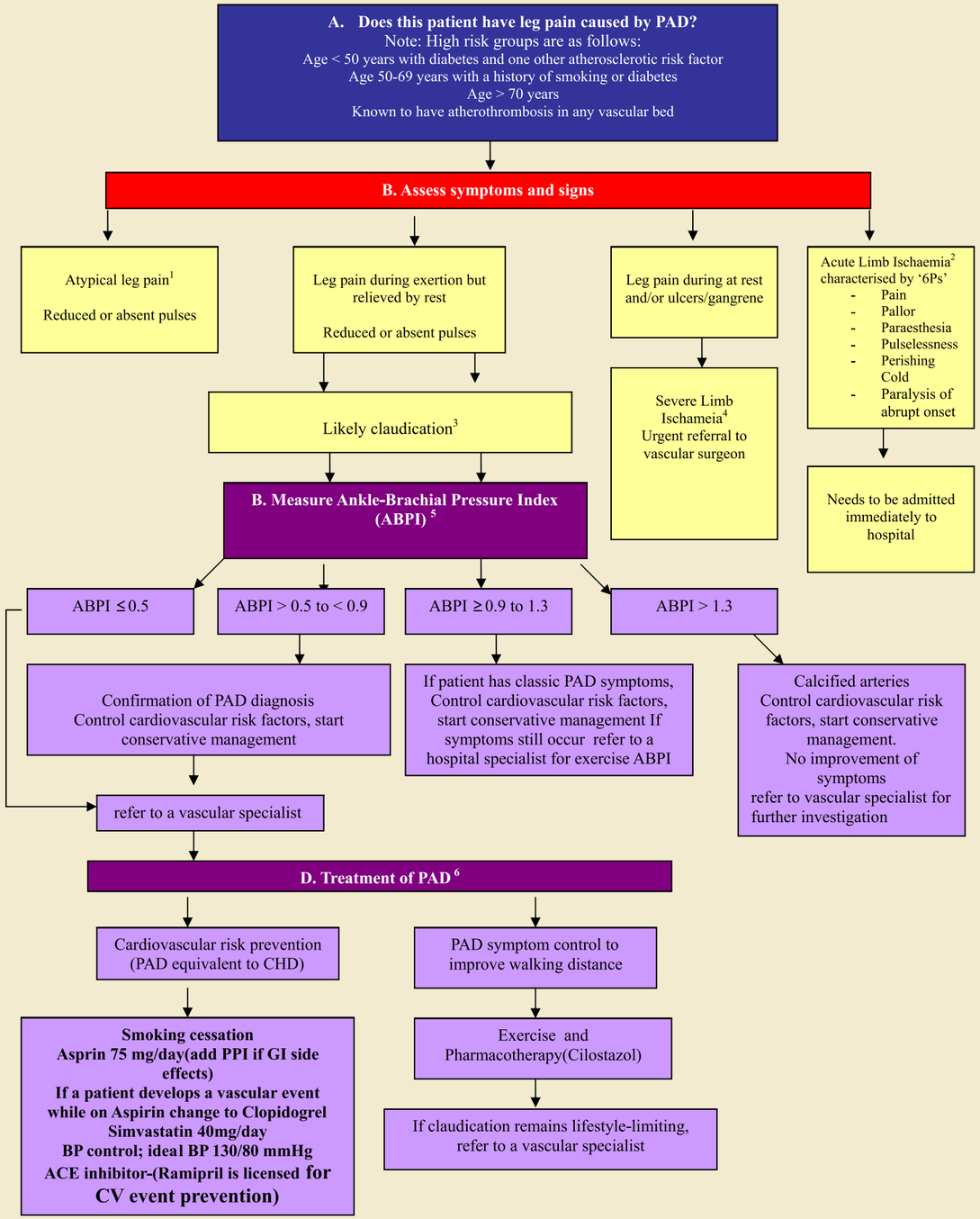
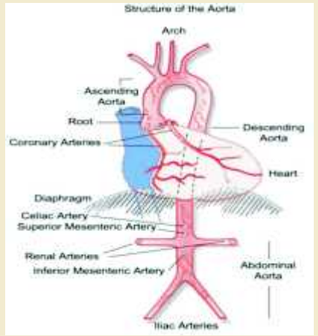
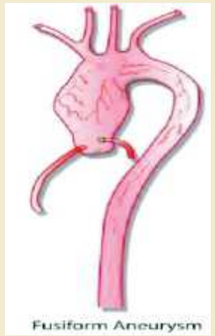
Peripheral Arterial Disease (PAD)



