CASE THREE

Short case number: 3_27_3
Category: Cardiovascular
Discipline: Surgery
Setting: Emergency Department
Topic: Carotid artery disease [SDL]

Case

Amanda Harris is a 65 year old who presents to the emergency department complaining of visual disturbance. Approximately 20 minutes ago while standing in the kitchen she noticed that she could not see out of her right eye. She describes a blackness coming over her eye, she called for husband and by the time he arrived in the kitchen about a minute later her vision was starting to return.
Her husband rang their GP who advised that they attend the emergency department because she may be 'having a stroke'

Questions

1. Amanda's has experienced a symptom called amaurosis fugax, explain the typical underlying pathophysiology of this symptom.
2. What are the key features of your history and examination of Amanda and why?
3. You are concerned that Amanda has atherosclerotic disease involving her carotid arteries, what investigations are undertaken in the assessment of Amanda's carotid arteries?
4. After discussion with the vascular surgeon, Amanda is considered for carotid endarterectomy surgery. What are the indications for carotid endarterectomy? What are the contraindications and the risks of this procedure?
5. Briefly describe carotid endarterectomy surgery. How does this differ from carotid stenting?
6. Summarise the evidence for the use of carotid endarterectomy in the management of patients with asymptomatic carotid artery disease.

Suggested reading:

- Garden OJ, Bradbury AW, Forsythe JLR, Parks RW, editors. Davidson's Principles and Practice of Surgery. 6th edition. Philadelphia: Churchill Livingstone Elsevier; 2012.
- Henry MM, Thompson JN, editors. Clinical Surgery. 3rd edition. Edinburgh: Saunders; 2012.

ANSWERS

1. Amanda's has experienced a symptom called amaurosis fugax, explain the typical underlying pathophysiology of this symptom.

   Amaurosis fugax describes transient, usually incomplete, loss of vision in one eye owing to occlusion of a branch of the retinal artery by cholesterol emboli. The patient typically describes it as a veil or curtain coming across the eye, which remains for a few minutes and then disappears. Amaurosis fugax is never synchronously bilateral, as it is almost infinitely improbable that an embolus would enter both retinal arteries at exactly the same time. Bilateral visual loss is usually due to occipital ischaemia secondary to vertebrobasilar insufficiency

2. What are the key features of your history and examination of Amanda and why?

   Diagnosis of amaurosis fugax is often based solely upon its description.

   There may be clinical evidence of a source of embolus, such as:
   - carotid arterial bruit (note the presence of a 'carotid' bruit bears no relationship to the severity of underlying internal carotid artery disease)
   - atrial fibrillation or other dysrhythmia
   - valvular heart disease/endocarditis
   - recent myocardial infarction
   - difference between right and left brachial BP.

   An underlying condition may be evident:
   - atheroma
   - hypertension
   - postural hypotension
   - bradycardia or low cardiac output
   - diabetes mellitus
   - rarely, arteritis, polycythaemia
   - antiphospholipid syndrome

3. You are concerned that Amanda has atherosclerotic disease involving her carotid arteries, what investigations can undertaken in the assessment of Amanda's carotid arteries?

   Colour Doppler (duplex) ultrasound (CDU) is the initial investigation of choice for imaging the carotid arteries. However, CDU is limited by vessel calcification and is very operator-dependent. Magnetic resonance angiography (MRA) provides excellent images and is increasingly used to plan treatment. Computed tomographic angiography also provides good images but involves ionizing radiation and iodinated contrast

4. After discussion with the vascular surgeon, Amanda is considered for carotid endarterectomy surgery. What are the indications for carotid endarterectomy? What are the contraindications and the risks of this procedure?

   <u>Carotid endarterectomy (CEA)</u>
   Patients with completed major stroke and no or little recovery are not candidates for carotid intervention; nor are those with an occluded internal carotid artery.

