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Peripheral Arterial Disease

Peripheral arterial disease, also called peripheral vascular disease, is a narrowing of the blood vessels (arteries). It mainly occurs in arteries that supply blood to the legs. The main symptom is pain in one or both legs when you walk. Treatment usually includes stopping smoking (if you smoke), regular exercise, medication to lower your cholesterol level, a daily aspirin and lowering your blood pressure if it is high. Medicines to open up the arteries may help. Surgery may be needed in severe cases.

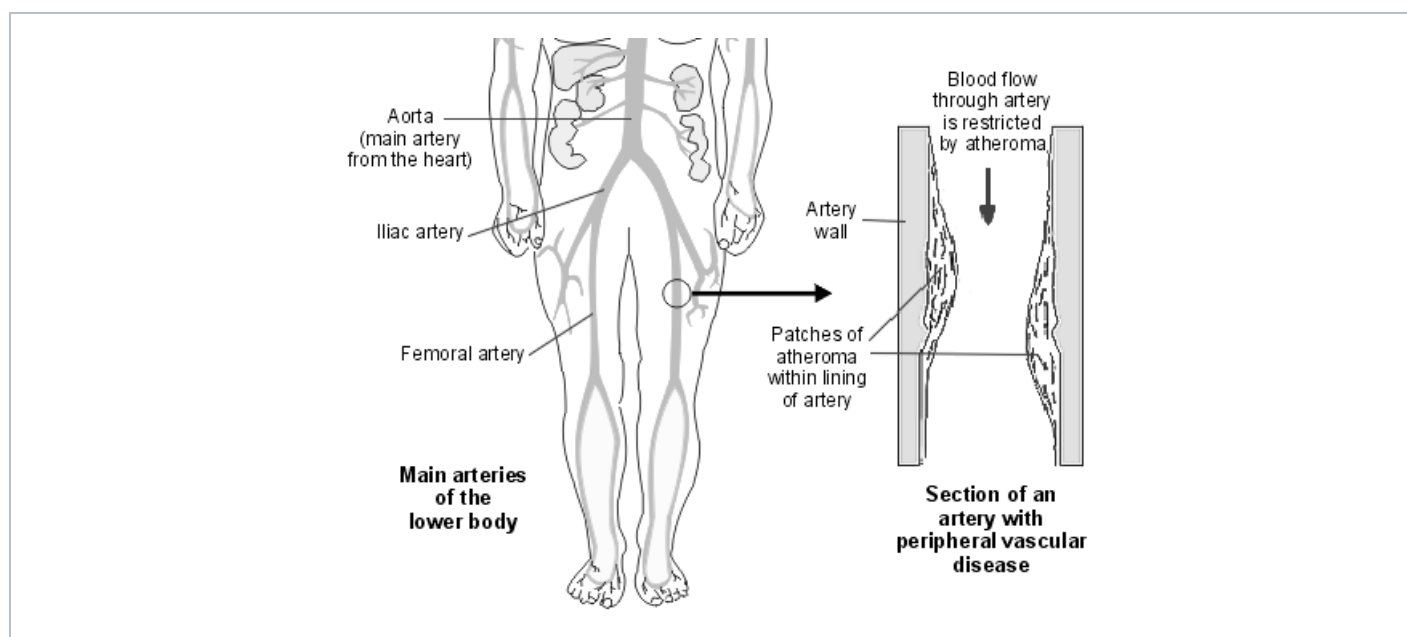
What is peripheral arterial disease (PAD)?

PAD is narrowing of one or more blood vessels (arteries). It mainly affects arteries that take blood to your legs. (Arteries to the arms are rarely affected and are not dealt with further in this leaflet.) The condition is also known as peripheral vascular disease (PVD). It is also sometimes called hardening of the arteries of the legs.

In the UK, around 1 in 5 men and 1 in 8 women aged 50-75 years have PAD. It becomes more common with increasing age.

What causes peripheral arterial disease (PAD)?

The narrowing of blood vessels (arteries) is caused by atheroma. Atheroma is like fatty patches (plaques) that develop within the inside lining of arteries. A patch of atheroma starts quite small and causes no problems at first. Over the years, a patch of atheroma can become thicker. (It is a bit like scale that forms on the inside of water pipes.)



A thick patch of atheroma makes the artery narrower. This reduces the flow of blood through the affected section of artery. Tissues downstream have a reduced blood supply, which can lead to symptoms and problems. Atheroma can develop in any artery but the common arteries affected are:

- Arteries taking blood to the heart - this is called coronary heart disease and may lead to problems such as angina and heart attacks.
- Arteries taking blood to the brain - which may eventually lead to a stroke.
- Arteries taking blood to the legs - which may lead to PAD.

What causes atheroma?

