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Carotid Doppler Ultrasonography

Figure 1: Normal Blood Flow

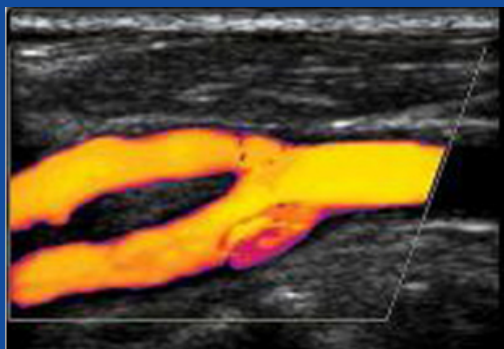
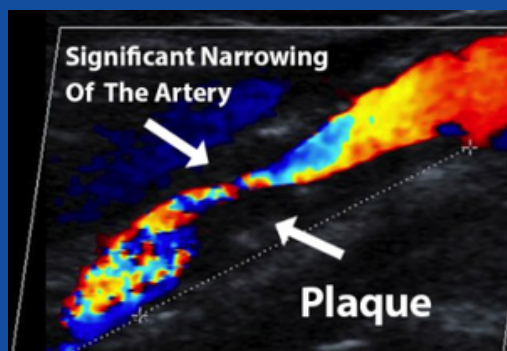


Figure 2: Abnormal Blood Flow



Carotid Doppler ultrasonography is a commonly used method of imaging the carotid artery. Popular for its rapid results, and non-invasive technique, it is used to evaluate the presence and degree of atherosclerosis within the carotid artery. Its two-dimensional grey scale can be used for measuring intima-media thickness, which is a very good biomarker for atherosclerosis and can aid in plaque characterisation. The plaque morphology is related to the risk of stroke. Carotid Doppler ultrasonography can also be used to evaluate the degree of carotid artery stenosis.

A carotid doppler ultrasound image of a normal carotid artery is shown in **Figure 1** and a carotid artery with abnormal blood flow is shown in **Figure 2** is most likely secondary to atherosclerotic stenosis.

A colour Doppler uses colour-encoded velocity information on a grey scale image. Colour Doppler is a good tool for visualising the blood flow in the vessel and finding stenotic segments. Flow travelling away from the transducer (negative Doppler shift) is depicted in blue, and flow travelling towards the transducer (positive Doppler shift) is depicted in red, with lighter shades of each colour denoting higher velocities. Green or yellow colours denote areas of high flow turbulence.

Carotid Artery Disease

Carotid artery disease occurs when fatty deposits (plaques) clog the blood vessels that deliver blood to your brain and head (carotid arteries). The blockage increases your risk of stroke, a medical emergency that occurs when the blood supply to the brain is interrupted or seriously reduced.

Symptoms

- Blurred vision or vision loss
- Confusion
- Memory loss
- Numbness or weakness in part of your body or one side of your body
- Problems with thinking, reasoning, memory and speech

