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Carotid Artery Disease

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Cumbria and Lancashire Vascular and Endovascular Centre
ASiT MRCS Part B (OSCE) Course – 7th September 2016

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Stroke

Definition

- Transient Ischaemic Attack (TIA):
  - Acute loss of focal cerebral function with symptoms lasting less than 24 hours.

- Stroke:
  - Acute loss of focal cerebral function with symptoms lasting more than 24 hours.

Stroke Epidemiology

- Third most common cause of death responsible for 12% of UK deaths.
- Annual UK incidence of first-ever stroke is 2.4 per 1000 and TIA is 0.5 per 1000.
- 125,000 people suffer their first stroke each year while 36,000 suffer a TIA each year.
- Half of strokes affect patients greater than 75 years of age.
- Accounts for 10% of in-patient beds and 5% of health care expenditure.

Aetiology

- 80% due to ischaemia:
  - Large vessel thrombosis
    - Blood vessel injury – Hypertension, atherosclerosis, vasculitis.
    - Stasis/turbulent blood flow - Atherosclerosis, atrial fibrillation, valvular disease.
    - Hypercoagulable state - Increased number of platelets, deficiency of anti-coagulation factors, cancer.
  - Large vessel emboli
    - Heart - Valve diseases, atrial fibrillation, dilated cardiomyopathy, atrial myxoma.
    - Arterial circulation - Atherosclerosis of carotid artery, arterial dissection, vasculitis.
    - Venous Circulation – Patent foramen ovale, systemic emboli.

Aetiology

- 20% due to haemorrhage:
  - Traumatic.
  - Spontaneous
    - Hypertension.
    - Amyloid angiopathy.
    - Aneurysmal rupture.
    - Arteriovenous malformation rupture.
    - Bleeding into tumor.
    - Cocaine and amphetamine use.

Clinical Presentation

- Anterior cerebral artery:
  - Leg>arm weakness, grasp.
  - Cognitive: muteness, perseveration, abulia, disinhibition.

- Middle cerebral artery:
  - Arm>leg weakness.
  - Left – aphasia.
  - Right – cognitive dysfunction and neglect, topographical difficulty, apraxia, constructional impairment.

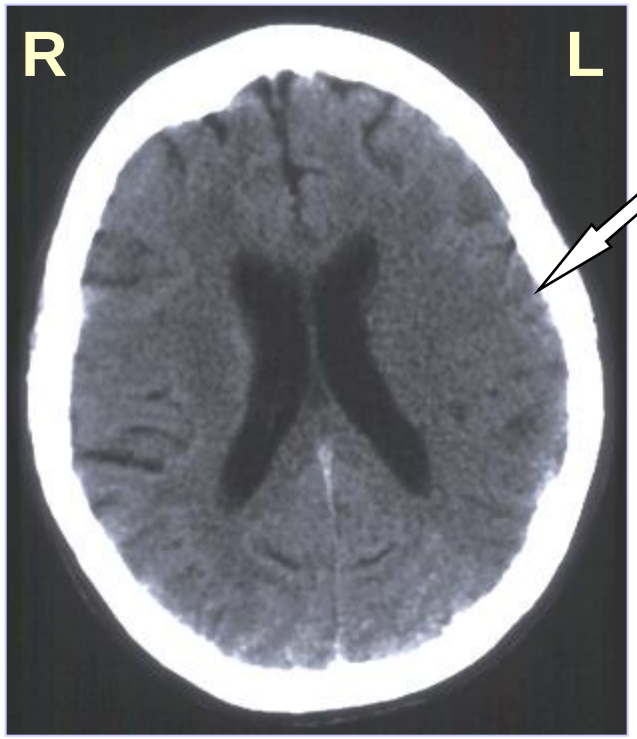
- Posterior cerebral artery:
  - Hemianopia.
  - Cognitive: memory loss/confusion.

Investigation

- CT
  - Non- contrast CT Head remains the gold standard as it is superior for showing haemorrhage.
  - CT with contrast may help identify aneurysms, AVMs, or tumors but is not required to determine whether or not the patient is a tPa lysis candidate.
- MRI
  - Superior for showing underlying structural lesions.
  - Contraindications.

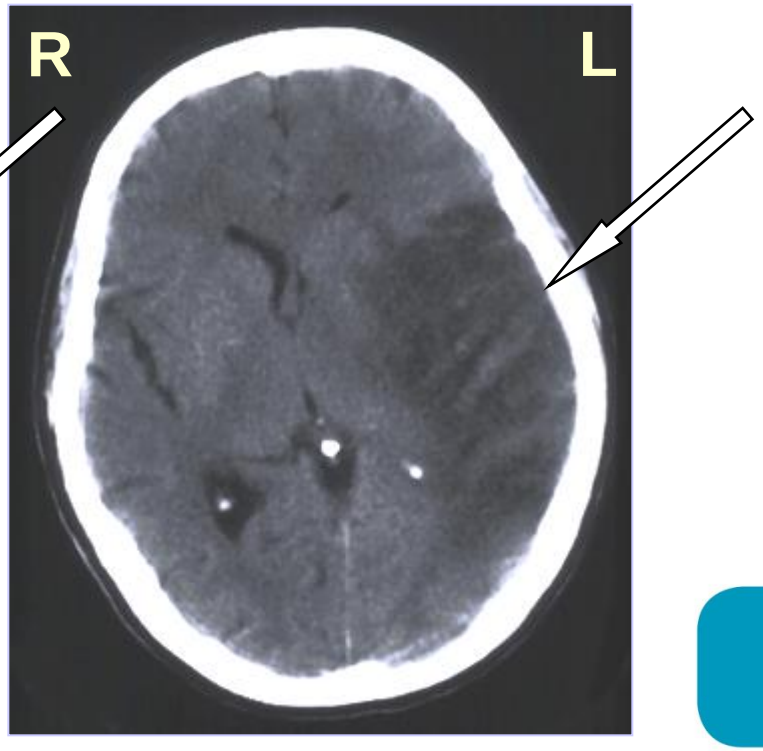
Investigation

Acute Infarction (4 hours)



Subtle blurring of gray-white junction & sulcal effacement

Subacute Infarction (4 days)



Obvious dark changes & "mass effect" (e.g. ventricle compression)

Therapeutic Strategy

- Best medical therapy;
  - Risk factor modification particularly blood pressure and smoking.
  - Antiplatelet therapy.
  - Lipid lowering therapy.

