DISORDERS OF ARTERIES

STRUCTURE OF BLOOD VESSELS

- Blood vessels have 3 layers
  - Tunica intima
  - Tunica media
  - Tunica adventitia

Tunica intima

- Innermost layer
- Made of simple squamous epithelium
- This provides a silk surface to facilitate smooth flow of blood

Tunica media

- Middle layer
- Made of smooth muscle
- Thicker than the tunica media of the veins
- This makes arteries more elastic than veins

Tunica adventitia

- Outermost layer is made of connective tissue
- Veins have a thicker tunica adventitia than arteries

Arteriosclerosis and atherosclerosis

- **Arteriosclerosis:-**

The term means hardening of the arteries.

It is the diffused process where by the muscle fibers and the endothelial lining of the walls, small arteries and arterioles become thickened

- **Atherosclerosis :-**

It involves a different process, affecting the intima of the large and medium sized arteries. These consists of accumulation of lipids, calcium, blood components, carbohydrates and fibrous tissue on the initial layer of the artery.

Risk factors for atherosclerosis

Modifiable

- Nicotine use (ie, tobacco smoking , chewing)
- Diet (contributing to hyper lipidemia)
- Hypertension
- Diabetes
- Stress
- Sedentary lifestyle

Nonmodifiable

- Age
- Gender

Pathophysiology

Vascular endothelial cell injury results from prolonged hemodynamic forces, such as shearing stress and turbulent flow, irradiation, chemical exposure or chronic hyper lipidemia in the arterial system

Injury to the endothelium increases the aggression of platelets and monocytes at the site of the injury. Smooth muscle cells migrate and proliferate, allowing a matrix of collagen and elastic fibbers to form.

Table II - Possible sequence of events in the theory of "response to lesion"

Lesion factors (lipids, hemodynamic, immunological reactions, etc)

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Functional endothelial lesion

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Infiltration and activation of macrophages -> foam cells

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Growth factor secretion (PDGF and other peptides)

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Migration and multiplication of smooth muscle cells

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Plaque growth

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Secondary endothelial lesion

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Platelet adhesion and activation

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Ulterior plaque growth

Modified from Ross R, 1986 [1].

CLINICAL MANIFESTATIONS

- Coronary atherosclerosis
  - Angina
  - Acute myocardial infarction
- Cerebrovascular disease
  - Transient ischemic attacks
  - Stroke
- Aortic aneurism
- Atherosclerotic lesions of the extremities
- Reno vascular disease (renal artery disease, end stage renal disease)
- Hypertension

INVESTIGATION

- ECG- shows ischemia due to poor blood supply
- Doppler study- assess amount of blood pass through, thickness of the walls
- Echo cardiogram
- X-ray
- Cardiac catheterization

Medical management

- Modification of the risk factors
- A controlled exercise program to improve circulation and
- Increase the functioning capacity of the circulation

Surgical management

- Inflow procedure:-

  which provide blood supply from aorta into the femoral artery

- Outflow procedure:-

  which provide blood supply to vessels below the femoral artery

Radiologic intervention

- Percutaneous trans luminal angioplasty (PTA)

To decrease the risk of re occlusion, stent (small mesh tubes made of nitinol, titanium, or stainless steel) may be inserted to support the walls of the blood vessels and prevent collapse immediately

Complication of PTA

- Hematoma formation
- Embolus
- Dissection (separation of the intima) of the vessel
- Bleeding

PREVENTION

- **American Heart Association recommends:-**
  - Reducing the amount of fat in diet
  - Substituting unsaturated fats for saturated fat
  - Decrease cholesterol intake to no more than 300mg daily to reduce the risk of cardio vascular disease

NURSING MANAGEMENT

MAJOR GOALS:-

- Increase arterial blood supply to the extremities
- Promotion of vasodilation
- Prevention of vascular compression
- Relief of pain
- Maintenance of tissue integrity

Peripheral arterial occlusive disease

arterial insufficiency usually found in individual older than 50 years of age, most in men

the legs are most frequently affected

The occlusion occur in below the renal arteries to the peripheral artery

Risk factors

- **Nonmodifiable**
- age
- Gender
- Familial predisposition

- **Modifiable**
- Nicotine use (tobacco smoking, chewing)
- Hypertension
- Diet
- Obesity
- Sedentary lifestyle
- Stress
- Diabetes mellitus

Clinical manifestations

- Intermittent claudication
- Pain- aching, cramping– fatigue or weakness that is consistently reproduced with the same degree of exercise or activity and relived with rest
- Decreased ability to walk the same distance or may notice increased pain with ambulation

when disease become severe, patient begins to have pain on rest also.

