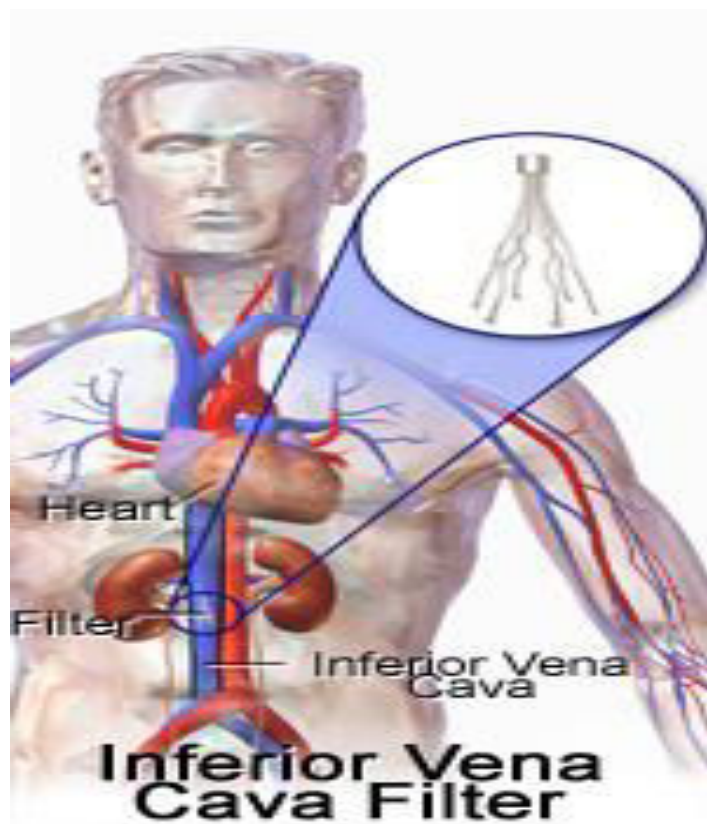
Administration of streptokinase ,urokinase or plasminogen activator

Surgical treatment

Open surgical venous thrombectomy and inferior venacava interruption

Inferior venacava filter

An **inferior vena cava filter (IVC filter)** is a type of vascular filter, a medical device that is implanted by interventional radiologists or vascular surgeons into the inferior vena cava to presumably prevent life-threatening pulmonary emboli (PEs).



The filter device is opened and the spokes penetrate the vessels wall. permitting filtration of clots without interruption of blood flow.

DIAGNOSTIC STUDIES

- Medical history
- Physical examination
- Family history
- Pulse check, using a stethoscope to listen for signs of reduce blood flow through a blood vessels
- Ankle/brachial index [ABI]test, which compares the blood pressure reading of the arms and legs to check for differences.
- Scans such as ultrasound or magnetic resonance imaging [MRI] to locate narrowed section of blood vessels.

Angiography, the injection of a contrast dye into the blood vessel that shows up on x-ray examination – this test is less common now that advanced imaging techniques, such as MRI, are available

TREATMENT OF PERIPHERAL VENOUS DISEASE

Medication –to help treat atherosclerosis ,such as statins lower LDL cholesterol and antihypertensive drugs to lower blood pressure

Drugs to treat blood clots –treatment may include various medication [including anticoagulants and anti-platelet drugs]to prevent blood clots from developing and medication [including thrombolytics]the dissolve existing blood clots.

Angioplasty-this procedure usually performed under sedation and local anesthetic, involves threading a thin tube [catheter]in to the narrowed or blocked site ,the small balloon on its tip is inflated. This widens the blood vessels and improves blood flow .Angioplasty is usually considered as a temporary measure.

Surgical insertion of a stent- a stent is a metal ‘sleeve’ that is implanted inside the narrowed blood vessels during an angioplasty procedure to prop it open .stent may be impregnated with medications that help to prevent scar tissue from narrowing the treated area of blood vessels

Atherectomy –this operation involves cutting away the fatty obstruction with a small scalpel – like instrument.