- Thrombolysis;
  - Rule out intracerebral haemorrhage.
  - Protocolised treatment pathway.
  - Check for contra-indications.
  - Administer within 3-hours of event.
  - 10% tPa stat over 1-2 minutes followed by remainder as infusion over 1-hour.

PHASE 1 – Immediate patient assessment indicates that this patient has the symptoms suggestive of a stroke & where the FAST test is positive for suspected stroke.

Times of **Symptom onset**	date ____/____/____	time ____:____hrs	Time difference ____:____ hrs
and **Arrival**	date ____/____/____	time ____:____hrs	

CONTRA INDICATIONS *Circle Yes, No or Not known as appropriate*

• History suggestive of subarachnoid haemorrhage	Yes	No	Not known
• Seizure at stroke onset	Yes	No	Not known
• BP > 185 mmHg systolic (or diastolic > 110 mmHg)	Yes	No	Not known
• BM < 2.8 or > 22 mmol/l	Yes	No	Not known
• Platelet count < 100,000	Yes	No	Not known
• If on Warfarin, INR >1.3	Yes	No	Not known
[contact Haematology bleep for urgent processing: **SJH** – ext 53353 / page 3729; **RIE** – bleep 6550; **WGH** – in hours ext 31482, out of hours page 8477**]**			
• Bacterial Endocarditis / Pericarditis	Yes	No	Not known
• Treated with LMW Heparin within last 48 hours & APTT is still raised	Yes	No	Not known
• NIH Stroke Scale <5 [*very minor neurological deficit*] or > 25	Yes	No	Not known
• Neurological symptoms very rapidly improving	Yes	No	Not known
or History of:			
⇒ Previous stroke **plus** Diabetes	Yes	No	Not known
⇒ Another stroke or head injury in last 3 months	Yes	No	Not known
⇒ GI, urinary or menstrual bleeding in last 21 days	Yes	No	Not known
⇒ Surgery or significant trauma in last 14 days	Yes	No	Not known
⇒ Arterial puncture at non-compressible site in last 10 days	Yes	No	Not known
⇒ Severe liver disease (hepatic failure, cirrhosis, varices etc)	Yes	No	Not known
⇒ Possibility of pregnancy	Yes	No	Not known

If there are any circles in the 'Yes' column, please discuss urgently with Stroke Consultant.

The time since onset was <3hr, and a possible contraindication was present, so discussed (telemedicine or face-to-face*) **with Stroke Consultant,** Dr. …… , who agreed the patient was eligible for Thrombolysis.

This ICP was initiated at …… : …… Signed …… [* please delete as appropriate]

CONDITIONS *Circle Y or N as appropriate*

1. Intracerebral haemorrhage (ICA) or structural lesion must be excluded:
   Any evidence of structural lesion or ICH on CT scan? Y N initial
2. Patient must be in agreed venue for thrombolysis delivery Y N initial
3. Consent must be obtained (or assent from next of kin if unable to communicate) Y N initial
   [discussion of risk and benefit must have taken place, and be documented.]

CONCLUSION of CONTRAINDICATIONS &CONDITIONS: Is patient to receive Thrombolysis? Y N

Signed print designation

date time

How does this affect the Vascular Surgeon?

Therapeutic Strategy

- Best medical therapy.
- Thrombolysis.
- Carotid Endarterectomy.
- Carotid Stent.

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Tips / Tricks for Carotid Disease

- Symptomatology.
- Disease Pathogenesis.
- Carotid Endarterectomy Consideration.

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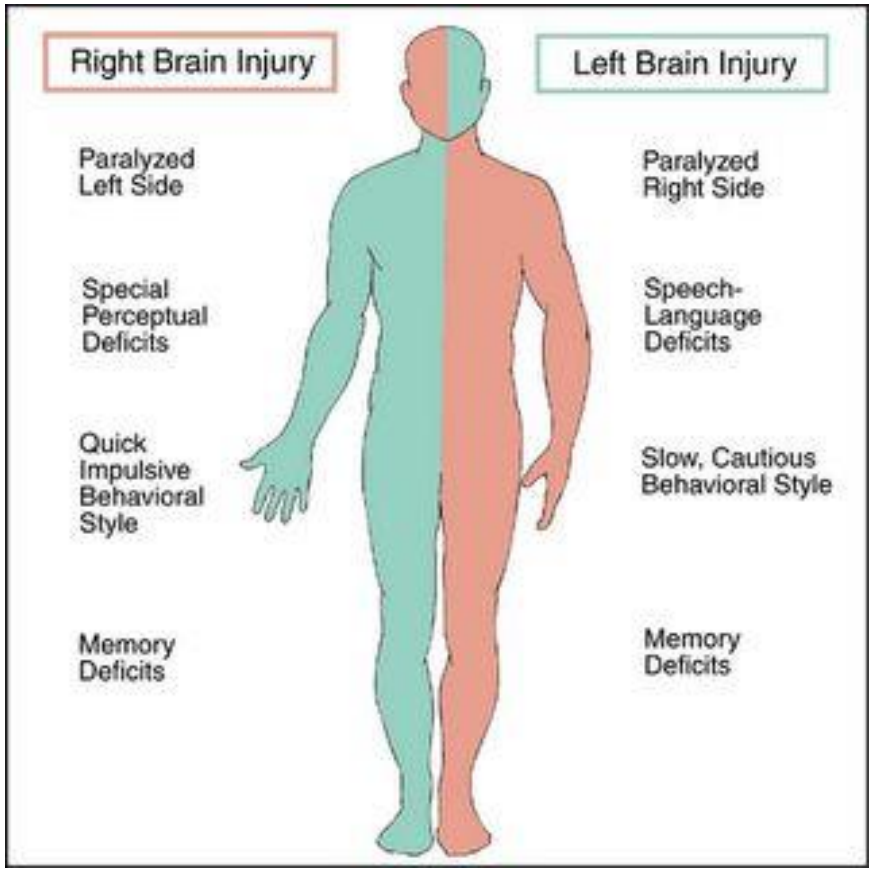
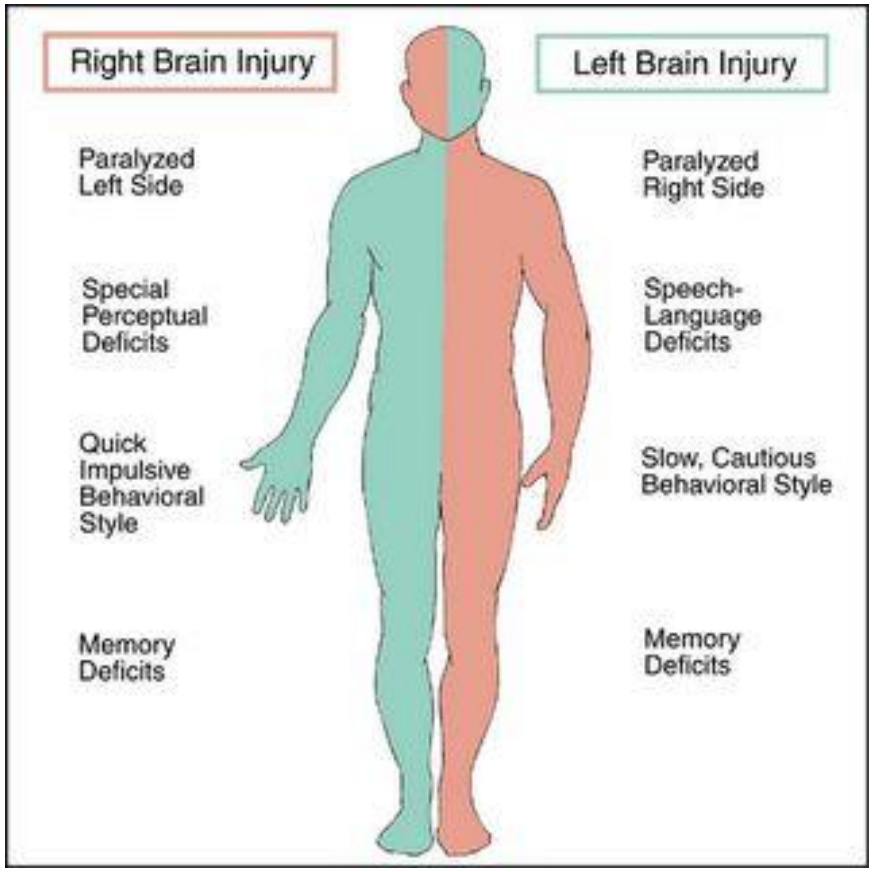
Symptomatology



