

Angiography for Investigation of Arterial Disease.



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The Disease

Arteries take blood, carrying vital **oxygen and nutrients**, to the tissues of the body.

The leg has several main arteries and a network of smaller arteries (called collaterals). The main arteries can be likened to the highways and the collaterals can be likened to side roads.

If there is insufficient blood supply, the tissues are deprived of oxygen and nutrients. This can cause **pain and dysfunction** during activity or in more severe cases **pain at rest, ulceration** and tissue death including **gangrene**.

The commonest cause of narrowing and blockage of the arteries is **atherosclerosis** (hardening of the arteries). Atherosclerosis is a complex deposition of fats and calcium in the artery wall.

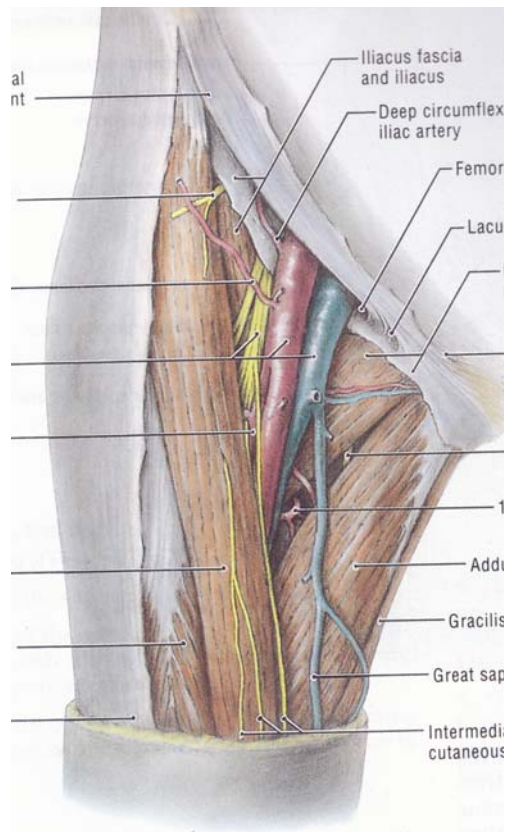


Figure 1. The femoral arteries in the groin.

Symptoms and Complications

- **Claudication** - Pain in the leg muscles during exercise.
- **Rest Pain** – often at night. This is more often in the foot near the toes. It is often relieved by hanging the leg down.
- **Ulceration/Non Healing Wounds** - This occurs when the blood supply is insufficient to keep the skin alive, especially in areas of increased load or after wounding.
- **Neurological** change such as tingling or numbness or even paralysis. Severe pain, numbness, tingling or paralysis is an **emergency** requiring immediate treatment.
- **Colour** changes in the foot/toes

Claudication can be a minor annoyance or a **debilitating** symptom. The risk of ultimate limb loss is small in people suffering only claudication.

Rest pain, ulceration and gangrene can signal impending limb loss. This is critical limb ischaemia and is a strong indication for treatment.

Investigations

There are multiple investigations used for the investigation of arterial disease. These include:-

- **Duplex Ultrasound Scan**
- **Doppler pressure studies** with an ultrasound probe and blood pressure cuff applied to the arm, leg and toes.
- **Exercise Doppler pressure studies** – pressure studies are done before and after exercise.
- **Angiography** with X-Ray contrast injection into the artery
- **CT or MRI Scans**



Angiography

Many of the treatments require accurate **information** about the anatomy of the disease and this is best provided with an **angiogram**. The procedure is not intended to *treat* the problem, rather to help decide how best to do this. In some cases however, a treatment is possible at the same time.

An **angiogram** is a procedure done under local anaesthetic. An artery, usually in the groin, is pierced with a needle, and through this a guidewire and a tiny tube called a catheter is placed in the major artery/s being investigated (See figure 2). Through this narrow tube, contrast is injected while X-Rays are taken which shows the points which are affected with the disease and gives valuable information about the diseased arteries and the other arteries connected to it.

At the end of the procedure, the catheter is removed, and pressure is applied to the puncture site for approximately 10 minutes until the vessel has sealed itself and will not bleed. It is necessary to lie flat for a period of hours after the procedure.

Side effects and Complications

Unfortunately, no invasive procedure is perfect or without risk. While not exhaustive, the more common and important risks are outlined below.

Potential risks include the general risks of anaesthesia and surgery:-

- **Death** – very rare.
- **DVT or Pulmonary embolus** - a clot in the deep veins of the leg which can travel to the lungs – rare.
- **Severe Allergic reaction to the contrast agent**
- **Worsening of blood flow** to the leg with possible major amputation requirement – estimated at approximately 1 in 1000 or less.
 - Sudden thrombosis of the vessel.
 - Dissection of the vessel.
- **Bleeding from the puncture wound** requiring further treatment or surgery.
- **False Aneurysm Formation** – a bulge in the artery at the puncture site.
- **Renal Failure**, rarely requiring permanent dialysis due to the contrast agent
- **Emboli** to the bowel or legs which is uncommon but can rarely have severe complications
- **Emergency Surgery** for complications is required in approximately 5%.

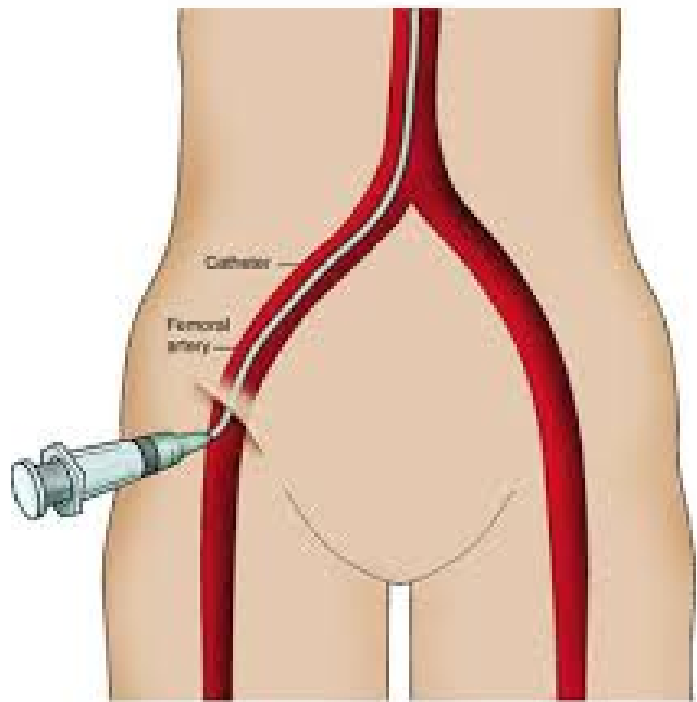


Figure 2. Femoral Artery Puncture for Angiogram.