Major Risk Factors

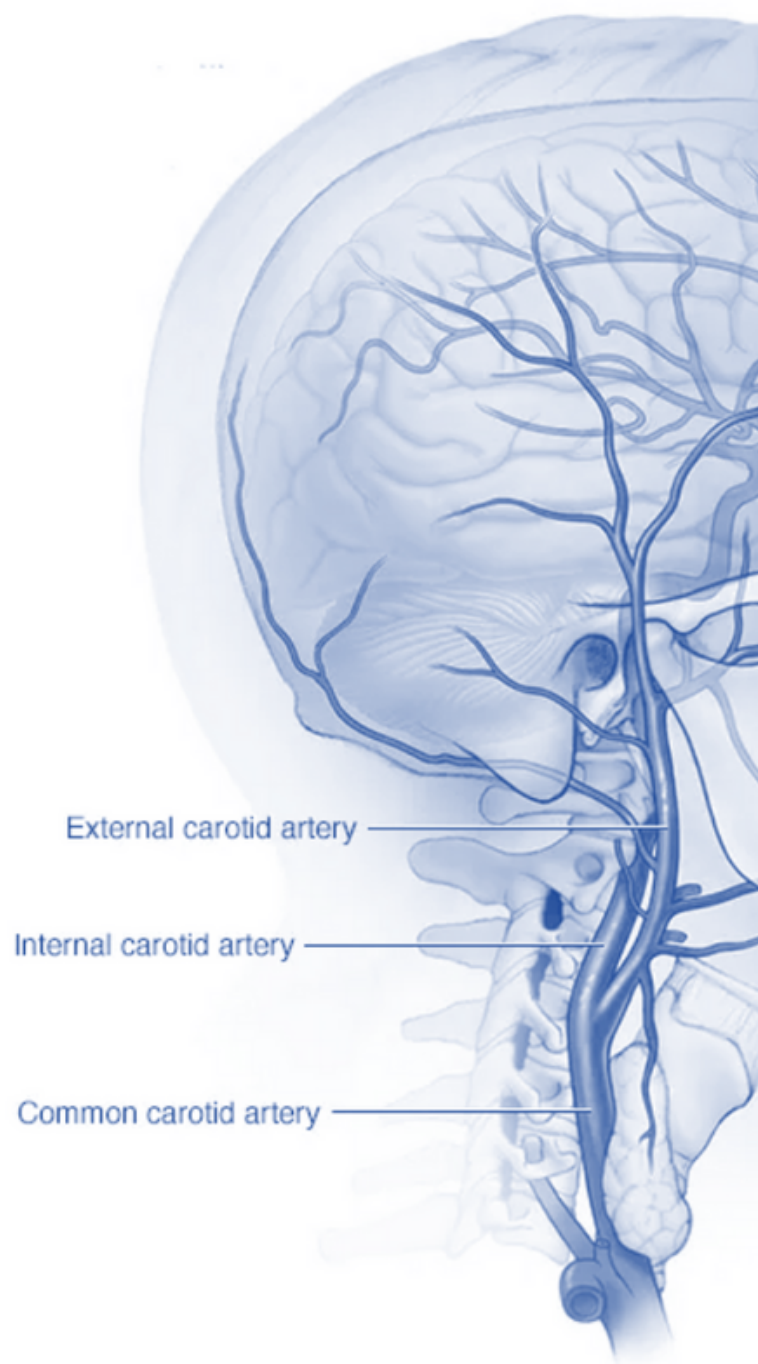
- Diabetes mellitus
- Family history of stroke
- High blood pressure, high cholesterol or high triglycerides
- Older age, especially if you are male
- Smoking or using alcohol or recreational drugs
- Trauma to your neck

Classification

- Type I: predominantly hypoechoic with thin echogenic rim
- Type II: echogenic plaque with >50% hypoechoic areas
- Type III: echogenic plaque with <50% hypoechoic areas
- Type IV: uniformly echogenic plaque

They can be termed as:

- homogeneous (type I and IV)
- heterogeneous (type II and III)



"Carotid artery disease is a major cause of stroke, accounting for about 20 in 100 of all cases."

Aneurysms

Diagnosis of an aneurysm involves medical history, physical examination, and imaging tests. A CT scan, MRI, or angiography may be used to confirm the presence of an aneurysm and assess its size, location, and characteristics. Aneurysms are classified based on their location, shape, and cause. The most common classification system for brain aneurysms is the size-based system, which categorizes them into small, large, and giant aneurysms. Other classification systems for the heart, abdomen and legs may consider factors such as the shape of the aneurysm, the presence of multiple aneurysms, or the underlying cause, such as trauma or infection.

1 IN 50
PEOPLE...

has an unruptured
brain aneurysm

7 RISK
FACTORS...

Smoking

High blood pressure or hypertension

Family history

Age over 40

Women have an increased risk

Drug use (particularly cocaine)

Traumatic head injury

EVERY 18
MINUTES...

a brain aneurysm ruptures

6 WARNING
SIGNS...

Localized headache

Dilated pupils

Blurred or double vision

Pain above and behind eye

Weakness and numbness

Difficulty speaking

Management of Aneurysms

- **Observation:** small aneurysms that are not causing symptoms may be monitored regularly with imaging tests to check for any changes
- **Medication:** medication may be prescribed to lower blood pressure or cholesterol levels to reduce the risk of aneurysm growth or rupture
- **Surgery:** two main types of surgery may be performed to treat aneurysms: clipping and coiling. Clipping involves placing a small metal clip at the base of the aneurysm to prevent blood flow and reduce the risk of rupture. Coiling involves threading a tiny wire through a catheter and into the aneurysm to fill it with coils and block blood flow.
- **Endovascular therapy:** a minimally invasive procedure, also called stenting, may be performed to place a small metal tube, or stent, in the affected artery to prevent further dilation and rupture.
- **Lifestyle changes:** patients may be advised to make lifestyle changes, such as quitting smoking, maintaining a healthy weight, and exercising regularly to reduce the risk of aneurysm growth or rupture.