Symptomatology

Left facial weakness

Right amaurosis fugax



Right facial weakness

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Tips / Tricks for Carotid Disease

- Symptomatology.
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Stroke

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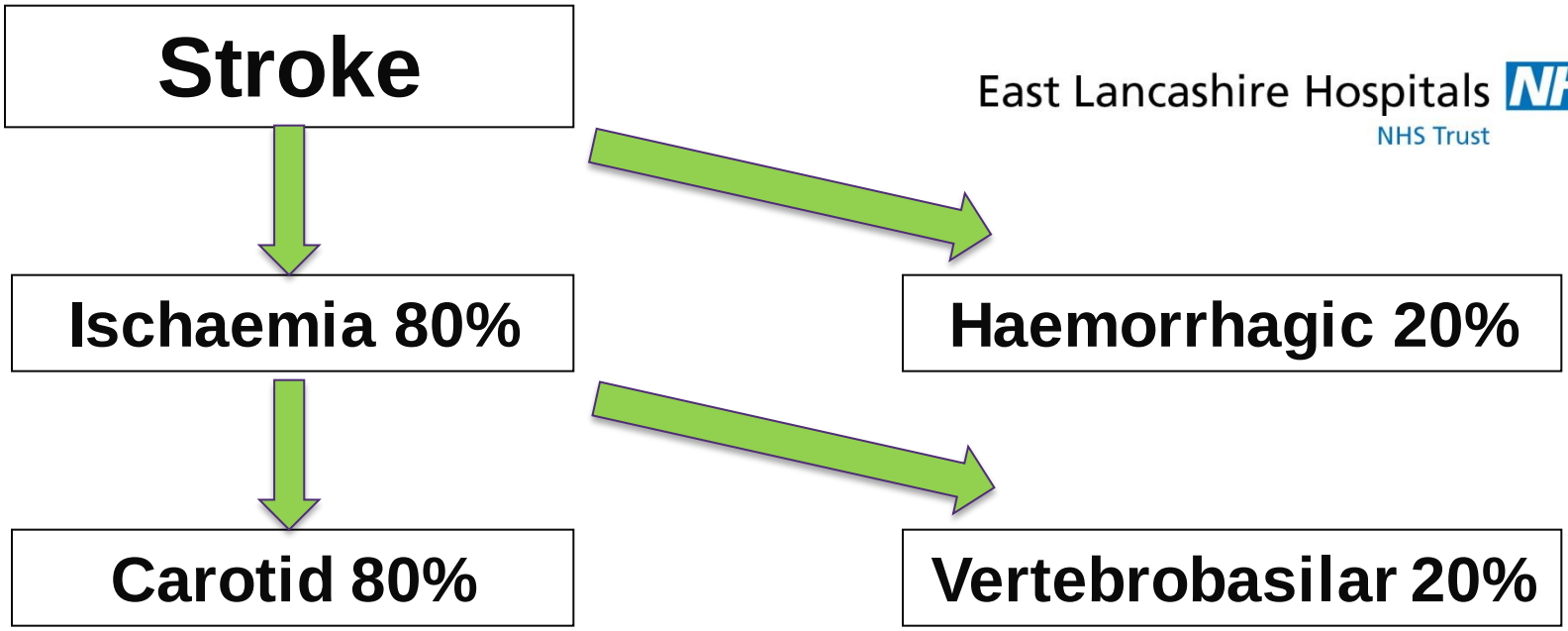
Ischaemia 80%

Haemorrhagic 20%


Stroke
Ischaemia 80%
Haemorrhagic 20%
Carotid 80%
Vertebrobasilar 20%

Stroke

- Ischaemia 80%
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    - Thromboembolism of ICA / middle cerebral artery 50%
    - Small vessel occlusion of end-arteries 25%
    - Cardiogenic embolism 15%
    - Haematological disorders 5%
    - Miscellaneous – tumours, arteritis 5%
  - Vertebrobasilar 20%
- Haemorrhagic 20%

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Tips / Tricks for Carotid Disease

- Symptomatology.
- Disease Pathogenesis.
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Why Treat – Nice Guidelines

- Early treatment saves brain …..
- Evaluation by stroke physician – prompt referral as time to surgery should be less than 14 days.
- Aspirin 300mg for 14 days.
- Clopidogrel 75mg for life.

