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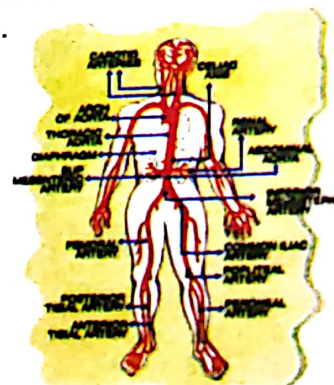
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What is the vascular system?

The system of arteries and veins in our body is called the vascular system.



Arteries supply good blood (oxygenated) to various organs and veins carry the bad blood (deoxygenated) from various organs. While the heart pumps blood through the arteries, the lungs purify deoxygenated blood into oxygenated blood

What is Vascular surgery?

Vascular surgery deals with the diseases of all the blood vessels [arteries, veins and lymphatics] in the body except those in the brain which are dealt by neurosurgeons and those around the heart which

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come under cardiac surgery. Though the term cardiovascular surgery was commonly used, in the past, now vascular surgery has emerged as a separate superspeciality. Vascular surgeon deals exclusively with the treatment of blood vessel diseases, whether it requires medical therapy, surgery or newer minimally invasive endovascular procedures.

What are vascular diseases?

As with any system, our vascular system too faces problems. There are mainly two types of problems:

A. Obstruction of flow within the vessel

Three conditions can result in obstruction of flow:

1. Arteriosclerosis (Atherosclerosis)

Arteriosclerosis refers to a group of diseases in which arteries thicken and lose their elasticity. This can also be called "**hardening of the arteries**". The most important type of arteriosclerosis is **atherosclerosis**.

In atherosclerosis, fatty material (bad cholesterol) and fibrous tissues accumulate inside the arterial

walls. The diameter of the artery decreases, leading to reduced flow of blood supply to the tissue. This narrowing is called stenosis.

Normal artery

Diseased Artery



If this narrowing happens in an artery leading to the heart, you experience pain in the chest that is one of the initial symptoms of a heart attack. Blood flow then reduces and tissues slowly begin to die due to lack of vital oxygen. The heart stops beating and the person dies.

However, if an artery in the limbs (arms/legs) narrows, the arm/leg pains, sometimes even without exercise (claudication). **Beware, this is the first symptom of a leg attack.** In case the blood flow is completely stopped, the limb tissues will die due to lack of oxygen, resulting in gangrene. Eventually, the arm/leg may have to be amputated (cut off) to save the life of the patient.

Similarly if a vessel to the brain narrows, and the

blood supply is stopped, a small portion of the brain dies leading to a **brain attack or stroke** and the person is paralysed, sometimes for life.

2. Thrombosis

Thrombosis is a term that describes the presence of a blood clot (thrombus) attached to the inner wall of an artery (intima). Thrombosis creates reduction in the blood flow and creates similar problems as described above.

Healthy artery



Artery with thrombus

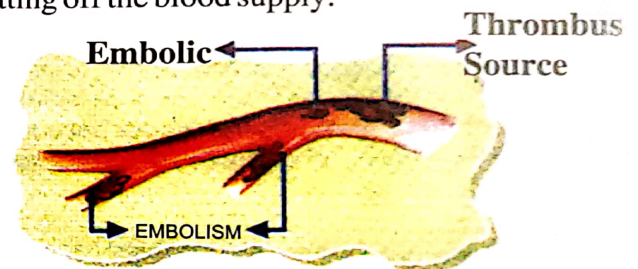


3. Embolism

The blood flow to a vessel is sometimes obstructed by small particles (**embolus**) of fat, air bubble or usually blood clot. This process of obstruction is called embolism.

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Note: The point of obstruction may be far from where the embolus originated. For example, the thrombus formed in your leg vein can travel to your lungs creating a life threatening situation or clot from the heart can travel to the leg, blocking the artery and cutting off the blood supply.



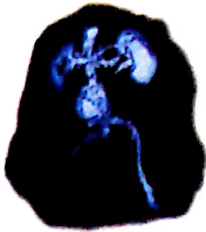
B. Dilatation of blood vessels

Blood vessels are constructed in layers made up of tissues. Tissues strengthen and preserve the integrity of the blood vessels.

Certain conditions such as hypertension, atherosclerosis, trauma or infection can disrupt the integrity of the blood vessels. As a result, the blood vessel wall could weaken causing the vessel to bulge

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outwards. This is called an aneurysm. When an aneurysm ruptures blood leaks out of the vessel (hemorrhage). This affects the blood flow to the relevant part of the body and creates a life threatening situation.