   However, several large randomized controlled trials have clearly indicated that CEA, in addition to medical therapy, is associated with a significant reduction in stroke, compared with medical therapy alone in patients with amaurosis, TIA and stroke with good recovery, provided that:

- there is a high degree of internal carotid artery stenosis (usually taken as a greater than 60-70% diameter reduction)
- the patient is expected to survive at least 2 years
- the intervention can be undertaken with a stroke and/or death rate of less than 5%
- the intervention can be performed soon after the index event, preferably within a month, but certainly within 6 months.

5. Briefly describe carotid endarterectomy surgery. How does this differ from carotid stenting?

Carotid endarterectomy (CEA)

The carotid bifurcation is dissected out, heparin is given and the arteries are clamped. If this leads to cerebral ischaemia, then a shunt is inserted. The plaque is shelled out (the endarterectomy) and the artery repaired with direct suture or a patch graft (patch angioplasty)

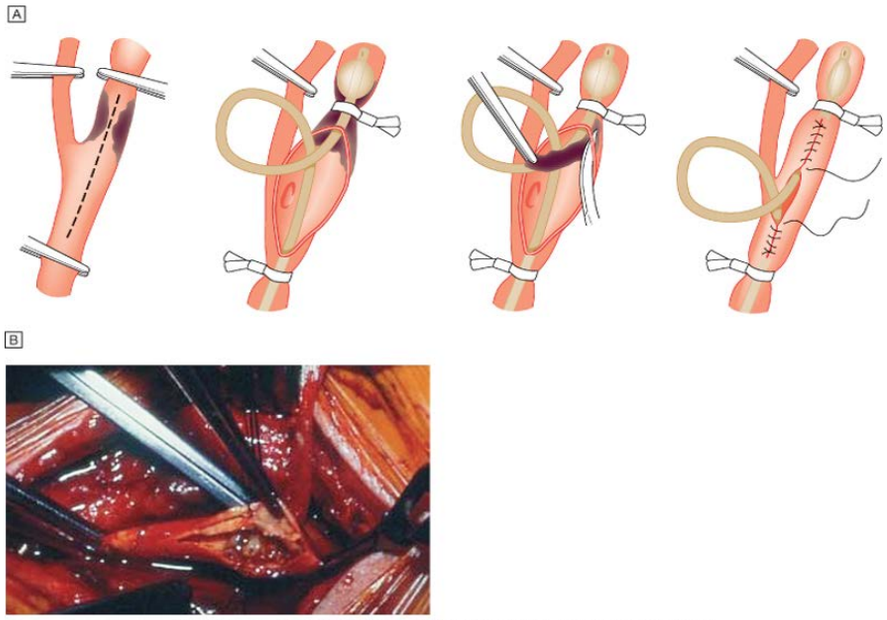

Diagram showing endarterectomy using a shunt to maintain cerebral blood flow while the occluding plaque is removed. Operative photograph of plaque being removed at carotid endarterectomy.

Carotid stenting

Primary carotid stenting via the femoral artery is currently being evaluated in terms of safety and efficacy as an alternative to surgery in several randomized controlled trials. The potential advantages are that the procedure can be performed under local anaesthesia, possibly with a reduced length of stay, and without a cut in the neck and thus any risk of cranial nerve injury

6. Summarise the evidence for the use of carotid endarterectomy in the management of patients with asymptomatic carotid artery disease.

Two RCTs have now indicated that in patients with asymptomatic high-grade (> 60%) internal carotid artery stenosis, CEA in addition to medical treatment is probably associated with a significant reduction in TIA/ ischaemic stroke, compared with medical therapy alone. However, the risks of TIA/stroke in this group are actually quite low (perhaps 10% at 5y). Thus, even if one could halve that risk with CEA, (*relative* risk reduction of 50%) the *absolute* risk reduction would be only 5% (1% per yr). Hence, the number of operations needed to prevent one TIA or stroke is potentially quite large (perhaps 20-30 or more). By contrast, the number of CEAs for symptomatic disease required to prevent one TIA/stroke is probably less than 10.