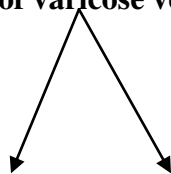
Bypass surgery –this operation is usually only considered in severe cases that don’t respond to other treatment or in cases that involves large sections of the diseased blood vessels, A section of healthy vein is taken from somewhere else in the body and surgically grafted to re-route blood around the blockage in the affected blood vessel .A surgeon may sometimes use a piece of synthetic tubing to detour blood flow.

VARICOSE VEINS

DEFINITION

Varicose veins - are subcutaneous dilated veins three millimeters or greater in size. They may involve the saphenous veins, saphenous tributaries, or nonsaphenous superficial leg veins.

Classification of varicose vein



i]Primary varicose veins ii]secondary varicose veins

i]Primary varicose veins [idiopathic]

- Common in women
- Family history
- Congenital weakness

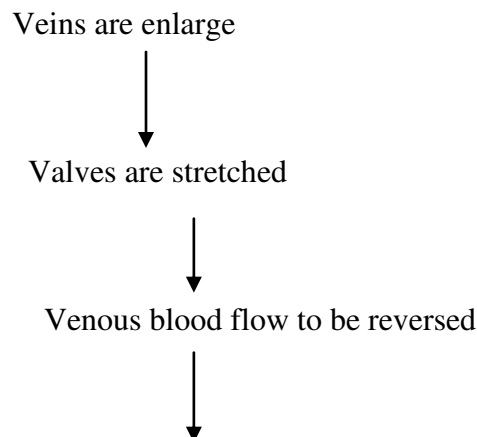
ii]secondary varicose veins

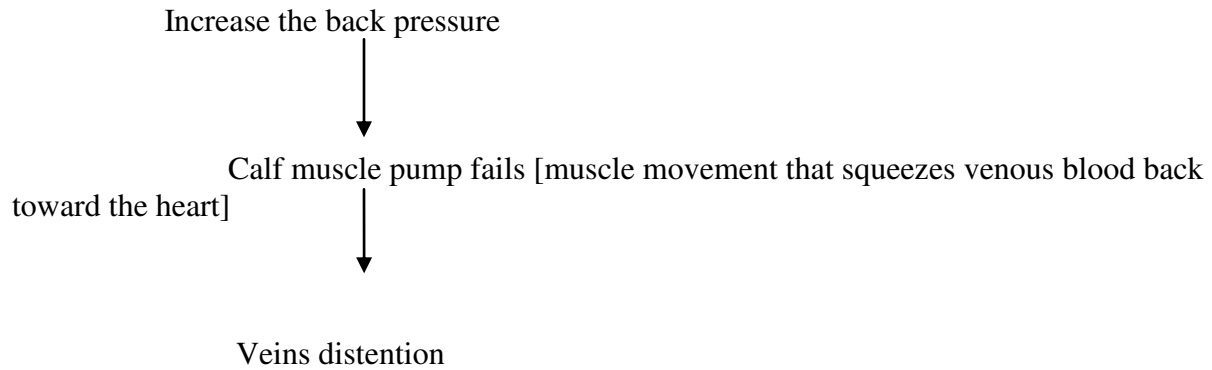
- Previous DVT
 - Oesophagus varices
 - Hemorrhoids
 - Abnormal arteriovenous connection [av fistula]
- **Telangiectasias** - are a confluence of dilated intradermal venules less than one millimeter in diameter.
- **Reticular veins** - are dilated bluish subdermal veins, one to three millimeters in diameter. Usually tortuous.