What are the Risk Factors ?

Following are the physical traits and unhealthy habits which may be risk factors;



Smoking



Eating food high in fat

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Ageing

* Diabetes*Smoking*Eating food high in fat*High blood pressure*Ageing*Heredity

Symptoms of "leg attack"

Peripheral artery disease is silent in its early stages but walking even short distances become painful for the patients as it worsens. This pain is relieved after rest but resurfaces again when walking. This pain cycle which makes one stop every now and again during walking is the first warning sign of the disease.



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Symptoms of the disease as it progresses

- *leg and foot become cold.
- *blue/red discoloration of the foot or toes.
- *numbness, tingling or pain in the leg, foot or toes.
- *paleness of the leg or foot if elevated.
- *dry, fragile or shiny-looking skin.
- *wounds/ulcers that do not heal.

Symptoms of Brain attack or Stroke

- *sudden, temporary weakness or numbness of the face, arm and/or leg on one side of the body; temporary loss of speech or trouble speaking or understanding speech.
- *unexplained dizziness, unsteadiness or sudden falls.
- *temporary dimness or loss of vision, particularly in one eye.



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REMEMBER, An early diagnosis and treatment can prevent amputation and stroke.

What happens if I don't treat these symptoms?

Any disease, if not treated at the initial stage, becomes increasingly complicated and difficult to manage. When a vascular disease becomes incurable, your doctor may even recommend amputation of the diseased arm or leg, or you may sustain a stroke, leaving a part of your body paralyzed.

What To do



If you have the symptoms mentioned above contact your doctor, or vascular surgeon. If vascular problems are suspected, your doctor may order Doppler scan (like ultrasound) or angiography. Based on the reports further treatment or even bypass surgery may be needed to improve blood flow. Just as heart attack may require angioplasty or bypass, similar treatment may be needed for vascular disease.

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What is angiography?

Angiography is the imaging of the vascular system using X-rays. In normal X-rays, you can not see the blood vessels, hence a special dye (**contrast**) is injected into your blood.

To inject the contrast in to the blood vessel, the doctor makes a small hole (approx. 2mm diameter) usually in the groin (thigh) and pushes a very thin wire (guide wire) into the blood vessel using the Seldinger's technique.

The doctor navigates through the vessels of the body by using X-ray images taken from time to time. Over this guide wire, the doctor pushes a very thin plastic tube (catheter), into the blood vessel. The contrast is then injected in the blood vessel through this catheter.



Entry points for catheter placements

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The contrast travels in the vessels along with the blood and images are taken using X-rays which are generated through a fluoroscope. The Fluoroscope is an X-ray machine that allows your doctor to see the contrast move and also take moving and stationary pictures, if required.

The patient is usually sent back the day after angiography.

Can vascular disease be completely cured by medicines?

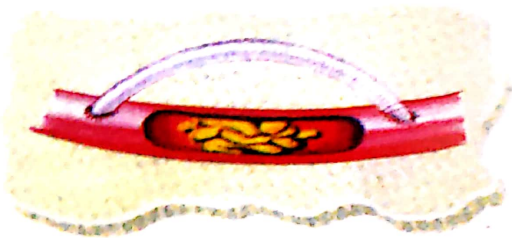
No. There are no medicines which can effectively treat these diseases.

What are the various treatment options available?

"Bypass" surgery is the time tested and well established treatment of blocked arteries. This is performed by a vascular surgeon using either your own vein or artificial tube made of synthetic material. The blood flows through the newly created

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channel beyond the blocked artery, carrying essential nutrients and oxygen, thus preventing an amputation or stroke.



Bypass surgery

The vascular surgeon may also perform "endarterectomy" in certain arteries, which means removal of diseased inner layer of the artery without performing a bypass. This technique is usually applied in relieving the blocked "carotid" arteries in the neck and is extremely successful in preventing strokes. "Embolectomy" and "thrombectomy" are the terms employed when fresh clots are removed from the arteries. These are usually emergency procedures done to prevent an amputation.

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What is Endovascular surgery?

Endovascular surgery is the name given to minimally invasive vascular surgery. This involves correction of arterial blocks or aneurysms either with small catheters and wires placed through needle punctures in arteries or through small incisions. These procedures require very short hospitalization and quick return to normal lifestyle. All arterial blockages and aneurysms are not amenable to these treatments and patients have to be selected carefully, the cost of these procedures is still high. Endovascular surgery is a relatively new and progressive branch of vascular surgery and over next few years many more vascular diseases will be treated this way. Balloon angioplasty and stenting are the common endovascular procedures.