AORTA

- **Root** - The root is the beginning of the aorta. Starting from the aortic valve (annulus) and becoming slightly wider in diameter (sinuses of Valsalva), it gives rise to two coronary arteries and ends at the beginning of the ascending aorta (sinotubular junction). The two coronary arteries are responsible for carrying oxygen-rich blood to the heart muscle itself.
- **Ascending Aorta** - This segment extends upward from the aortic root to the point where the innominate artery branches off the aorta, and the aorta begins to form an arch. It is within the heart sack (pericardium) by itself and no arteries branch from it. There is little support from surrounding tissue and it must face the entire cardiac output volume (minus the coronary arteries), making the ascending segment the most vulnerable part of the aorta.
- **Aortic Arch** - The arch represents the curved portion at the top of the aorta. The innominate, left common carotid, and left subclavian arteries, which supply blood to the head and upper body, branch from the arch. It is outside the pericardial sack and generally has better support from surrounding structures.
- **Descending Aorta** - This section begins just beyond the arch as the aorta bends down into the body. The descending aorta ends at the diaphragm. It contains the intercostal arteries that feed the spinal cord. The beginning portion of the descending aorta is vulnerable to injury (intimal tear) during deceleration conditions.
- **Thoracoabdominal Aorta** - This section begins at the diaphragm and ends at the visceral vessels (celiac, superior mesenteric and renal arteries).
- **Abdominal Aorta** - The abdominal aorta begins below the renal arteries, which supply blood to the kidneys. The aorta ends where it divides into the two iliac arteries. It contains a small artery named the inferior mesenteric artery.





AORTIC ANEURYSMS

- The permanent enlargement of some portion of a blood vessel is often described as bulging, ballooning or dilated. The diameter of the enlargement will determine whether or not it is considered an aneurysm. Traditionally for the aorta, any permanently dilated section measuring 4.0 cm or greater in diameter has been called an aneurysm.
- The definition of an aneurysm may also be based on comparison with the normal blood vessel size for an individual. When the permanent enlargement of some part of a blood vessel is at least 1.5 times greater than normal size, it may be termed an aneurysm.
- Whether the aorta is called "dilated" or the word "aneurysm" is used, any enlargement of the aorta, regardless of its size, is an indication of aortic disease and requires treatment.
- Thoracic aortic aneurysms are described according to their location, size and shape. Location indicates the sections of the aorta affected (i.e., the root, ascending, arch, descending or abdominal). There are generally two different shapes for aneurysms: fusiform and saccular.

DIAGNOSTIC TESTS

- **Echocardiography :** Echocardiograms use sound waves to produce pictures showing the heart chambers and valves as well as the aorta. This technology is particularly useful in evaluating valve function. Transthoracic echocardiograms (TTE) have the advantage of being noninvasive with a good level of accuracy for evaluating the ascending aorta, as well as the cardiac chambers and valves.
- **CT:** Spiral CT scans will require an intravenous contrast agent to rule out aortic dissection. This technology is widely available and an excellent tool for sizing of the aorta.

- **MRI:** MRI technology, an alternative to the CT scan, uses magnetic fields in creating images of the aorta. MRI shows blood flow, as well as details of the aorta and heart valves. Although more expensive than CT scans, the resultant images display much finer detail. There is no X-ray exposure, and the intravenous contrast has no adverse affect on the kidneys. It is not possible to use this test in critically ill patients or those with implanted pacemakers or ICDs.

- **Aortography:** Presently there is very little indication for the use of aortography in the diagnosis of aortic disease unless it is done at the point of interventional treatment (balloon fenestration, endovascular stented graft placement). Routine use of coronary angiography in aortic dissection and connective tissue disorders (Marfan syndrome or bicuspid aortic disease) is not advised as these patients have a natural protection against atherosclerosis. Unless patients have a high risk factor for coronary artery disease, they are usually free of any significant plaque formation.

TREATMENT

Medical Treatment

- Medical treatment and lifestyle changes are specified for each individual and will include blood pressure optimization and lifestyle recommendations. Blood pressure medications, such as beta blockers, ACE inhibitors, ARBs and calcium channel blockers, are commonly prescribed. Lifestyle recommendations address diet, exercise and smoking cessation. It is very important that those with aortic disease do not smoke either actively or passively. A diet low in fat and carbohydrates and high in fiber and protein is recommended.

Surgical Treatment

- When the risk of aortic dissection or rupture is greater than that associated with surgery, elective surgery is offered to replace the diseased section of the aorta with a Dacron graft. If necessary the aortic valve may also be either repaired or replaced.

