

# Vascutek Patient Education

## Vascular Anatomy & Vascular Surgery A Patient's Guide



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## Foreword

We hope this booklet will help you understand more about your vascular system and your prosthesis. Hundreds of thousands of men and women like you, of all ages and from all walks of life, have prostheses and continue to lead full, enjoyable and productive lives.

This booklet has been compiled by a Consultant Vascular Surgeon to provide helpful background information to patients who receive a vascular prosthesis. It is intended to supplement information given by the patient's own medical/surgical team and is not a replacement for such information.

Please consult your General Practitioner or Surgeon if there is anything you are unsure of.

## Introduction

A **vascular prosthesis** is a man-made tube that replaces or bypasses part of a blood vessel, most commonly an artery. This booklet has been specially prepared to help you understand your vascular prosthesis and what it will do for you.

The successful development of vascular prostheses has been likened to a **modern miracle** and has generated great excitement over the years. The first devices were developed in the 1960's. Since then, great progress has been made in improving the materials used and today's prostheses are vastly superior to the original versions.

Originally the placement of a vascular prosthesis was considered to be experimental, but, with the passage of time, vascular prostheses have become commonplace and **hundreds of thousands of people** have been successfully treated. Modern vascular prostheses are widely accepted as being dependable and reliable - they are a marvellous testimonial to the scientists who developed the materials used to make them.

As you read through these pages, you'll learn how your vascular system works, the function of your prosthesis and answers to many of your questions. For any information not covered here, especially questions of a medical nature, please consult your General Practitioner or Surgeon. Between them, they will know your condition best of all and will want to know if anything is puzzling you.

## What is the vascular system?

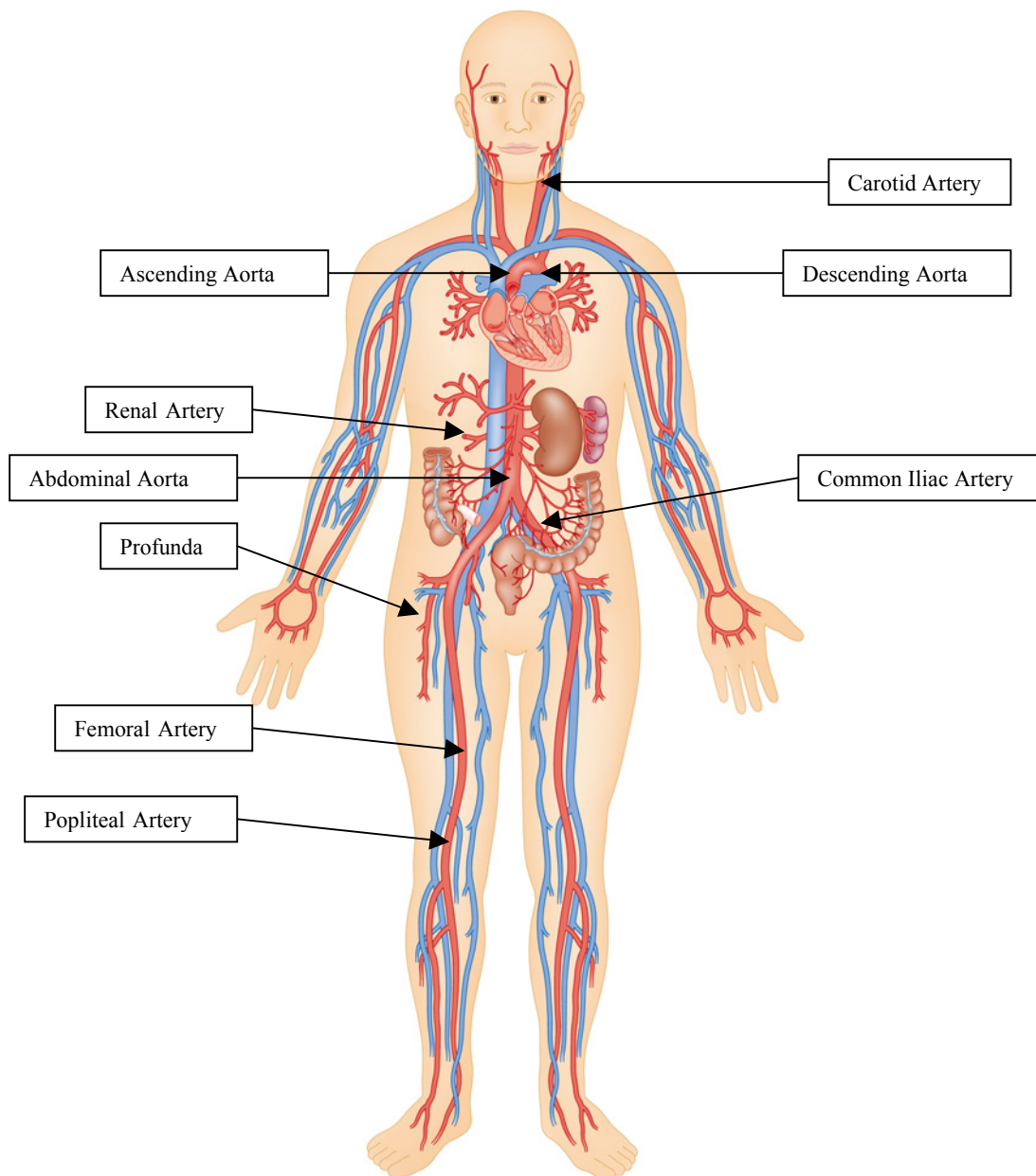
First, let's take a look at the vascular system and how it works.

