

# Arteriovenous Malformation

**Arteriovenous Malformation (AVM)**  
vascular malformation (abnormal network of blood vessels)  
where arteries shunt directly into veins instead of  
going through a bed of capillaries

- The walls of the blood vessels affected by AVM are often much weaker than normal vessels, and may cause ruptures (*hemorrhages*) from which blood leaks out, possibly causing damage to the surrounding areas.
- AVM is a "rare" disorder with a **prevalence** of around **0.2%** (1 in 500 people), which is much lower than the prevalence of brain aneurysms (1-5%).
- There are currently no well-established risk factors for AVM, but generally, it is regarded as a "developmental" or "congenital" (present at birth) vascular malformation.
- Typically, one is born with an AVM, and as he grows older, the size of the malformation increases, but it does not "spread" as cancer may.
- Most are not inherited, with the exception of *Hereditary Hemorrhagic Telangiectasia* (HHT). An exception to congenital AVM is *Dural Arteriovenous Malformation*, which is generally acquired following an injury, and occurs in the dura (covering of the brain).

## Symptoms of AVM

- **Seizures**: brain AVMs may create abnormal electrical activity in the brain by acting as "irritants" and cause seizures
- **Headaches**: potentially caused by the high blood flow through the AVMs, and could range anywhere from mild to migraines; sudden and severe headaches may be caused by bleeding, especially if followed by nausea, vomiting, neurological problems, or decrease in level of consciousness
- **Stroke-Like Symptoms**: brain AVMs may deprive nearby brain tissues of oxygen and nutrients they require and cause stroke-like symptoms such as weakness/paralysis on one side of body, numbness and tingling, or problems with vision, hearing, balance, memory, or personality changes
- **Bleeding (Hemorrhage)**: 50% of bleeds are significant, with half producing permanent disabilities, and other half causing death
- **None**: AVM may be present but not have any symptoms

## Treatment Options for AVM

- **Craniotomy** (for brain AVMs): Part of the skull is removed, and malformed blood vessels are operated on directly
- **Radiosurgery**: Uses radiation to damage DNA inside cells; benefits are gradual and may take years before apparent
- **Embolization**: Surgically blocking blood vessel to prevent blood flow
- **Sclerotherapy**: Injection of sclerosant (irritant) directly into the malformation to cause symptomatic relief and possible shrinkage
- **Surgery** (for non-brain AVMs)
- **Observation**: No direct treatment; AVMs observed

## Diagnosing AVM

- **Cerebral Angiogram**: catheter is inserted into an artery in the groin area, and pushed up the blood vessels towards the brain, at which point contrast is injected through the catheter into the blood vessels of the brain in order to take "pictures" (most accurate test in identifying exact location and size of the AVM)
- **Magnetic Resonance Imaging (MRI)**: generates highly detailed images of the body without using x-rays; *Magnetic Resonance Angiogram (MRA)* uses "pulse sequences" to show the blood vessels in the brain, which is useful in identifying AVMs and other blood vessel abnormalities
- **Computerized Tomography (CT Scan)**: can detect bleeding in the brain or fluid around the brain using x-rays

Toronto Brain Vascular Malformation Study Group

## Subarachnoid Hemorrhage (SAH)

"bleeding into the subarachnoid space - the area between the arachnoid membrane and the pia mater surrounding the brain. This may occur spontaneously, usually from a ruptured cerebral aneurysm, or may result from head injury."

- Form of stroke and comprises 1~7% of all strokes
- Is a medical emergency and may lead to death or severe disability, even when treated early
- Up to 50% of all cases of SAH are fatal
- Survivors often experience neurological/cognitive impairments following SAH
- **Symptoms**: Rapid onset severe headache ("thunderclap headache"), vomiting, confusion or lowered level of consciousness, seizures

**Lifetime Risk of Rupture (in %) = 105 - Patient's Age**  
(Mayfield Clinic)

4% with AVM will have a bleed during any year

Sources:

Mayfield Clinic: <http://inked.pw/129F6wg>

Medical Dictionary: <http://inked.pw/169afXg>

Toronto Brain Vascular Malformation Study: <http://inked.pw/ZWmTlf>

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