Endovascular Treatment (TAA & AAA)

Thoracic Aortic Aneurysms & Abdominal Aortic Aneurysms are now treated by minimally invasive methods by using Thoracic Endoprosthesis (VALIANT)& Abdominal Endoprosthesis (TALENT). These treatment options are very safe for the patients.

Peripheral Vascular Disease

The vascular system is a network of blood vessels including arteries, veins, and capillaries. Arteries carry oxygen and nutrients to the body; veins return blood from the tissues to the heart. Peripheral Vascular disease refers to changes that can occur in blood vessels affecting the normal flow of blood. These disorders can be life- or limb-threatening and can run in families.

Peripheral Arterial Disease (PAD)

Lifestyle and heredity can play a strong role in whether someone will develop Peripheral vascular disease. It is especially important to understand the risk factors, signs/symptoms, and warning signs associated with vascular disease, which are as follows:

Signs/Symptoms

- Stroke
- Hardening of the arteries
- Non-healing wounds
- Aneurysms
- Varicose or spider veins
- Difficulty walking

1. Diagnosis of a typical leg pain

Atypical leg pain is defined by lower extremity discomfort that is exertional, but does not consistently resolve with rest, or consistently limits exercise at a reproducible distance.

2. Acute Limb Ischaemia (ALI)[i]

ALI is due to sudden cessation of blood flow. This could be due to thrombosis or embolus clinical symptoms. This is a surgical emergency that requires an emergency admission to the hospital.

3. Diagnosis of (Intermittent) Claudication [i]

Location	Buttock, thigh or calf muscles. Rarely the foot
Characteristic pain	Cramping, aching, fatigue, weakness, or frank
Onset relative to exercise	After some degree of exercise
Effect of rest	Relieved
Effect of body position	None
Other characteristics	Reproducible

4. Severe Limb Ischaemia(SLI) [i]

Severe or critical limb ischaemia, manifested by rest pain, ulceration or gangrene, represents a risk of limb loss and requires urgent assessment by a vascular specialist. Rest pain requiring nacortic analgesic with or without tissue loss, with or without ulceration or gangrene lasting more than 2 weeks requires urgent vascular referral.

5. Ankle-Brachial Pressure Index (ABPI) [ii]

- The ABPI is a quick (10mins), non-invasive, simple, inexpensive measurement to assess the patency of the lower extremity arterial system.
- Measurements for both the ankle and brachial blood pressure readings are taken with the patient in the supine position using a 8-Mhz handheld Doppler device.
- The ABPI value is calculated by dividing the ankle systolic pressure (ASys) by systolic brachial pressure (BSys):

ABPI = Asys/BSys

Although the ABPI is an effective diagnostic tool, it should only be used within the context of clinical judgement and the presence of other PAD indicators. For example, patients with diabetes may record abnormally high values.

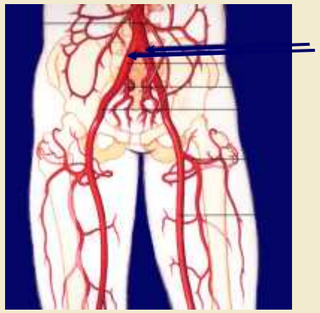
6. Treatment of PAD [ii]

Published UK treatment guidelines for PAD recommend the aggressive management of all associated risk factors.

Cardiovascular Event Risk Reduction: Preventing the cardiovascular and cerebrovascular events associated with PAD is crucial to patient well being and survival. The treatment is identical to that used for patients with CHD. It should be noted that β-blockers may be used in patients with intermittent claudication.

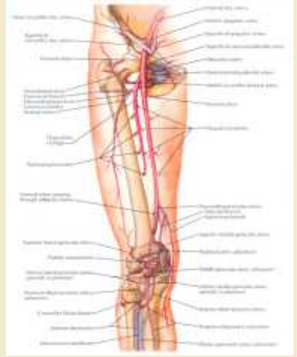
Symptom Control: Although inherently part of an exercise programme, improved walking distance can have a marked effect on patient quality of life. Pharmacotherapy may improve quality of life and walking distances. Invasive therapeutic interventions such as angioplasty or surgery may be indicated for patients with severe, disabling, intermittent claudication.

Iliac Artery Anatomy



- The common iliac arteries (right and left) evolve from the distal end of the aorta.
- Diameter: ranges between 7-9 mm
- Length: approximately 2 inches.