All parts of the body require a supply of blood. Blood carries oxygen and nourishment and has many other important functions that allow your body to work properly. Blood is distributed around the body by the vascular system which consists of the heart, arteries and veins. The heart is a highly efficient pump, made of special muscle which pumps blood into the arteries. These are tubes that carry blood to all parts of the body. The arteries branch and become progressively smaller until they eventually become microscopic capillaries. It's easy for oxygen and nourishment to leave the blood in the capillaries and enter the tissues and organs. After blood has passed through the capillaries, it enters the veins that join together and become progressively larger as they carry blood back to the heart. The heart then pumps the blood through the lungs to pick up oxygen before pumping it again into the arteries, so starting the whole process again.

Blood leaving the heart in the arteries is rich in oxygen which is removed by the tissues. Blood returning to it in the veins has been virtually depleted of oxygen and has to be revitalised by passage through the lungs.

The drawing below shows how the heart, arteries, capillaries, veins and lungs work together to provide a highly efficient system that circulates blood around the body. Normally, your heart will beat more than 100,000 times every day (70 beats per minute), thrusting 1500 gallons of blood on a total journey of approximately 12,000 miles through your vascular system's arteries and veins. This incredible organ completes about 2.6 billion cycles in an average lifetime. Your vascular system contains an average of eight pints of blood that is regularly being renewed by new cells.

The vascular system carries the blood in a closed system from the heart, through organs and tissues and then back to the heart where the process starts again



As you can see in the diagram above, the vascular system carries the blood in a closed system from the heart, through organs and tissues and then back to the heart where the process starts again. When blood leaves the heart for the body, it contains a rich supply of oxygen that is removed by the tissues. When it returns to the heart, it has been virtually depleted of oxygen and has to be revitalised by passage through the lungs.

## Disease & Treatment

### What goes wrong with the vascular system?

Although all arteries become more rigid with age, some people develop the disease "atherosclerosis" or "hardening of the arteries". The term atherosclerosis depicts what the affected arteries look like - they are narrowed by deposits of material that consists of hard (sclerosis) and sludgy (atheroma, from the Greek for porridge) components.

The mechanisms by which atherosclerosis develops are not known, but we do know that some people are prone to developing it. There may be a genetic predisposition in these people. We also know other factors that can result in atherosclerosis. Among these, smoking is the worst culprit, along with high blood pressure, diabetes and high cholesterol levels.