Carotid Investigation

- Risk factor evaluation and treatment.
- Baseline haematological analyses.
- Carotid duplex.
- Cross-sectional collaborative / operative planning image;
  - CT angiogram.
  - MR angiogram.
- Conventional angiograms no longer warranted due to 1-2% stroke risk.

Carotid Duplex

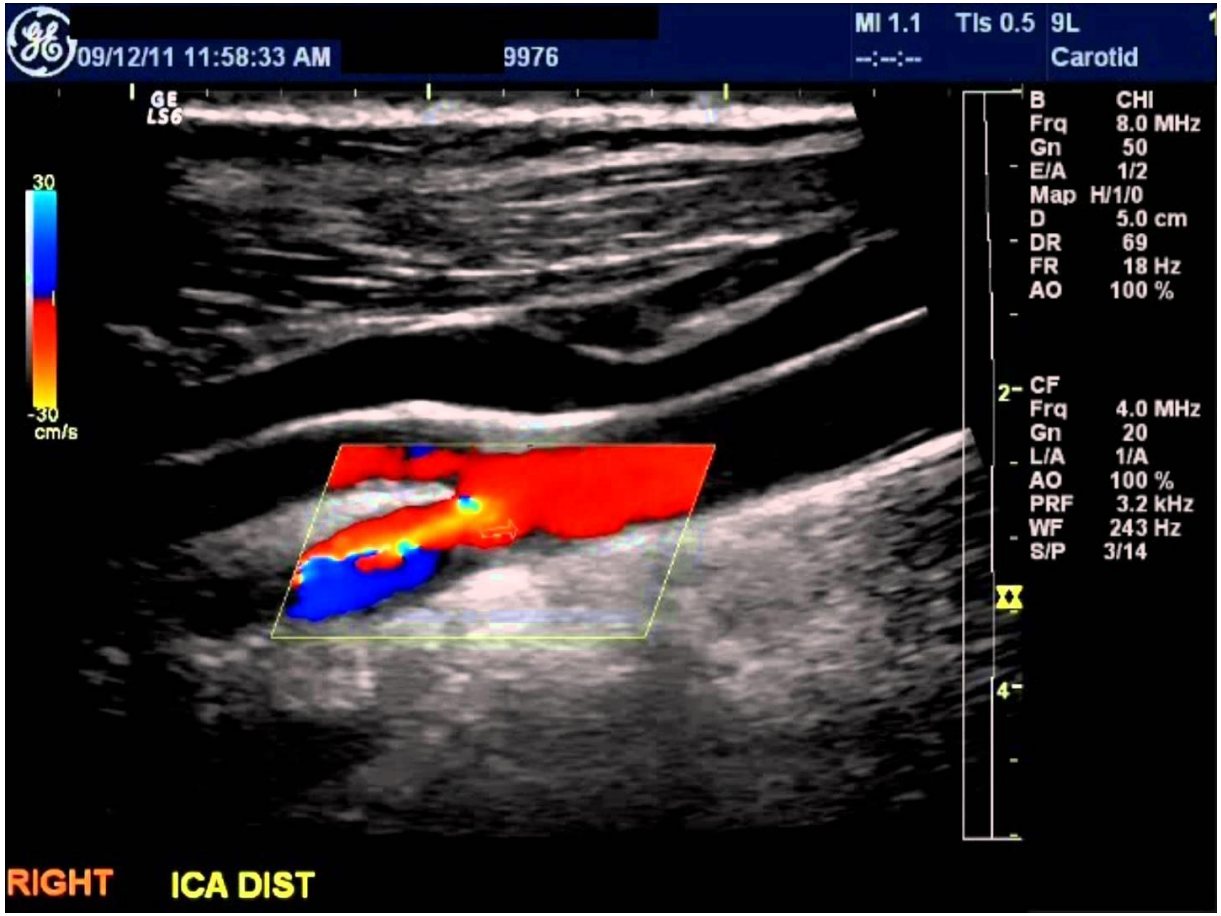

Table 10.6 • Carotid Endarterectomy Trialists Collaboration: 5-year risk of any stroke (including 30-day stroke/death) from the combined VA, ECST and NASCET trials

Trial	Stenosis	*n*	30-day CEA risk	5-year risk		ARR	RRR	NNT	Strokes prevented per 1000 CEAs
				Surgery	Medical				
CETC	<30%	1746	No data	18.36%	15.71%	– 2.6%	N/b	N/b	None at 5 years
CETC	30–49%	1429	6.7%	22.80%	25.45%	+ 2.6%	10%	38	26 at 5 years
CETC	50–69%	1549	8.4%	20.00%	27.77%	+ 7.8%	28%	13	78 at 5 years
CETC	70–99%	1095	6.2%	17.13%	32.71%	+ 15.6%	48%	6	156 at 5 years
CETC	String	262	5.4%	22.40%	22.30%	– 0.1%	N/b	N/b	None at 5 years

ARR, absolute risk reduction; N/b, no benefit conferred by CEA; NNT, number needed to treat; RRR, relative risk reduction; strokes prevented per 1000 CEAs, number of strokes prevented at 5 years by performing 1000 CEAs.
Data derived from the CETC[36–38] with all pre-randomisation angiograms remeasured using NASCET method.