Everybody has some risk of developing atheroma. However, certain risk factors increase the risk. Risk factors include:

- Lifestyle risk factors that can be prevented or changed:
 - Smoking.
 - Lack of physical activity (a sedentary lifestyle).
 - Obesity.
 - An unhealthy diet.
 - Excess alcohol.
- Treatable or partly treatable risk factors:
 - High blood pressure (hypertension).
 - High cholesterol level.
 - High fat (triglyceride) blood level.
 - Diabetes.
 - Kidney diseases causing diminished kidney function.
- Fixed risk factors - ones that you cannot alter:
 - A strong family history. This means if you have a father or brother who developed heart disease or a stroke before they were aged 55 years, or in a mother or sister before they were aged 65 years.
 - Being male.
 - An early menopause in women.
 - Age. The older you become, the more likely you are to develop atheroma.
 - Ethnic group - for example, people who live in the UK, with ancestry from India, Pakistan, Bangladesh or Sri Lanka, have an increased risk.

However, if you have a fixed risk factor, you may want to make extra effort to tackle any lifestyle risk factors that can be changed.

Note: some risk factors are more risky than others. For example, smoking causes a greater risk to health than obesity. Also, risk factors interact. So, having two or more risk factors has a much more increased risk compared with a person who only has one risk factor. For example, a middle-aged male smoker who does little physical activity and has a strong family history of heart disease has quite a high risk of developing a cardiovascular disease such as a heart attack, stroke or PAD before the age of 60 years.

Research is looking at some other factors that may be risk factors. For example, high blood levels of apolipoprotein B or homocysteine are being investigated as possible risk factors.

What are the symptoms of peripheral arterial disease (PAD)?

The typical symptom is pain which develops in one or both calves when you walk or exercise and is relieved when you rest for a few minutes. This pain varies between cases and you may feel aching, cramping or tiredness in your legs. This is called intermittent claudication. It is due to narrowing of one (or more) of the blood vessels (arteries) in your leg. The most common artery affected is the femoral artery.

When you walk, your calf muscles need an extra blood and oxygen supply. The narrowed artery cannot deliver the extra blood and so pain occurs from the oxygen-starved muscles. The pain comes on more rapidly when you walk up a hill or stairs than when on the flat.

If an artery higher upstream is narrowed, such as the iliac artery or aorta, then you may develop pain in your thighs or buttocks when you walk.

If the blood supply to the legs becomes worse, the following may be found by a doctor who examines you:

- Poor hair growth below your knee and poor toenail growth.
- Cool feet.
- Weak or no pulses in the arteries of your feet.

Severe cases

If the blood supply is very much reduced then you may develop pain even at rest, particularly at night when the legs are raised in bed. Typically, rest pain first develops in the toes and feet rather than in the calves. Sores (ulcers) may develop on the skin of your feet or lower leg if the blood supply to the skin is poor. In a small number of cases, tissue death (gangrene) of a foot may result. However, this is usually preventable (see below).

How is peripheral arterial disease (PAD) diagnosed?

The diagnosis is usually made by the typical symptoms. A simple test that your doctor or nurse may do is to check the blood pressure in your ankle and compare this to the blood pressure in your arm. This is called the ankle brachial pressure index (ABPI). If the blood pressure in your ankle is much different to that in your arm then this usually means that one or more blood vessels (arteries) going to your leg, or in your leg, are narrowed. However, the ABPI can be normal in some cases. Although this test can help your doctor find out if PAD is affecting your legs, it will not identify which blood vessels are blocked.

More sophisticated tests are not needed in most cases. They may be done if the diagnosis is in doubt, or if surgery is being considered (which is only in the minority of cases). For example, a **CT scan**, an **MRI scan** or an **ultrasound scan** of the arteries can build up a map of your arteries and show where they are narrowed.

What is the outlook (prognosis) for peripheral arterial disease (PAD)?

Studies that have followed up people with PAD have shown that:

- Symptoms remain stable or improve in about 15 out of 20 cases.
- Symptoms gradually become worse in about 4 out of 20 cases.
- Symptoms become severe in about 1 out of 20 cases.

So, in most cases, the outlook for the legs is quite good.

However, if you have PAD, it means that you have an increased risk of developing fatty patches (atheroma) in other blood vessels (arteries). You have around a 6-7 higher-than-average risk of developing heart disease (such as **angina** or a **heart attack**) or of **having a stroke**. The main concern for most people with PAD is this increased risk of having a heart attack or stroke.

Note: your chance of developing severe PAD (and heart disease or a stroke) is **much** reduced by the self-help measures and treatments described below.

What self-help measures can I do?

Stop smoking

If you smoke, **stopping smoking** is the single most effective treatment. Stopping smoking increases walking distance by two or threefold in over 8 out of 10 people with PAD. (Stopping smoking also greatly reduces your risk of having a heart attack or stroke.)

You should see your practice nurse for help if you find it difficult to stop smoking. Nicotine gum or patches to help you stop may be an option. There are also other medicines that are sometimes prescribed to help people stop smoking.

Exercise regularly

Regular exercise encourages other smaller blood vessels (arteries) in the legs to enlarge and improve the blood supply. If you exercise regularly, there is a good chance that symptoms will improve and the distance that you can walk before pain develops will increase.

Walking is the best exercise if you have PAD. Regular exercise means a walk every day, or on most days. Walk until the pain develops, then rest for a few minutes. Carry on walking when the pain has eased. Keep this up for at least 30 minutes each day and preferably for an hour a day. You should try to do at least two hours of exercise per week. The pain is not damaging to the muscles.