Atherosclerosis results in the narrowing of blood vessels and can eventually block them. These narrowings and blockages reduce the amount of blood that can pass through the arteries into the tissues and organs of the body. The affected parts are then unable to work efficiently and, if called upon to do extra work, may result in symptoms. A common example is cramp-like pain in the legs when walking. The narrowed arteries of the legs are unable to provide enough blood and oxygen for the muscles to work properly during exercise. The muscles therefore start to hurt. At rest, however, less oxygen is required and there is enough blood supply for the muscles to work normally. This is called intermittent claudication. The equivalent process in the heart is called angina.

A different problem with the vascular system is caused by the weakening of the wall in the artery. This results in the artery increasing in size, resulting in an aneurysm. Aneurysms may rupture when they reach a certain size so it is recommended that they are repaired.

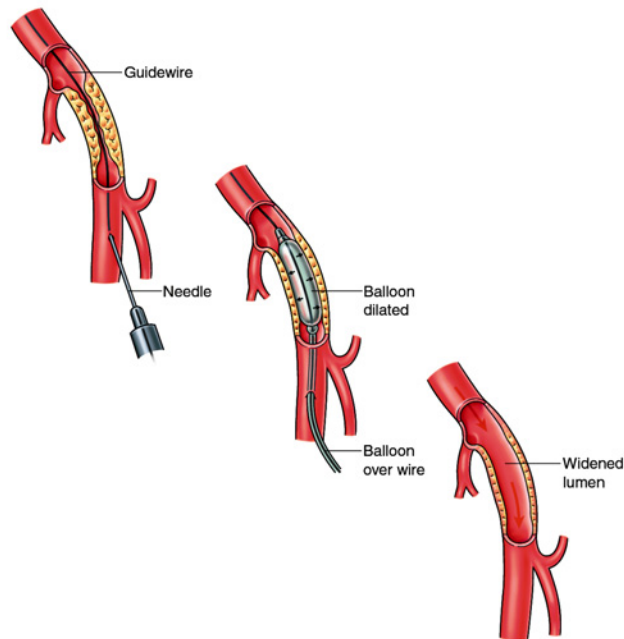
### How can atherosclerosis be treated?

It is important to control the factors that we know will cause atherosclerosis. There is little we can do about our genetic predisposition. The most important thing to do is **not to smoke**. Looking for and treating diabetes, high blood pressure and a high cholesterol level is also very important. With treatment, atherosclerosis may stop getting worse and may even improve as long as you don't smoke. Many patients benefit from taking aspirin regularly and there are effective medications for angina, high blood pressure, high cholesterol and diabetes. Take advice from your doctor about taking any medication.

Sensible exercise is very beneficial, although you shouldn't exercise beyond "the pain barrier". If it hurts, you should stop.

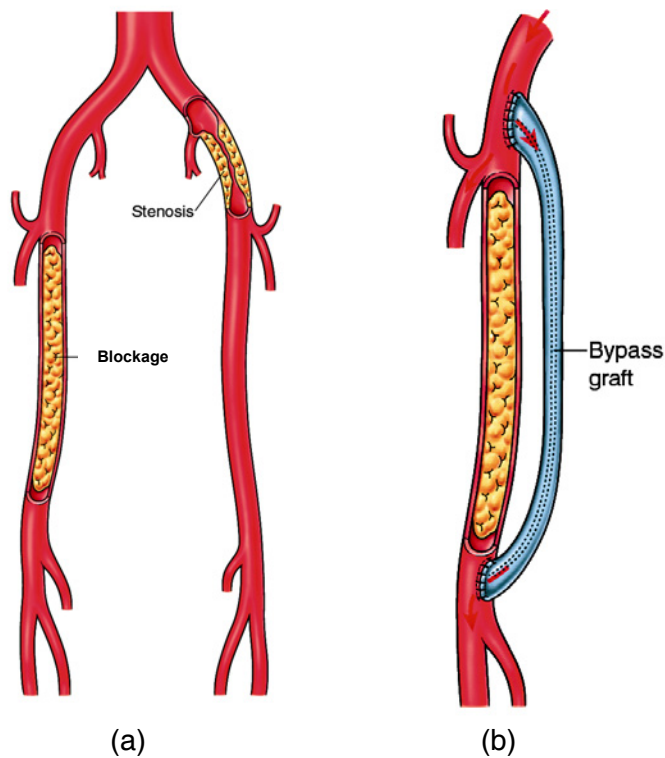
These measures are all that many patients require as treatment for their atherosclerosis. In a small proportion however, these measures are not enough and some other form of treatment has to be considered. It is your General Practitioner, medical specialist or surgeon who will help you decide if you are one of the people who need additional treatment.