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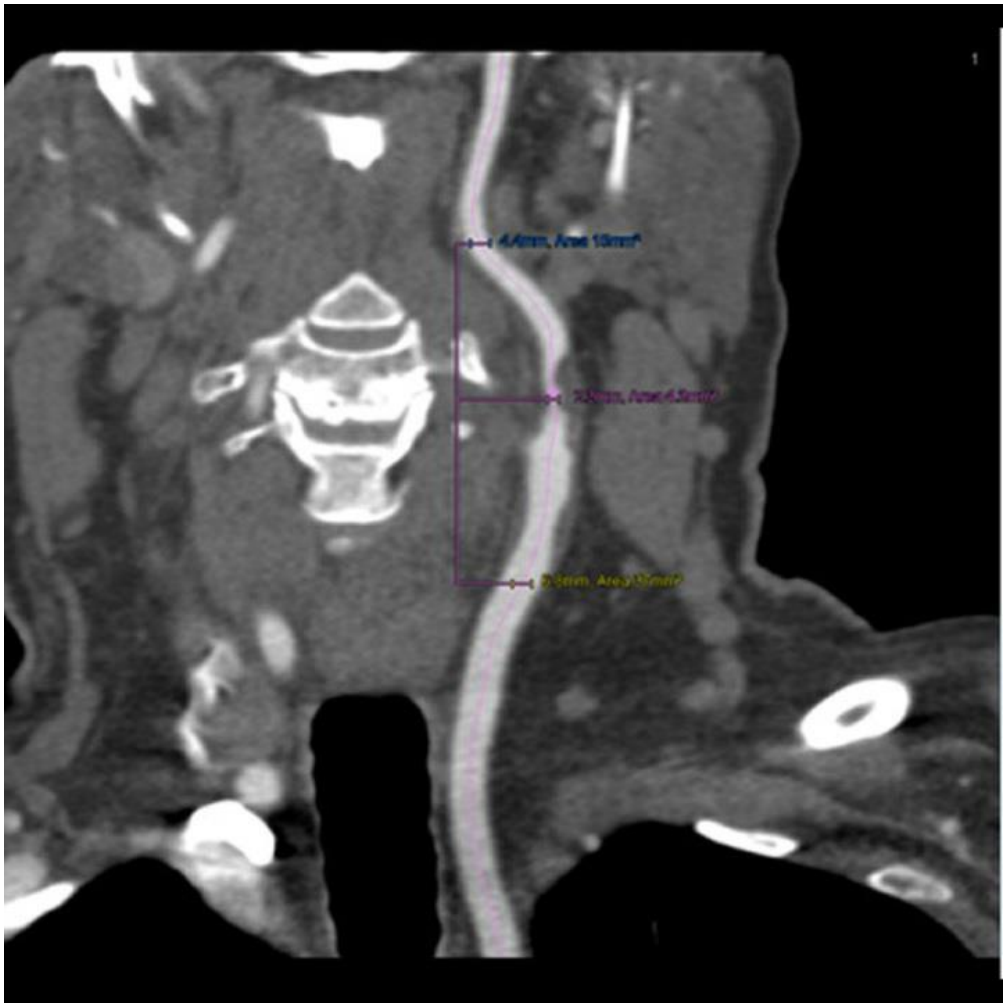
CT Angiogram



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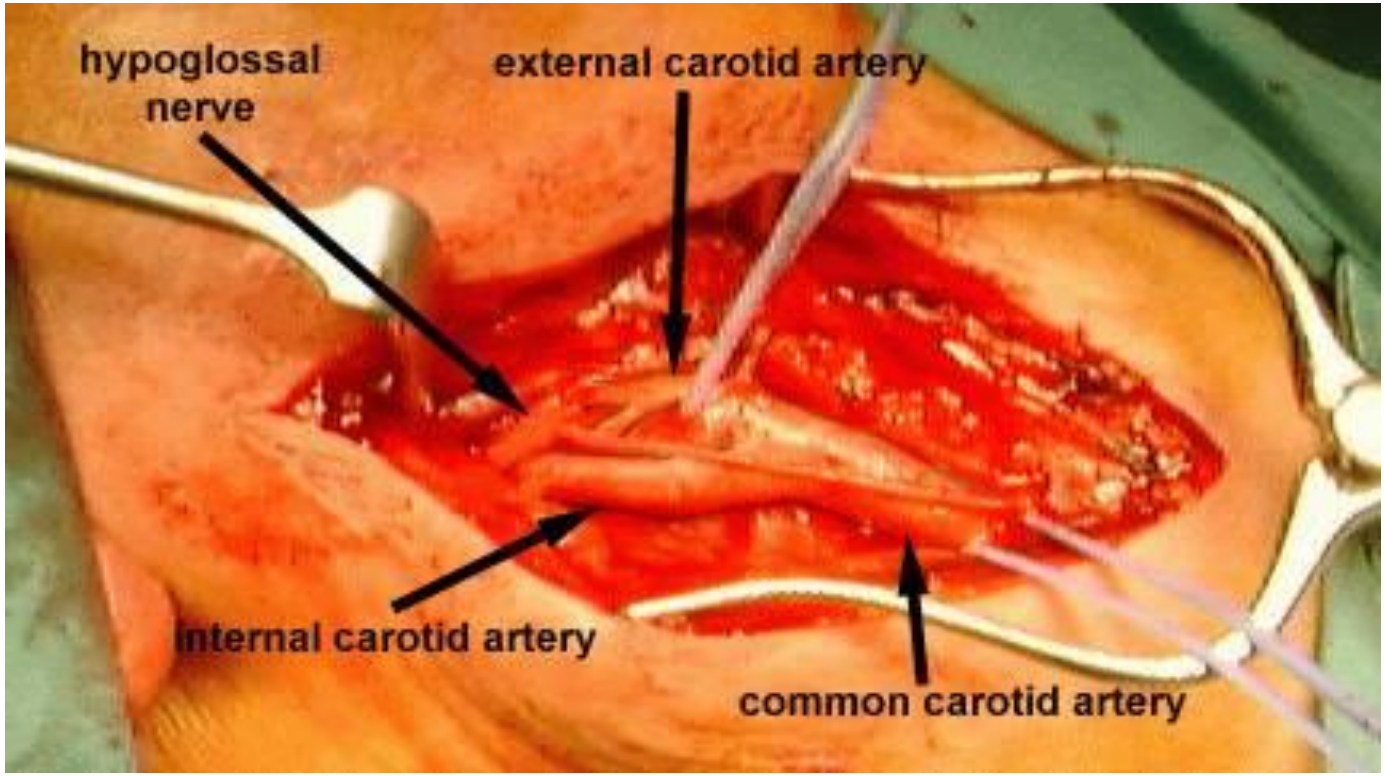
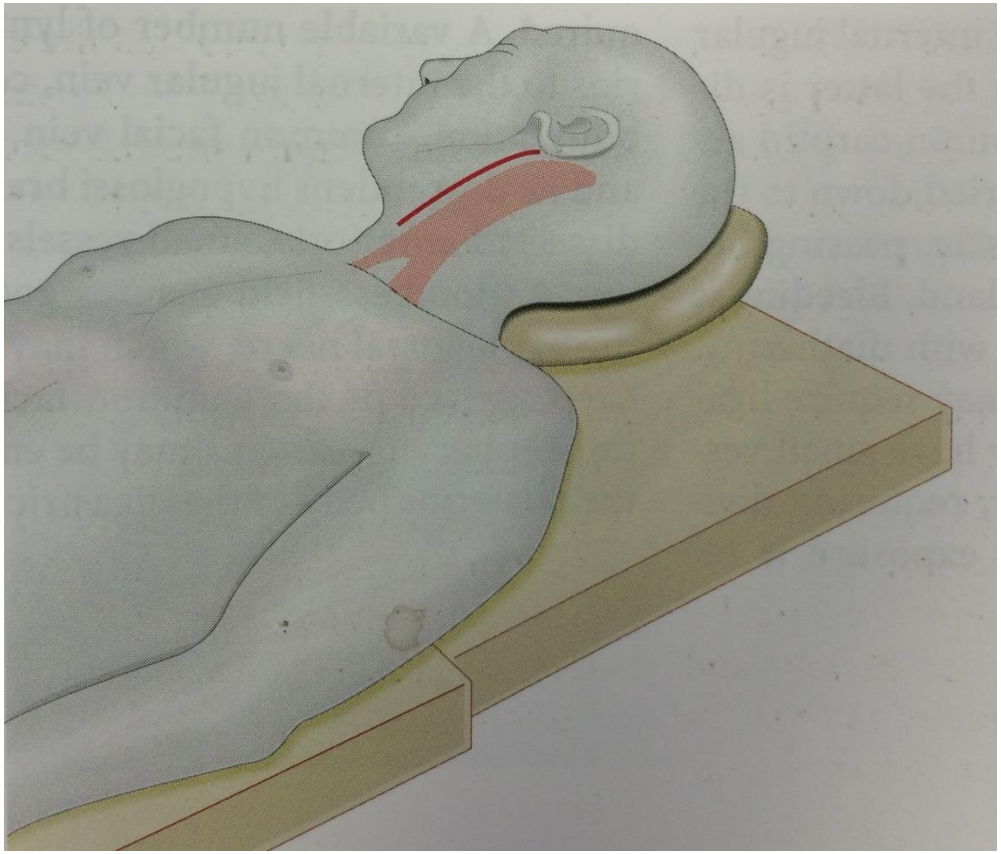
Consent