ETIOLOGY & RISK FACTOR

- Common in women
- Family history
- Congenital weakness
- Increasing age
- Obesity
- Pregnancy
- Occupation [prolong standing]

PATHOPHYSIOLOGY





CLINICAL MANIFESTATION

- Fullness, heaviness, aching, and sometimes pain in the legs
- Visible, swollen veins
- Mild swelling of ankles
- Brown color of the skin at the ankles (in more severe cases)
- Skin ulcers near the ankle (in more severe cases)

DIAGNOSTIC STUDIES

- ❖ History
- ❖ Physical examination
- ❖ Duplex ultrasound exam of the extremity

TREATMENT

Conservative

- Leg elevation
- Exercise
- Compression stockings
- Avoid standing for too long

Surgical treatment

Vein stripping is surgery to remove varicose veins in the legs. It is usually only done in patients who are having a lot of pain or who have skin sores.

Less invasive treatments for varicose veins are:

- Laser ablation
- Radiofrequency ablation
- Sclerotherapy (which is often done to improve appearance)
- Saphenofemoral ligation
- Transilluminated powered phlebectomy

Radiofrequency ablation

Heats the tissue surrounding the catheter electrode to a specified temperature. Radiofrequency works well on tissue composed primarily of collagen

Special probes have been designed for the radiofrequency device to manage non-saphenous and perforator veins.

SCLEROTHERAPY

Sclerosing Agents

- Sodium tetradecyl sulfate
- Hypertonic Saline
- Polidocanol
- Monoethanolamineoleate

Sclerotherapy (injection of a substance into the vein) shows greater benefits than surgery in the short term but surgery has greater benefits in the longer term. varicose veins are a relatively common problem. two treatments available are surgery and sclerotherapy. both involve removal of the vein either by stripping it out (surgery) or by injecting it with a solution that causes it to collapse and be absorbed into the surrounding tissues (sclerotherapy). neither treatment adversely affects blood flow through the limb. this review found that sclerotherapy was better than surgery in terms of treatment success, complication rate and cost at one year, but surgery was better after five years. however, the evidence was not of very good quality and more research is needed.

Complications

- Pain, bruising, hematoma
- Skin changes: burns, induration, pigmentation, matting, dysesthesia, & superficial thrombophlebitis.
- Nerve injury
- DVT
- Wound infection

CHRONIC VENOUS INSUFFICIENCY AND VENOUS LEG ULCERS

DEFINITION

Chronic venous insufficiency (CVI) is a condition that occurs when the venous wall and/or valves in the leg veins are not working effectively, making it difficult for blood to return to the heart from the legs.

INCIDENCE

An estimated 40 percent of people in the United States have CVI. It occurs more frequently in people over age 50, and more often in women than in men.

ETIOLOGY

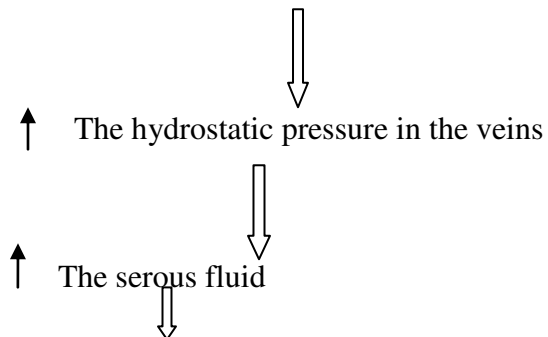
- ❖ Valve damage [allowing the blood to leak backward.]
- ❖ Deep vein thrombosis
- ❖ Pelvic tumors and vascular malformations,
- ❖ Calf muscle failure

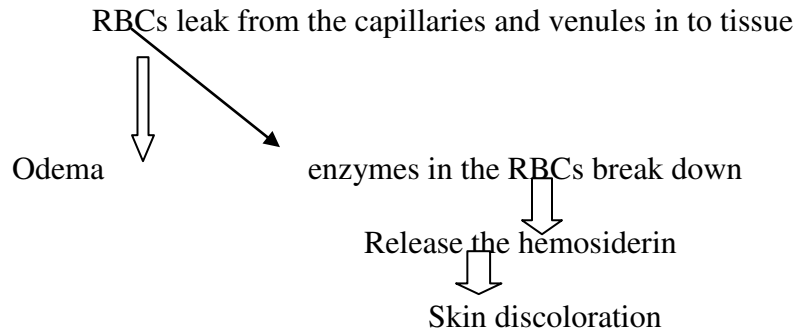
RISK FACTORS

- Deep vein thrombosis (DVT)
- Varicose veins or a family history of varicose veins
- Obesity
- Pregnancy
- Inactivity
- Smoking
- Extended periods of standing or sitting
- Female sex
- Age over 50

