

## **Embolization of Cerebral Arterio-venous Malformation AVMs**

### **Introduction**

Arteriovenous Malformation is a tangle of abnormal and poorly formed blood vessels (arteries and veins). They have a higher rate of bleeding than normal vessels. AVMs can occur anywhere in the body. Brain AVMs are of special concern because of the damage they cause when they bleed. They are very rare and occur in less than 1% of the general population.

Bleeding may injure the surrounding brain resulting in a stroke, with possible permanent disability or even death. The risk of bleeding is about 2-4% per year, which means that 4 out of every 100 people with an AVM will have a bleed (hemorrhage) during any one year. AVM's may also produce headaches, seizures and progressive paralysis, and the treatment may alleviate these symptoms.

There is an increased risk of hemorrhage from an AVM during pregnancy usually after the first three months of pregnancy. Hemorrhage does not occur only during labour. It is thought to be due to the increased blood circulation that occurs during pregnancy.

The chances of completely curing the AVM will depend on the size and the complexity of the AVM. Using embolization treatment alone is about 20% and therefore it is frequently combined with other treatments such as radiation or surgery.

Embolization may not completely close off an AVM. The chance of bleeding every year in a partially treated AVMs is likely reduced by embolization, but not eliminated.

### **The Procedure**

- The procedure will be performed under local or general anesthesia and aseptic technique.
- The interventionist will puncture a blood vessel at your groin region (mostly right side) with a needle. After the needle is correctly positioned, a slender guidewire is placed through the needle into the blood vessel. The needle is then withdrawn, allowing a fine plastic tube (the catheter) to be placed over the guide wire into the blood vessel.
- Under X-ray guidance, the catheter will be advanced into your neck region and special dye (contrast medium) will be injected through the catheter and X-rays taken.
- Within this catheter, another smaller micro-catheter will be advanced into the brain vessels and then into the AVM. Embolic agents are injected into the vessels to block the AVM. The embolic material can be coils, liquid agents or particles.
- All the catheters will be removed at the end of the procedure. Pressure will be applied to the groin region to stop any bleeding. The opening in the skin is then covered with a dressing.
- The duration of this procedure is different for every patient; it depends on the complexity of the condition.
- If the interventionist does not think that he/she can safely embolize the AVM, then the embolization procedure will be discontinued. A single AVM may need to be embolized several times before satisfactory results are obtained or until no further embolization is possible. If more than one embolization is necessary, the procedures are usually done in stages spread over weeks or months.
- Your vital signs (e.g. blood pressure, pulse) and neurological condition will be monitored during and after the procedure. Attention should be paid on the skin puncture site to make sure there is no bleeding from it.

### Potential Complications

- The overall complication rates with AVM embolization ranging from 3% to 11%.
- The combined rate of death and any permanent disabling neurological deficit is below 5%.
- Major complications include:
  - Immediate or delayed intracranial hemorrhage
  - Retrograde thrombosis leading to stroke.
  - Inadvertent occlusion of normal vessels leading to stroke.
  - Pulmonary embolism
  - Retained catheter
- Minor complications includes:
  - Groin bruise and pain
  - Complications related to contrast medium injected – rash, urticaria.
  - Transient neurological deficit which is reversible within 24 hours (limb weakness, numbness)
  - Transient visual loss
  - Arrhythmia

### Before the Procedure

- Your referring doctor will ask you to sign a consent form for this investigation. You should volunteer information to your doctor on history of allergy to food and drugs, history of asthma, urticaria, eczema and allergy to contrast medium.
- Check any bleeding tendency and correct if possible.
- Fast for 6 hours before the examination.
- Empty the bladder before the procedure.
- Skin preparation of the puncture site.
- During the examination, you are advised to listen carefully to the instructions given by our staff.
- For diabetic patient on drug - consult clinician concerned for the adjustment of insulin dosage if necessary.

### After the Procedure

- After the catheter was removed, the puncture site has to be compressed for at least more than 10mins.
- Continue to watch for evidence of secondary bleeding and swelling at the puncture site.
- Continue to check blood pressure and pulse, or neuro-observation.
- You may need to have bed rest.
- You may need to continue to fast or take diet as tolerated depending on your condition.
- For diabetic patient on drug- consult clinician concerned for the adjustment of insulin dosage if necessary.

### Remarks

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