If you do need additional treatment, an important step in most cases is an "angiogram". This is an X-ray test that involves injecting dye into your arteries through a needle in your groin or arm. The angiogram gives a "road map" of your arteries and shows exactly where the narrowing and blockages causing your symptoms are. Some narrowing and blockages can be widened with a balloon inserted into your arteries through a needle. The balloon is placed across the narrowing and is then blown-up – This is called an angioplasty.



In other narrowing and blockages which are not suitable for angioplasty the treatment is then bypass surgery.

A vascular bypass can be thought of as a dual carriageway built around a congested town. The congested town is your narrowed or blocked artery while the dual carriageway is the bypass itself. The narrowed or blocked artery is not generally removed and the bypass is joined onto the side of the healthy artery above and below the affected area. The diagram below shows how this is done.



- (a) The blood flow is restricted through the artery
- (b) A bypass is sutured into place above and below the affected area and normal blood flow is resumed.

The choice of material for the bypass depends on the exact site in your body that needs a bypass. A prosthesis (artificial bypass) is almost always chosen for bypasses from the abdomen to the legs and to repair aneurysms. In these positions, a prosthesis can be expected to work well for many years. Bypasses from the groin to sites further down the leg are often made with your own vein that can be used as a "spare part". The further down your leg your bypass has to go, the more likely it is that your surgeon will try to use your own vein as this is the best material to use in these circumstances. Some bypasses in the leg work just as well with a prosthesis, however, and in these cases your surgeon will decide which is best for you. If you have no available vein in your leg because of previous bypass surgery or because of varicose veins, your surgeon may choose to use a prosthesis instead. Bypasses made in the arm often use vein "borrowed" from your leg, but some made around the shoulder and in the neck will use a prosthesis as first choice.

### **How vascular prostheses work**

A prosthesis is medical science's substitute for your body's natural artery. It works in a similar way to the one with which you were born. It provides a tubular bypass for arteries that have become narrow or blocked due to disease processes.

Vascular prostheses are sophisticated materials made into tubes of variable length, shape and diameter. Every component is made of the highest quality materials and receives a thorough visual and functional inspection. Each component and completed device is tested during every stage of production and meticulously manufactured using advanced knitting, weaving or ePTFE technologies. Sterility is guaranteed and there are no risks of passing on diseases with the use of a prosthesis. The vascular prosthesis has inbuilt reserves of strength and stability, far above that of the natural artery. It is designed to be a permanent part of your vascular system whose function is affected more by other factors, such as age and disease, than by material from which the prosthesis is made.

### **Future Outlook**

#### **Bypass longevity**

There is a possibility that a bypass may not work forever. This is due to a number of factors such as how severe the atherosclerosis was in the first place, how quickly it progresses after the bypass operation, whether you continue to smoke and how well the other factors which influence atherosclerosis are controlled.

Bypasses onto small arteries in the legs (especially below the knee) and arms tend to last longer if they were made with your own vein as this is a living material that helps to keep the blood flowing. If a prosthesis should block, it is highly unlikely to be due to prosthesis failure, and is normally due to the changes brought about by advancing years and further disease.

### **A Final Word**

We hope these pages will help you to understand more about your vascular system and your prosthesis. Hundreds of thousands of men and women of all ages have prostheses and continue to lead full, enjoyable and productive lives.

This leaflet was provided as a service to medicine by **VASCUTEK**, a **TERUMO** Company