PATHOPHYSIOLOGY

Duo above cause dysfunction of the valves





CLINICAL MANIFESTATION

- Swelling in the lower legs and ankles, especially after extended periods of standing
- Aching or tiredness in the legs
- New varicose veins
- Leathery-looking skin on the legs
- Flaking or itching skin on the legs or feet
- Stasis ulcers (or venous stasis ulcers)
- Wound infection&cellulitis

DIAGNOSTIC STUDIES

- Complete medical history and physical exam
- **Vascular Ultrasound or duplex ultrasound** may be used to examine the blood circulation in your legs. During the vascular ultrasound, a transducer (small hand-held device) is placed on the skin over the vein to be examined. The transducer emits sound waves that bounce off the vein. These sound waves are recorded, and an image of the vessel is created and displayed on a monitor.

MANAGEMENT

Conservative management

- **Avoid long periods of standing or sitting:** If you must take a long trip and will be sitting for a long time, flex and extend your legs, feet, and ankles about 10 times every 30 minutes to keep the blood flowing in the leg veins. If you need to stand for long periods of time, take frequent breaks to sit down and elevate your feet.
- **Exercise regularly.** Walking is especially beneficial.
- **Lose weight** if you are overweight.
- **Elevate your legs** while sitting and lying down, with your legs elevated above the level of your heart.
- Wear compression stockings.
- Take antibiotics as needed to treat skin infections.

- Practice good skin hygiene.
- Skin Care

Practicing good skin hygiene is important. Keep your skin moisturized so that it doesn't flake or crack easily. If the skin is not broken or leaking fluid but is inflamed, your doctor may recommend an anti-itch cream, such as one containing hydrocortisone; a cream containing zinc oxide to protect the skin; or an antifungal cream to prevent fungal infections.

Skin that is leaking fluid is treated with wet compresses. If you have ulcers on your legs, your doctor will show you how to apply layered compression bandages to protect the skin and maintain blood flow.

NONSURGICAL TREATMENT

Nonsurgical treatments include sclerotherapy and endovenous thermal ablation.

Sclerotherapy involves the injection of a solution directly into spider veins or small varicose veins that causes them to collapse and disappear. Several sclerotherapy treatments are usually required to achieve the desired results. Sclerotherapy is simple, relatively inexpensive, and can be performed in the doctor's office. Sclerotherapy can eliminate the pain and discomfort of these veins and helps prevent complications such as venous hemorrhage and ulceration. It is also frequently performed for cosmetic reasons.

Endovenous thermal ablation is a newer technique that uses a laser or high-frequency radio waves to create intense local heat in the affected vein. The technology is different with each energy source, but both forms of local heat close up the targeted vessel. This treatment closes off the problem veins but leaves them in place so there is minimal bleeding and bruising. Compared with ligation and stripping, endovenous thermal ablation results in less pain and a faster return to normal activities, with similar cosmetic results.

SURGICAL TREATMENT

Ligation and stripping often are performed in combination. Vein ligation is a procedure in which a vascular surgeon cuts and ties off the problem veins. Most patients recover in a few days and can resume their normal activities. Stripping is the surgical removal of larger veins through two small incisions. Stripping is a more extensive procedure and may require up to 10 days for recovery. It usually causes bruising for several weeks after surgery.

Microincision/ambulatory phlebectomy is a minimally invasive procedure in which small incisions or needle punctures are made over the veins, and a phlebectomy hook is used to remove the problem veins.

Vein bypass in the leg is similar to heart bypass surgery, just in a different location. It involves using a portion of healthy vein transplanted from elsewhere in your body to reroute blood around the vein affected by CVI. Bypass is used for treatment of CVI in the upper thigh and only in the most severe cases, when no other treatment is effective.