- General Local Complications;
  - Pain, Bruising, Bleeding, Wound infection.
- Systemic Complications;
  - Cardiovascular, Respiratory, Thromboembolic.
- Procedural Specific Complications;
  - Stroke.
  - Nerve injury.
  - Scar.
  - Numbness.
  - Patch infection.

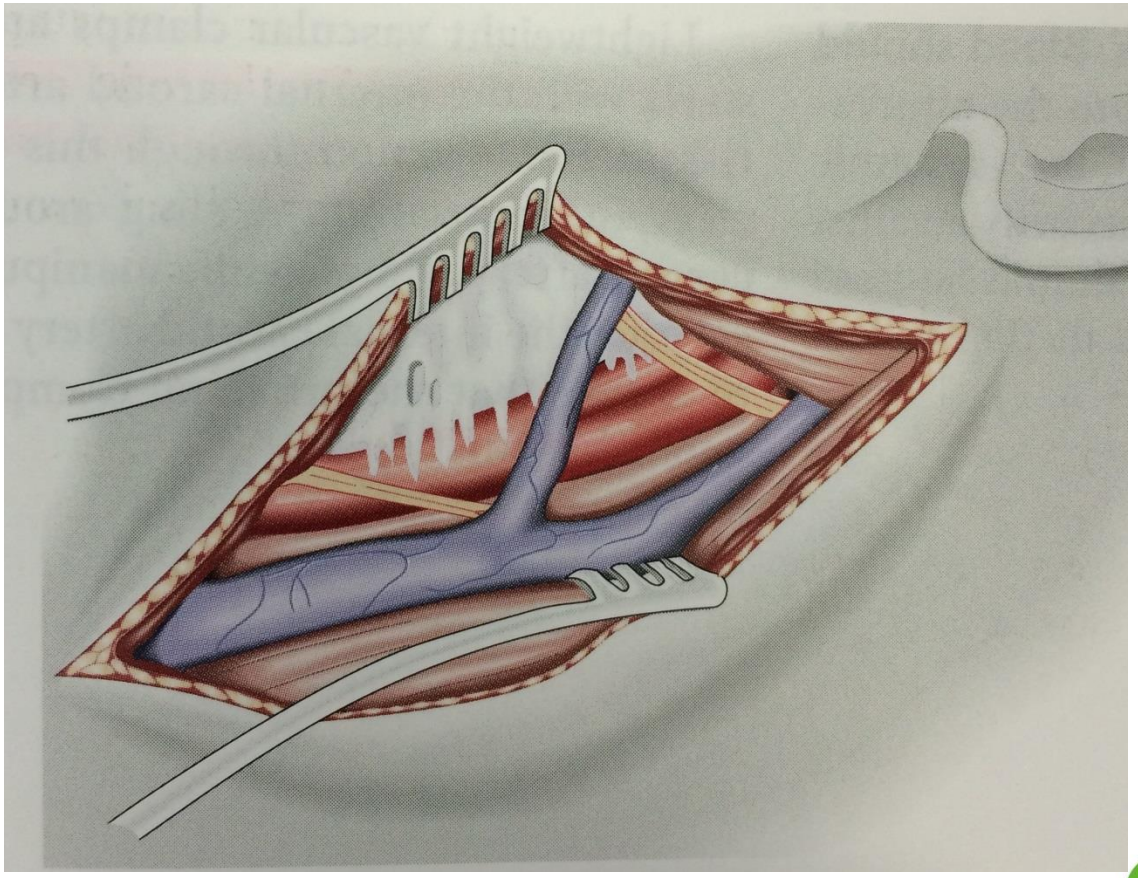
Carotid Endarterectomy



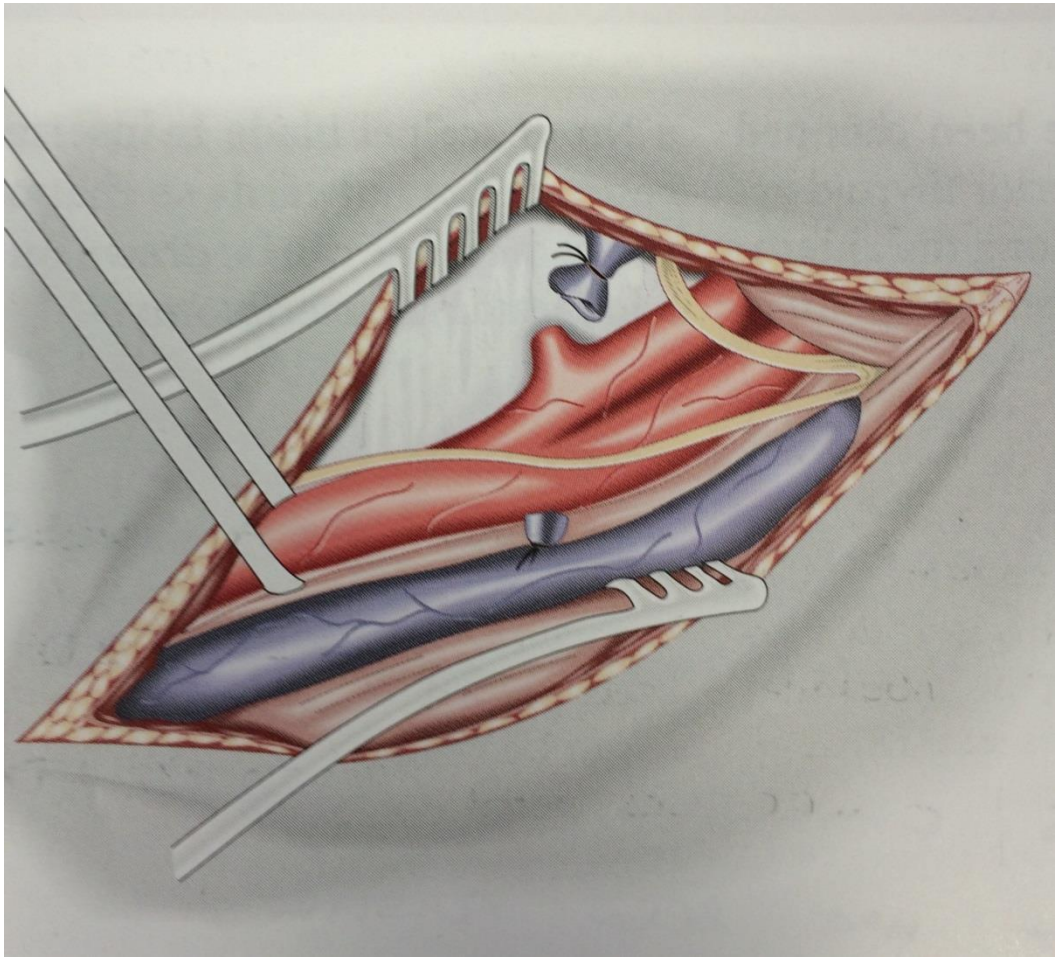
1 – Patient Positioning



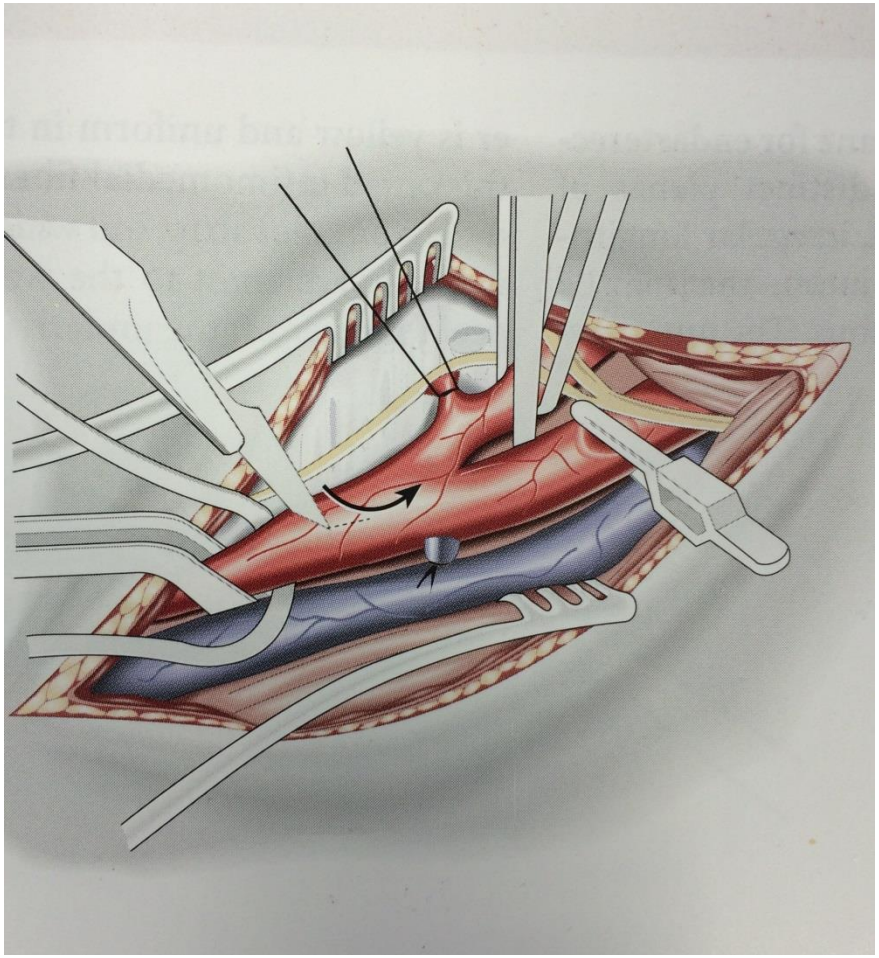
2 – Dissection down onto anterior facial vein