- This pain unrelieved by opioids
- Pain usually worse at night
- Elevating the extremities or placing it in the horizontal position increases the pain

CLINICAL MANIFESTATIONS

- Coldness or numbness in the extremities
- Pale in colour
- Cyanosis
- Ulcerations
- Gangrene
- Muscle atrophy
- Peripheral pulse diminished or absent

INVESTIGATION

- Doppler
- Ankle-Brakial Indices (ABIs)
- Treadmill test – for claudication
- Duplex ultrasonography

Medical management

- Some type of exercise programme with wait reduction
- Cessation of tobacco use will helps to improve their activity tolerance level

Pharmacologic therapy

- Pentoxifylline- increase erythrocyte flexibility and reduces blood viscosity and improve the oxygenated blood supply to the muscle
- Cilostazol- inhibiting platelet aggregation and increase vasodilatation
- Aspirin
- Clopidogrel

Surgical management

- Visceral grafting or enderterectomy
- Amputation
- Bypass graft
- Femoral to popliteal graft- if the occlusion is below the inguinal ligament

NURSING MANAGEMENT

- Maintaining circulation
  - Assess colour and temperature of the extremities
  - Capillary refill
  - Doppler assessment
  - ABIs- at least once in 8 hour for 24 hours

- Monitoring and maintain potential complications
  - Monitoring urine out put (>30ml/hr)
  - CVP
  - Mental status
  - Pulse rate and volume
  - Bleeding –because of heparin administration
  - Edema- elevating the extremities, elastic stockings

UPPER EXTREMITY ARTERIAL OCCLUSIVE DISEASE

Arterial occlusion occur less frequently in the upper extremities than in the legs

Risk factors

- Atherosclerosis
- Trauma
- Accident

PATHOPHYSIOLOGY

The stenosis usually occur at the origin of the vessel proximal to the vertebral Artery

reverse flow in the vertebral and basilar artery to provide blood flow to the arm (vertibrobesilar symptom)

CLINICAL MANIFESTATIONS

- Vertigo
- Ataxia
- Syncope
- Arm fatigue
- Pain with exercise
- Inability to hold or gasp object
- Coolness on the affected extremities

Diagnosis

- Upper arm and for arm blood pressure
- Duplex ultrasonography
- Trance cranial Doppler evaluation- assess intracranial circulation

MEDICAL MANAGEMENT

- PTA
- Axillary to axillary artery bypass
- Carotid to subclavian artery bypass

NURSING MANAGEMENT

- Frequently assess the radial or ulnar, and brachial pulses
- Motor and sensory functions
- Colour changes and capillary refill every 2 hour
- Assess for post operative complications such as
  - Infection
  - Re occlusion
  - Occlusion of the graft

THROMBOANGITIS OBLITERANS

(BURGER'S DISEASE)

Burger's disease is characterised by recurring inflammation of the intermediate and small arteries and veins of the lower and upper extremities.

Incidence

- It occurs most often in men between the age of 20 and 35

Causes

- Exact causes is unknown, but it is beloved to be an autoimmune vasculitis

- Smoking or chewing of tobacco is the aggregating factor

Clinical manifestations

- Pain
- Foot cramps

} Especially after exercise

- Pain released after rest
- Burning sensation
- Cold sensation
- Reddish blue discoloration of the foot
- Absence of pulse

MANAGEMENT

- Main objectives:-
  - To improve circulation to the extremities
  - Prevent progression of the disease
  - Protect the extremities from trauma and infection

- Treatment for ulceration and gangrene
  - Conservative debridement

- Vasodilators are rarely prescribed, because these dilates healthy vessels only

Surgical management

- Toe amputation for gangrene
- Trasmetatarsam amputation
- Below knee amputation
- Above knee amputation

NURSING MANAGEMENT

- AFTER AMPUTATION:-
- Elevate the stump for first 24 hours to promote venous return and minimise edema.
- Provide sterile dressing
- Assess for any signs for infection
- Assess for bleeding
- Check the skin integrity and color
- Compare the temperature with both extremities

- Psychological support
  - Patient may experience grief, fear, or anxiety related to loss of limb
  - Encourage to discuss to ventilate their feelings
  - Rehabilitation educate about the home care

THANK YOU...