Valve repair

In valve repair, your surgeon shortens the valves inside your vein to improve valve function. After making a small incision into your skin, your surgeon cuts into the affected vein. Your surgeon then folds or tucks the valve flaps. He or she may place a fabric sleeve around the outside of your affected vein to help press the walls of the vein together to maintain valve function.

Angioplasty and Stenting

In more severe cases of CVI, your surgeon may recommend angioplasty or stenting. An angioplasty is the use of a balloon to push open a narrowed or blocked portion of the vein. A stent is a metal-scaffold tube that helps to keep the narrowed areas open. In some instances, depending on where the vein blockage is, this may be used to open up the blockage. The procedure is performed through small needle punctures in the veins, either behind the knee or in the groin. Typically angioplasty and stenting are safe procedures.

PREVENTION

- Eat a healthy balanced diet.
- Quit smoking.
- Exercise regularly.
- Avoid wearing restrictive clothing such as tight girdles or belts.
- Lose weight if you are overweight.
- Avoid prolonged sitting or standing.

NURSING MANAGEMENT PATIENT WITH PERIPHERAL VASCULAR DISEASE

List of nursing diagnosis patient with peripheral arterial disease

1. Ineffective tissue perfusion related decreased arterial blood flow as evidenced by claudication ,absent peripheral pulses.
2. Acute pain related to inflammation as evidenced by highest rating in pain scale.
3. Impaired skin integrity related to edema/surgical incision/wound as evidenced by redness or breaks in skin.
4. Activity intolerance related to imbalance between oxygen supply and demand as evidenced by intermittent claudication.
5. Ineffective therapeutic regimen management related to lack of knowledge of disease and self care measures as evidenced by questions about disease, treatment.
6. Risk for Peripheral Neurovascular Dysfunction related to impaired peripheral blood flow to lower extremities.

Intervention

Maintain adequate tissue perfusion

Assess the general condition of the patient

Check peripheral pulse, edema, capillary refill, color.

Monitor degree of discomfort

Provide warmth to increase the vasodilation

Encourage the patient to exercise to enhance oxygen utilization in the tissue.

Intact skin integrity

Asses the skin condition of the patient

Instruct the patient and family on protection from injury

Instruct the patient foot and nail care

Provide good antiseptic dressing

Maintain adequate hydration

Apply emollients to affected area

Increase the activity tolerance

Asses the activity level of the patient

Instruct the patient about appropriate type of exercise

Assist the patient develop an appropriate exercise program to meet needs to prevent injury

Instruct the patient on proper warm up and cool down exercise .

List of nursing diagnosis patient with peripheral venous disease

1. Acute pain related to venous congestion, impaired venous return and inflammatory as evidenced by highest rating in pain scale.
2. Activity intolerance related to imbalance between oxygen supply and demand as evidenced by intermittent claudication.
3. Ineffective health maintenance related to lack of knowledge about disorder and treatments.
4. Risk for impaired skin integrity related to altered peripheral tissue perfusion
5. Potential complication bleeding related to anticoagulant therapy
6. Potential complication pulmonary embolism related to embolization of thrombus, dehydration and immobility.

Peripheral Artery Disease procedures and trends in Asia Pacific 2010 – 2011

- Lower limb peripheral artery disease (PAD) or peripheral vascular disease (PVD) is a cardiovascular disease that leads to narrowing and hardening of arteries found outside the coronary, aortic arch and brain. With an estimated 10 million people in these markets who are diagnosed with lower limb PAD annually, another 76% (Taiwan) to 98% (India) of cases remain to undiagnosed due to low awareness or asymptomatic patients.
- Current methods for treating lower limb PAD generally commence with the prescription of medication and lifestyle changes for milder cases. However, lower limb PAD is often

diagnosed in the later stages and treatment options include angioplasty (with or without stenting) and bypass grafting.

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