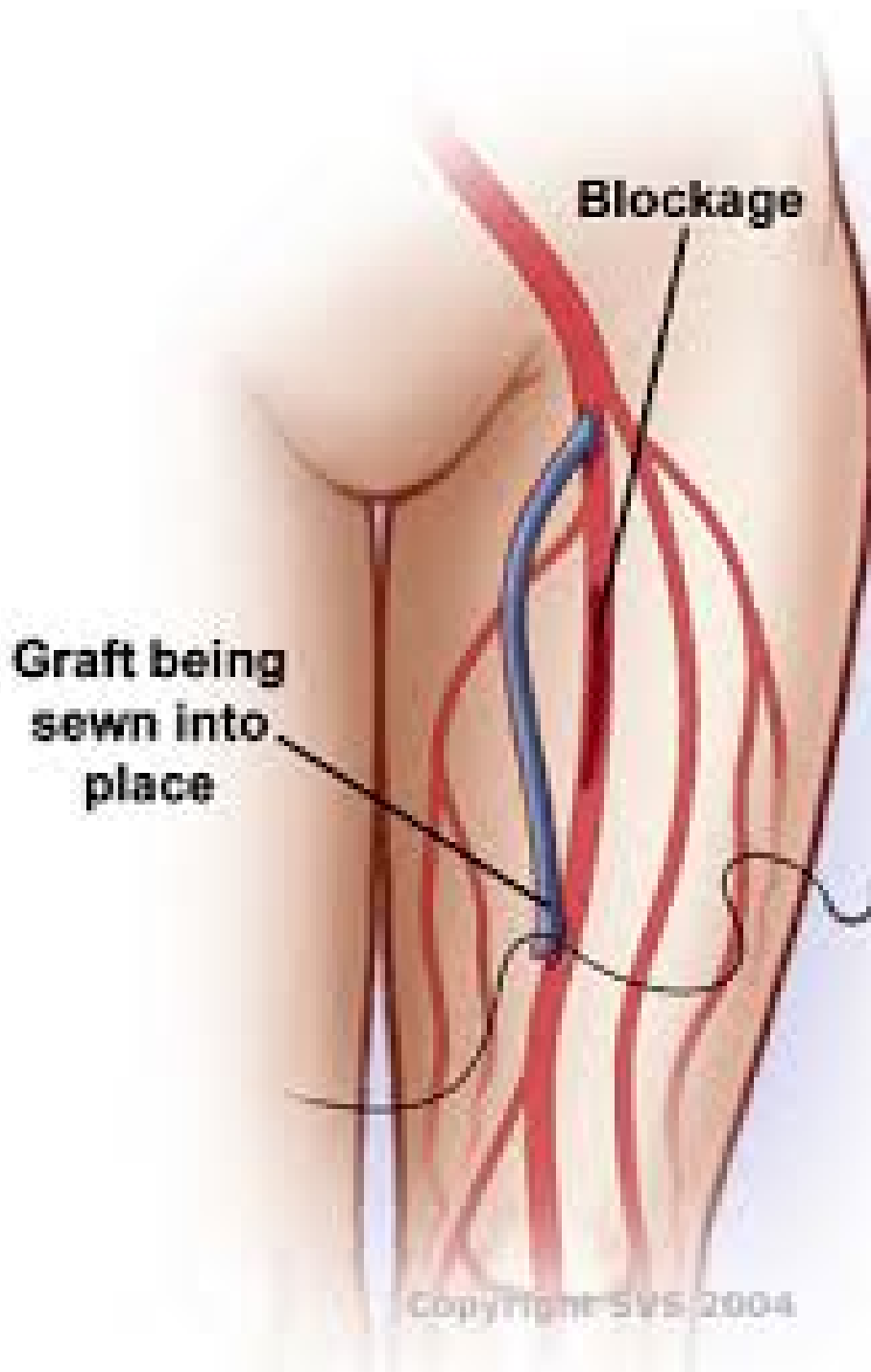


Surgical Bypass for Blocked Artery.



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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.

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**

Treatment Options

- **Conservative Management** and risk factor control including exercise therapy.
- **Endoluminal treatment** with balloon angioplasty ± stent placement.
- **Surgical Endarterectomy** – a removal of a focal narrowing from the artery.
- **Arterial Bypass Surgery**
- **Sympathectomy** – a procedure to destroy some of the nerves to provide some temporary relief.
- **Major and Minor Amputation**
- A **Combination** of the above

The treatment depends on the nature and location of the pathology, the symptoms experienced, levels of previous and current activity and patient choices.

Arterial Bypass Surgery

The surgery aims to **bypass** the blockage, taking blood from the artery above it and allowing it to flow into the artery below. See *front cover*.

Vein is usually used for this, either from the leg or an arm. Occasionally a **synthetic** tube is needed to bypass the blockage instead, when vein is inadequate.

Under **anaesthetic**, a series of cuts is made and the artery above and below the blockage are exposed. Likewise the vein which is to be used is exposed, and removed to be used in the bypass. **Blood thinning medication** is given before the blood flow is temporarily interrupted with either **clamps, balloons or a tourniquet** to allow the surgery to be performed. A tunnel is made in the leg to allow the tube to sit below the skin, fat and sometimes muscle.

Cuts are made in the artery to allow the tube to be sewn on above and below the blockage with special fine vascular stitches. The joins are inspected before drains are placed and the cuts sewn closed, usually with dissolving stitches.

Expectations

The results from surgery depend on a number of factors, including:-

- The extent of atherosclerosis
- The quality, size and number of the vessels above and below the blockage
- The length of the required bypass (shorter is generally better)
- The quality and size of the vein or plastic tube used to perform the bypass
- The symptoms suffered by the patient.



Generally arterial bypasses are very durable, especially above the knee. Below this, bypasses may not last as long. For this reason, longer bypasses are generally not performed for patients suffering claudication only, rather reserved for critical limb ischaemia. Blockage of a bypass graft may not always result in return of the critical limb ischaemia symptoms.

Re-do surgery is generally more difficult.

Side effects and Complications

Unfortunately, no invasive treatment 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**
- **Heart Attack**
- **Stroke**
- **Renal Failure**
- **Wound Infection (5-15%)**
- **Deep Venous Thrombosis**
- **Pulmonary Embolus**
- **Excessive Scarring**

The specific risks of the surgery include:-

- **Failure** to improve the blood supply.
- **Worsening of blood flow** to the leg with possible amputation requirement.
 - Very calcified, diseased arteries are fragile and can be damaged with minimal manipulation.
- **Bleeding** and requirement for blood transfusion.
- **False Aneurysm** formation which is a ballooning of the artery which may require further surgery in the future.
- **Sensory nerve damage** causing numbness, tingling or pain.
- Rarely, **motor nerve damage** causing weakness can occur.
- **Graft Infection** requiring further surgery.
- **Graft narrowing** with time due to scarring.
- **Progression of disease** in arteries above or below the bypass.
- **Lymphatic leak** - a clear fluid which usually flows in very small tubes which can leak from the wound. Occasionally requires further surgery.
- **Swelling leg** – common, may last weeks → months.

