KK Women's and Children's Hospital
SingHealth

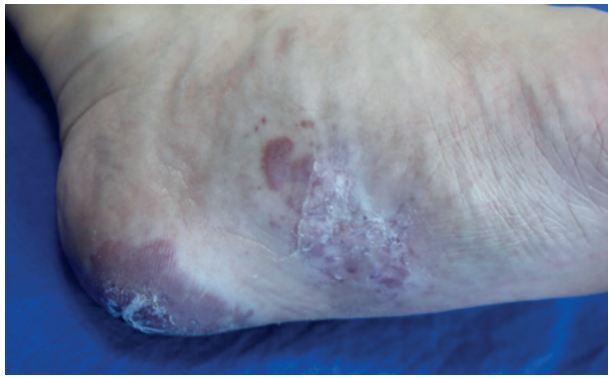
Arteriovenous Malformations

What are arteriovenous malformations?

Arteriovenous malformations (AVM) are abnormal connections of the blood vessels that can occur during development of the fetus (congenital) or may be acquired (e.g. after trauma).

In a normal situation, blood vessels called arteries carry oxygen-filled blood away from the heart to all organs of the body. Inside each organ, these arteries divide into small blood vessels called capillaries and oxygen is transferred from the blood to the tissues. Blood without oxygen is then carried away from the tissues and back to the heart by blood vessels called veins.

An AVM is an abnormal connection (or usually multiple small connections) between an artery and vein. In this situation, blood bypasses the capillaries within the organs. The blood pressure in these connections are also abnormal.



Arteriovenous malformation

What symptoms do arteriovenous malformations present with?

Depending on the site and size of the AVM, the presentation and symptoms can vary significantly.

AVM on the skin or soft tissues may typically present as a skin-coloured or reddish swelling that may or may not be painful and may get bigger over time. Occasionally, these AVM can be disfiguring. Pulsations may be felt over some AVM.

AVM in the brain may present with headaches, seizures or weakness of one or more parts of the body. AVM in the lungs are typically asymptomatic although shortness of breath and coughing up of blood can occur. AVM in the gastrointestinal tract typically present with bleeding and abdominal pain.

What complications can arteriovenous malformations cause?

Most AVM are asymptomatic until a complication occurs. The most common and potentially life-threatening complication is bleeding.

If left untreated, larger AVM may grow and lead to heart failure due to the fast flow of blood through the AVM bypassing the rest of the body and returning rapidly to the heart. This leads to the heart's inability to cope with the increased blood flow and may lead to shortness of breath, chest pain or light-headedness.

Rarely, AVM may be part of a vascular malformation syndrome e.g. Parkes-Weber syndrome where the affected limb can become larger or longer than the normal limb.

How are arteriovenous malformations diagnosed?

AVM are diagnosed with a combination of clinical history, physical examination and tests including ultrasound, magnetic resonance imaging (MRI), angiography and less commonly, tissue biopsies.

Ultrasound is a useful non-invasive, non-painful test to aid in diagnosis of AVM, and may help to assess the suitability for treatment. It can be performed either in the clinic or at the diagnostic imaging center. It involves using a probe placed on the skin over the site of the suspected AVM. Depending on the size of the lesion, this may take 5 to 30 minutes and will require some cooperation from the child.

MRI is another useful test for diagnosis of AVM and is able to demonstrate the size and extent of the lesion, as well as the relation to other important adjacent structures. There is no radiation involved. However, the child needs to stay still for about 30 to 60 minutes, rarely longer. General anaesthesia (GA) may be required for infants and younger children who are unable to cooperate. GA is administered by our team of paediatric anaesthetists.

Angiography is a more invasive investigation that involves the introduction of a small, narrow plastic tube into the blood vessels (catheter). The catheter is placed typically in the artery in the groin called the femoral artery. A picture of the blood vessels can be obtained by injecting dye (contrast) through the catheter using an X ray machine. This gives detailed information to the nature and anatomy of the blood vessels making up the AVM. Angiography is usually performed under GA and can be carried out at the same time as treatment.

How are arteriovenous malformations treated?

Treatment for AVM can be complicated. It is important that treatment and follow-up is carried out and supervised by a multi-disciplinary team with an interest in vascular malformations. The management of these conditions requires input from the whole team.

Most AVM do not require immediate treatment and can be monitored regularly in the clinic.

The decision to treat AVM depends on a few factors including presenting features, site, size and symptoms. Treatment options range from endovascular therapy to surgery to radiation treatment.

Endovascular embolisation therapy is the treatment of AVM using catheters and needles placed in the blood vessels under x-ray control to allow the permanent blockage of the abnormal vessels. Embolisation therapy is carried out by interventional radiologists. There are several embolic materials used and the interventional radiologist will discuss these with you. They range from liquids (sodium tetradecyl sulphate, alcohol, histoacryl glue and Onyx™), metal springs (coils) or metal plugs that block the blood vessels. More than 1 session may be required, and treatment is done under GA.

Surgical resection of AVM can be performed. However, in some cases, complications such as bleeding can arise. Often, surgery and embolisation are complementary where the lesion is treated by embolisation and then surgery is performed to remove the residual AVM.

Recently, an oral medication called sirolimus has been used to treat AVM that are symptomatic but not amenable to surgery or embolisation. However, results are not consistent.

Useful telephone number

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