Other exercises such as cycling and swimming will also help you to become fit and are good for the heart. However, these should be done in addition to walking, as walking has been shown to be the best exercise to improve symptoms of PAD.

Research studies have shown that if you stop smoking and exercise regularly then symptoms of PAD are unlikely to become worse, and they often improve. Your risk of developing heart disease or a stroke will also be reduced.

Lose weight if you are overweight

Losing weight reduces the demands on the heart and leg muscles and reduces the risk of forming atheroma.

You should eat a healthy diet

This is the same as advised to prevent heart disease. This reduces the chance of atheroma forming. A practice nurse may advise you on how to eat a healthy diet.

Briefly, a healthy diet means:

- Five portions, and ideally 7-9 portions, of a variety of fruit and vegetables per day.
- You should not eat much fatty food such as fatty meats, cheeses, full-cream milk, fried food, butter, etc. Ideally, you should use low-fat, mono-unsaturated or polyunsaturated spreads.
- Try to include 2-3 portions of fish per week, at least one of which should be 'oily' (such as herring, mackerel, sardines, kippers, salmon or fresh tuna).
- If you eat meat, it is best to eat lean red meat or poultry such as chicken.

- If you do fry, choose a vegetable oil such as sunflower, rapeseed or olive.
- Try not to add salt to food, and limit foods which are salty.

See separate leaflet called [Healthy Eating](#) for more details.

Alcohol

Some research suggests that drinking a small amount of alcohol helps to reduce the risk of developing cardiovascular diseases such as PAD. The exact amount is not clear but it is a small amount. So, do not exceed the [recommended amount of alcohol](#), as more than the recommended upper limits can be harmful. That is, men should drink no more than 14 units of alcohol per week, no more than four units in any one day and have at least two alcohol-free days a week. Women should drink no more than 14 units of alcohol per week, no more than three units in any one day and have at least two alcohol-free days a week. Pregnant women should not drink at all. One unit is in about half a pint of normal-strength beer, or two thirds of a small glass of wine, or one small pub measure of spirits.

Take care of your feet

Try not to injure your feet. Injury may lead to a sore (ulcer) or infection developing more easily if the blood supply to your feet is reduced. Do not wear tight shoes or socks which may reduce blood supply. Tell your doctor if you have any foot injury, pain in a foot when you are resting or any marked change in skin colour or temperature in either of your feet. [For more advice on protecting your feet see the separate leaflet called Ageing Feet.](#)

What are the treatments for peripheral arterial disease (PAD)?

The self-help measures above are the most important part of treatment. In addition, medication is often advised. Surgery is only needed in a small number of cases.

Medicines

A medicine called **clopidogrel** is usually advised. This does not help with symptoms of PAD but helps to prevent blood clots (thromboses) forming in blood vessels (arteries). It does this by reducing the stickiness of platelets in the bloodstream. If you cannot take clopidogrel then alternative antiplatelet medicines such as **low-dose aspirin** may be advised.

A statin medicine is usually advised to lower your cholesterol level. This helps to prevent a build-up of fatty patches (atheroma).

If you have diabetes then good control of your blood sugar (glucose) level will help to prevent PAD from worsening.

If you have high blood pressure (hypertension) then you will normally be advised to take medication to lower it.

Other medicines are sometimes used to try to open up the arteries - for example, **cilostazol** and **naftidrofuryl**. One may be given and may help. However, they do not work in all cases. Therefore, there is no point in continuing with these medicines if you do not notice an improvement in symptoms within a few weeks.

Surgery

Most people with PAD do not need surgery. Your GP may refer you to a surgeon if symptoms of PAD become severe, particularly if you have pain when you are resting. Surgery is considered a last resort. There are three main types of operation for PAD:

- **Angioplasty** - in this procedure, a tiny balloon is inserted into the artery and blown up at the section that is narrowed. This widens the affected segment of artery. This is only suitable if a short segment of artery is narrowed.
- **Bypass surgery** - in this procedure, a flexible pipe (graft) is connected to the artery above and below a narrowed section. The blood is then diverted around the narrowed section.
- **Surgical removal (amputation)** of a foot or lower leg - this is needed in an extremely small number of cases. It is only offered when all other options have been considered. It is needed when severe PAD develops and a foot has tissue death (becomes gangrenous) due to a very poor blood supply.

Further reading & references

- [Lower limb peripheral arterial disease](#); NICE Clinical Guideline (August 2012, updated 2018)
- [Peripheral Arterial Disease](#); NICE CKS, April 2014 (UK Access Only)
- [Clopidogrel and modified-release dipyridamole for the prevention of occlusive vascular events](#); NICE Technology Appraisal Guidance, December 2010
- [Peripheral arterial disease - cilostazol, naftidrofuryl oxalate, pentoxifylline and inositol nicotinate](#); NICE Technology Appraisal Guidance, May 2011
- [Peach G, Griffin M, Jones KG, et al; Diagnosis and management of peripheral arterial disease. BMJ. 2012 Aug 14;345:e5208. doi: 10.1136/bmj.e5208.](#)

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