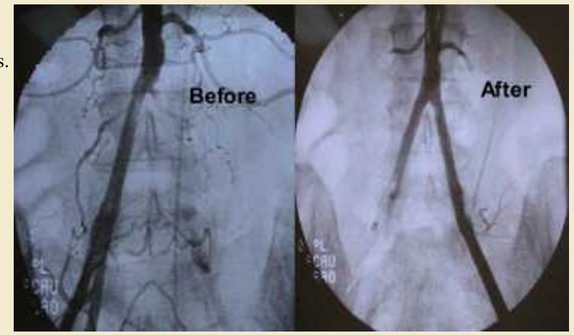
Iliac Artery Anatomy



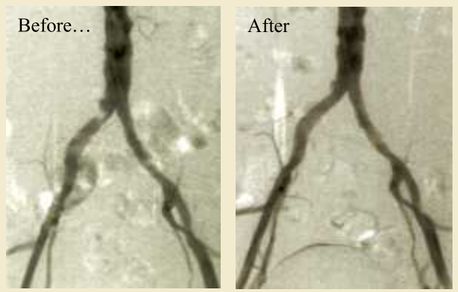
- The external iliac artery changes to the femoral artery at the groin.
- The femoral artery changes to the popliteal artery at the knee joint.
- The popliteal artery branches into the tibial and fibular arteries.

Iliac Artery Disease

- The iliac arteries supply blood to all the arteries in the legs.
- Symptoms of iliac artery disease resulting from limb ischemia include:
  - claudication
  - non - healing ulcers
  - gangrene

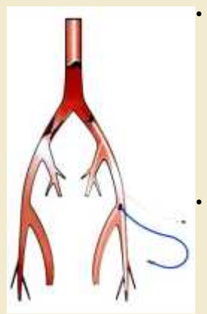


The Result…

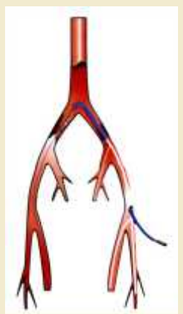


Perfect Result in 6 Minutes!!

Technique : Treatment Options



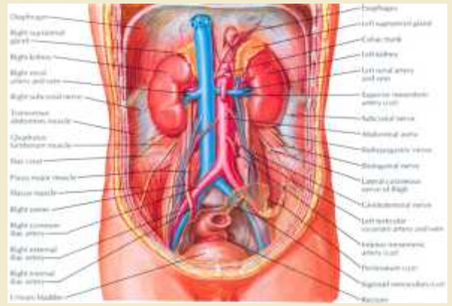
- Arterial sheath is placed in the artery on the opposite side of the body as the lesion.
- A guide catheter is used to direct the guidewire “up-and-over” the bifurcation.

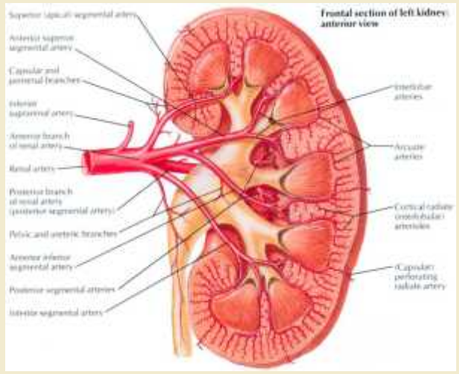


Renal Artery Anatomy

Functions of Kidney

- Filtration organ
- Blood pressure control mechanism





Renal artery stenosis may result in the following clinical symptoms:

- Hypertension (not controlled with medications)
- Renal Insufficiency
- Cardiovascular Disease

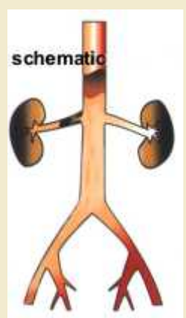
Treatment options for renal artery stenosis

- Medical therapy (to control blood pressure)
- PTA
- Stent placement
- Surgery

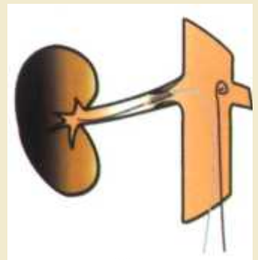
Why perform renal stenting ?

- Progression of disease if left untreated
- Control hypertension
- Alleviate clinical symptoms of CHF, angina, etc.

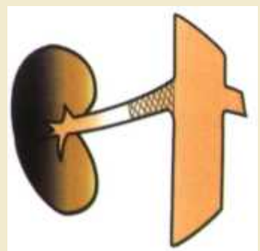
Example of a renal lesion



Example of renal stenting



Racer



Launcher