**What are Vascular malformations (VMs)?**

A vascular malformation is a rare benign non- cancerous condition. It usually presents at birth and might go unnoticed for years. Sometimes, this vascular anomaly can be seen after trauma or as a complication of a treatment or even medication.

Vascular malformations have tendency to grow as time goes by. Although the speed of growth is slow, faster growth can be noticed during puberty or during pregnancy.

**Types of vascular malformations**

There are several types of VMs. General speaking, VMs have slow or fast flow of blood. The vessels involved in the condition can be small, intermediate, large or any combination. Proper diagnosis is important as this has direct influence on the choice of intervention as well as the outcome.

**Why do I have vascular malformation?**

It is not clear why they happen, but we know that there is a defect in the early days of development of the vascular system of the embryo.

**How Vascular malformations present?**

The symptoms of VMs depend on the vessel affected.

A description of each malformation apart will give a clearer picture of the vascular anomaly itself.

1. **Venous malformations:**

Venous malformations are abnormal blood vessels which mainly affect the venous side of the vascular tree. They can change the blood flow in the affected veins making it slower which encourage the development of small blood clots.   If this happens, the abnormal veins swell, become hard to touch and very painful. The venous malformations can occur anywhere in the body and if the blood clots develop, they typically present as pain and swelling. Superficial venous malformation on the skin with bluish discolouration raise concerns to patient because of cosmetic reason or, in some part of the body, might cause restriction in movements and or bleed.

Although some cases are noted in families, there is no definite concern they are passed on to children.

**How are venous malformations diagnosed?**

The patient is usually referred to a specialist based on personal medical history, physical examination, and sometimes family history.

Imaging investigations are of great help to the interventional radiologist to establish the diagnosis, assess the extent of  malformation and help treatment planning. The most common modalities for diagnosis are ultrasound scan and MRI scan.

**What treatments are available for venous malformations?**

The aim of treatment in VMs is to improve quality of life and or for cosmetic reasons, taking into account the symptoms and the level of distress they cause. There is a range of options from conservative to percutaneous injection and major surgery.

**1** -Conservative approach focuses on controlling the pain and inflammation using painkillers. Patients with painful venous malformation on the legs, are offered a change in lifestyle consisting of avoiding long standing hours and concomitant use of pressure garment.

**2**- Percutaneous injections: Patients  not tolerating the symptoms and have "large venous lakes" without solid tissue, are offered percutaneous injections called sclerotherapy.

**3**- Surgery is reserved for venous malformations with large venous spaces and more solid tissue.

**What is sclerotherapy?**

It is a non-invasive day case procedure carried out by interventional radiologist. It requires the use the ultrasound  scan and X-Ray to guide and control the delivery of treatment  in the right area.

 It consists of injecting chemical substance into the lesion to create a scar that makes the lesion shrink. Significant improvement can be noticed after one or few treatment sessions.

If the procedure is not successful at controlling the symptoms and reducing its the size, surgery may be required.

**What happens after sclerotherapy?**

* Swelling and pain is expected immediately after the procedure. Painkillers are usually effective to control the pain, but the swelling can take days to weeks to settle down before noticing any improvement in size and symptoms of VM.
* Bleeding and infection are very rare.
* Breakdown of the skin situated over the superficial venous malformation and apparition of blisters with or without ulcer formation can occur. It requires few weeks to heal.
* The swelling caused by the sclerotherapy might put pressure on the nerve close to the malformation, causing temporary or in rare cases, permanent loss of sensation or muscle weakness.

1. **Arteriovenous- venous malformations**

Arteriovenous malformations (AVMs) are abnormal connections between an artery and a vein present from birth. Their presence prevents oxygen delivery to organ and tissue. They can occur in any part of the body including the brain and spinal cord. They twist together and form direct connections with a short circuit that run at high blood flow pressure.

**What are the symptoms of arteriovenous malformations?**

Signs and symptoms often go unnoticed until extremely serious bleeding occurs. Symptoms depend on the site of the body affected. In the brain, bleeding can be the first manifestation if the AVM bursts, otherwise non -specific symptoms such as headaches, seizures, loss of consciousness and feeling or becoming sick are the dominant features. In the lungs there is shortness of breath on exertion and coughing up blood. In the abdomen, there is bleeding and abdominal pain, patients present with abdominal pain, signs and symptoms of anaemia such as fatigue, yellowish skin cold hands and feet, dizziness etc....or black stool because of abdominal bleeding.

On skin of the face, trunk, arms and legs,  AVMs  present as swelling or lump that may or may not be painful, sometimes the malformation can be disfiguring which can raise concerns of self-esteem and body image. In the majority of cases, AVMs presenting as lumps at these locations, are excised before reaching a diagnosis of AVMs to exclude a malignancy.