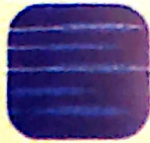
What is balloon angioplasty?

If the blood vessels have become very narrow, the doctor will push a balloon catheter (a catheter which has a balloon at one tip) upto the obstruction site.

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Narrow artery



Balloon Catheters

The balloon is then inflated to break up the hard plaque (substance which narrows the blood vessel) and thus reestablish the blood flow.



Narrow artery being opened by balloon

This procedure is called Percutaneous Transluminal Angioplasty (PTA). Percutaneous through the skin, Transluminal through the channel of the blood vessel and Angioplasty - shaping of the vessel.

What is a stent?

Stent is a tube made of metallic wire, which lends support to a diseased blood vessels. A stent is placed

inside the blood vessel, by using guide wires, catheters and balloon catheters.



Stent

Why do I need a stent?

As blood vessels become narrower, sometimes they lose their elasticity. In such a case, even after balloon angioplasty, the blood vessel does not remain open and collapses back to its previous narrow position. **The stent is placed to provide support to the vessel walls.**



Stent in an artery

Will these symptoms re-occur after some time?

If you do not take the precautions, as prescribed by your doctor, the symptoms could occur again.

Reducing Risk Factors:



Peripheral artery disease does not go away. Although angioplasty or bypass surgery may improve blood flow in damaged arteries, they can not cure the disease. Only patients have the power to slow the disease process. You can do this by controlling your risk factors (like stopping smoking and monitoring your diet and blood pressure). For even better overall health, make a commitment to good foot care and daily exercise.

What are varicose veins?

Veins carry impure blood to the heart. They have valves to help the blood move against gravity in the legs. When these valves are absent or destroyed from any reason, the one way flow of blood becomes two way movement especially on standing and walking. This causes veins under the skin (called superficial veins) and certain bridging veins (called perforators) to become distended and tortuous and these are called varicose veins. Some times valves in the veins inside muscles in the leg (called deep veins) do not function properly resulting in vein problems.

Can these varicose veins cause problems?

Initially these may not cause any problems. Over the years if untreated they can cause swelling of the leg especially on walking, pain and heaviness. If still neglected they can cause discoloration around the ankle, thickening of the skin then leading to skin breakdown and to ulceration. This stage is called 'chronic venous insufficiency'.

What is the treatment for varicose veins?

The mainstay of treatment of early varicose veins is a customized compression stockings which can apply 'prescribed' 'pressure' to the legs as advised by the vascular surgeon. This cannot cure the varicose veins, but will prevent progression in most of the patients.

Is surgery necessary for varicose veins?

Surgery is needed for advanced varicose veins and usually requires a short hospital stay. This involves removal of the affected veins and sometimes repair or transplantation of vein valves.

What is deep vein thrombosis / DVT ?

DVT means clot formation in the deep veins in the leg and is an extremely dangerous since these clots can get dislodged and travel to the lungs (called pulmonary embolism). The only symptoms are rapid onset of swelling in the leg and pain.

What causes DVT?

Commonest cause of DVT is prolonged bedrest from any reasons. Certain operations (eg. hip surgery, cancer operations) are accompanied by higher incidence of DVT.

Is DVT preventable?

Yes by early ambulation (walking) after any operation or illness. Certain Blood thinning drugs (Heparin) and more recently refined form of this called low molecular weight heparins are very effective in reducing the chances of DVT and Pulmonary embolism.

How is it diagnosed?

The best way to diagnose suspected DVT is by Duplex scan, also known as color Doppler scan. Another test venogram-which involves injecting dye into the leg veins and then obtaining X-rays is rarely used today.

How do you treat DVT?

By the same medicines mentioned above in a higher dose and by hospitalization. Above are in injection form and these should be switched to blood thinners in tablet form (oral anticoagulants). These need to be continued for 3 to 6 months and sometimes lifelong.

What happens if DVT is not treated?

It may result in clots travelling to the lungs (pulmonary embolism) which can be fatal. Long-term complications can be destruction of vein valves resulting in chronic venous insufficiency and varicose veins.

Can these clots be dissolved?

In a few selected patients, if seen early certain drugs (thrombolytic agents) can dissolve the clots. Most of the time the human body dissolves these clots to varying degrees.

What is an IVC Filter?

It is a metallic filter, which is placed through a minimally invasive technique either from the neck or groin, into a large vein (Inferior Vena Cava), inside the abdomen. It traps the blood clots and prevents them from going to the lungs. It should be used in a few selected patients.