**Is it necessary to treat AVMs?**

Not all cases of AVMs need treatment.

Left untreated, the AVMs continue to grow bypassing the rest of the body.  They transmit within their walls a high flow of blood returning to the heart causing breakdown of the heart (heart failure) because of its inability to cope with this rapid increase in blood flow. Moreover, they can continue to grow and extend considerably leading to rupture with a massive bleeding.

AV malformations localised in the brain, might lead to a severe neurological damage, seizure, loss of consciousness with stroke and even death.

**What are the risks of not treating an AVM ?**

Because of abnormal tangling of the blood vessels, they can burst and cause bleeding. If left untreated, a brain AV malformation leads to a severe neurological damage, seizure, loss of consciousness with stroke and can occur or even death.

**How are AVMs diagnosed?**

Imaging, physical examination and family history are very important keys for referral to a specialist depending on the location. Often the patient receives the diagnosis and treatment by a consultant in Interventional Radiology. There are 4 modalities of imaging used for the diagnosis of AVMs.

1- Ultrasound scan is used to identify the flow of blood within the lesion.

2-  CT scan , second non- invasive X-Ray test that can give detailed three dimensional picture of the malformation and allows the decision on management plan.

3- MRI scan uses magnetic field rather than radiation. It is useful for more information.

4- Angiography is a more invasive technique that requires the use a catheter,  local anaesthesia  and dye solution  to obtain further information about the nature and anatomy of the AVM. However, it hardly ever used nowadays as a pure diagnostic tool. It is usually done as part of the intervention session.

**How are AVMs  treated?**

Because of their complexity, the case of AV malformation should be discussed with a range of health professionals working as a team to deliver the best care plan. This should be followed by a detailed discussion with the patient.

Decision of treatment depends on a number of factors such as the site, size and presenting symptoms and patient's choice. On one hand, stable malformations (Schobinger type 1) and even those that are growing (Schobinger type 2) don't require treatment, but a regular surveillance and active monitoring of these lesions is recommended respectively at all times to ensure that no significant changes occurred. On the other hand, patients presenting  with severe bleeding necessitate an immediate intervention.  There is no one treatment that fits all cases, and treatment is individualised.

There are three options of treatments available to symptomatic patient diagnosed with AVMs: non-surgical (embolization), surgical and radiation.

1\_ Embolisation ( endovascular therapy) is a  day case procedure carried out under general anaesthesia by consultant specialised in interventional radiology and in the imaging department.  It is the treatment of choice for AVMs using catheters and needles placed in the blood vessels under x-ray control guidance. It consists of using a number of techniques with the aim to block the point where the artery and the vein communicate called "nidus". The  type of embolic material can be liquid or metal springs, this will be discussed with the patient before the procedure.

There are two techniques of embolisation:

a-  Percutaneous embolization: which is a procedure performed on  an outpatient basis under local anaesthesia. It includes the placement of synthetic material called “embolic agent” through a direct access to the abnormal  connection between an artery and a vein (nidus).

b- Endovascular trans-catheter embolisation: it  involves the insertion of the embolic material through a special plastic tube (catheter)  and guided wires.

B- Surgery: surgery alone has limited use for the treatment of AVMs because of serious complications that might result.  However, if the surgery is preceded by embolisation,  the blood flow to the lesion can be extremely reduced and the risk of massive bleeding and blood loss is greatly lessened.

C- Radiation therapy is reserved only for brain lesions.

**How successful is embolisation ?**

Simple malformation are successful after one session but larger AVMs especially in the brain, might need multiple sessions that are carried out at 2- 6 weeks interval by consultant specialised in neuro- interventional  radiology.

**What are the complications of Embolisation ?**

There are few complications related to the embolization:

1)Pain, it occurs after the procedure and will last for several days. It can be controlled with painkillers.

2) Swelling related to the embolic material that causes a local inflammation

3) Occasional nausea that is controlled with anti -sickness medication

4) Passage of the embolic material into the wrong blood vessel is extremely rare and rarely causes any problem. But If it occurs, it makes the procedure more complicated.

If an angiography has been performed, there is small risk of bleeding, formation of small collection of blood called “hematoma” or bruising at the site of access. There is no need of specific treatment as it will resolve in few days, unless there is a major bleeding. If infection occurs, an antibiotic will be given. Finally, in case of a damage to the blood vessel’s wall or nearby blood vessels, hospital admission is required to correct the situation.

For further detailed information on above mentioned and other types of vascular malformations, please follow the link below:

<https://www.bsir.org/patients/vascular-malformations/#how-can-venous-malformations-be-treated>.