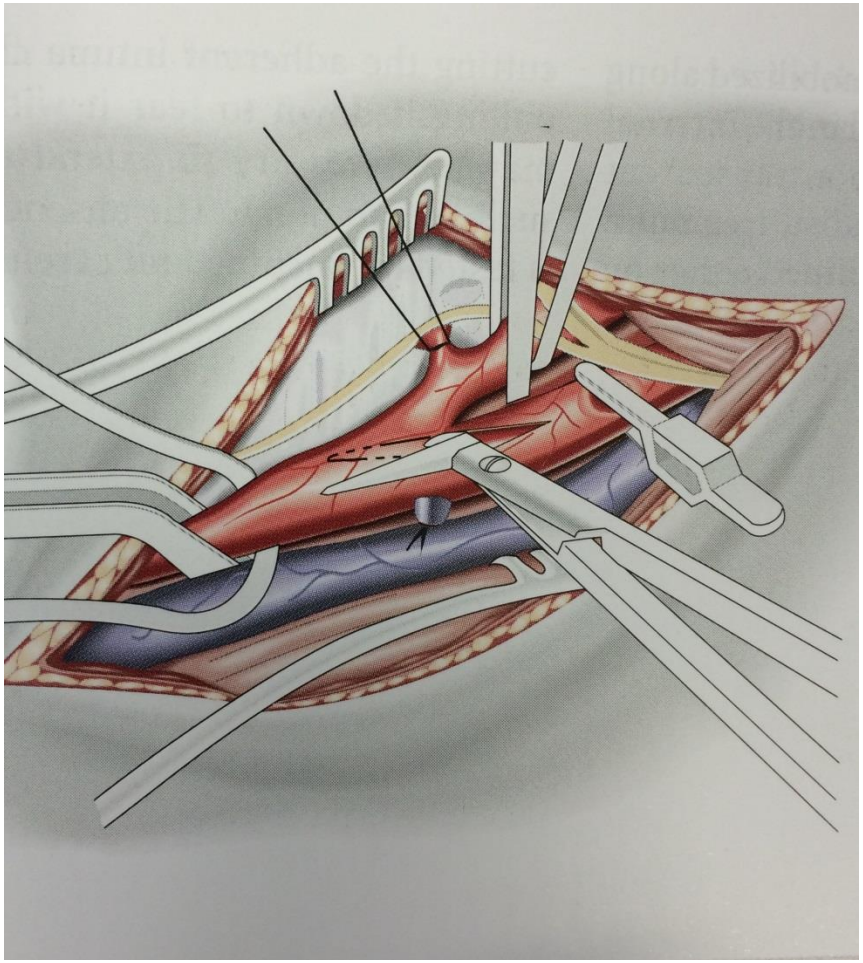
3 – Control of Carotid Vessels



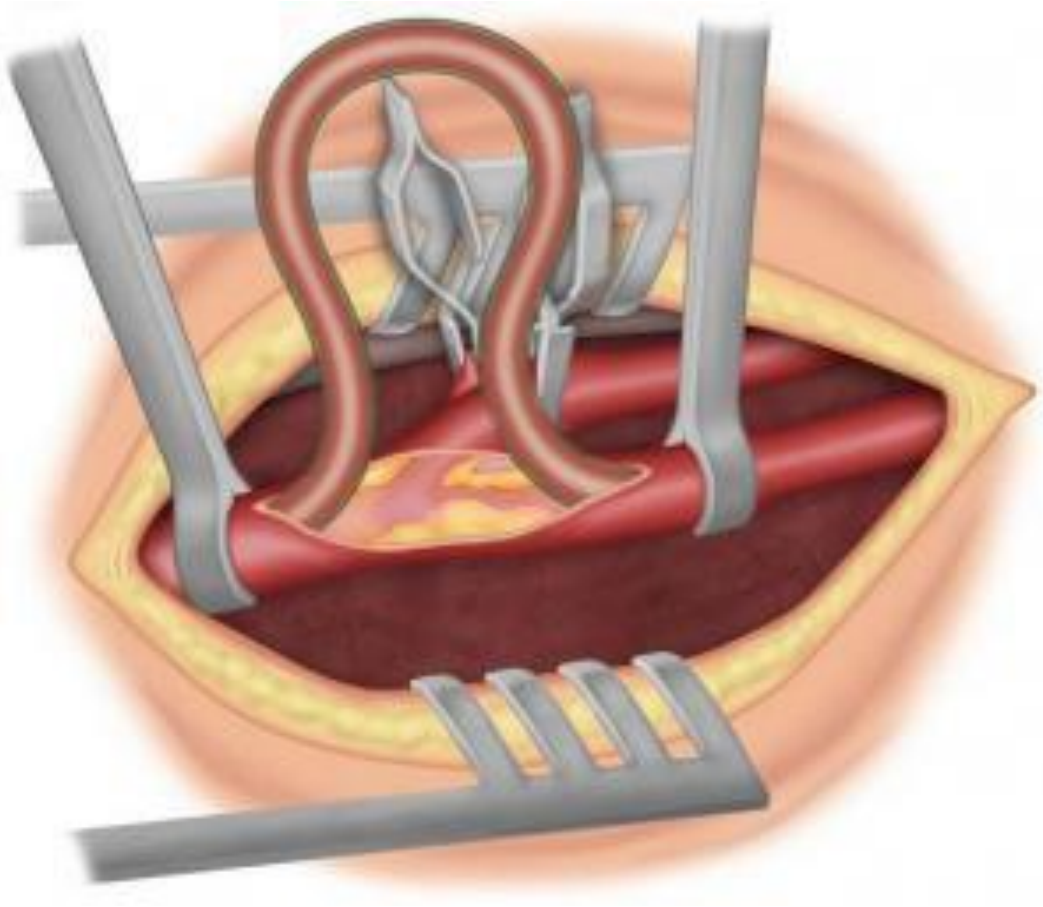
4 – Vessel Clamping



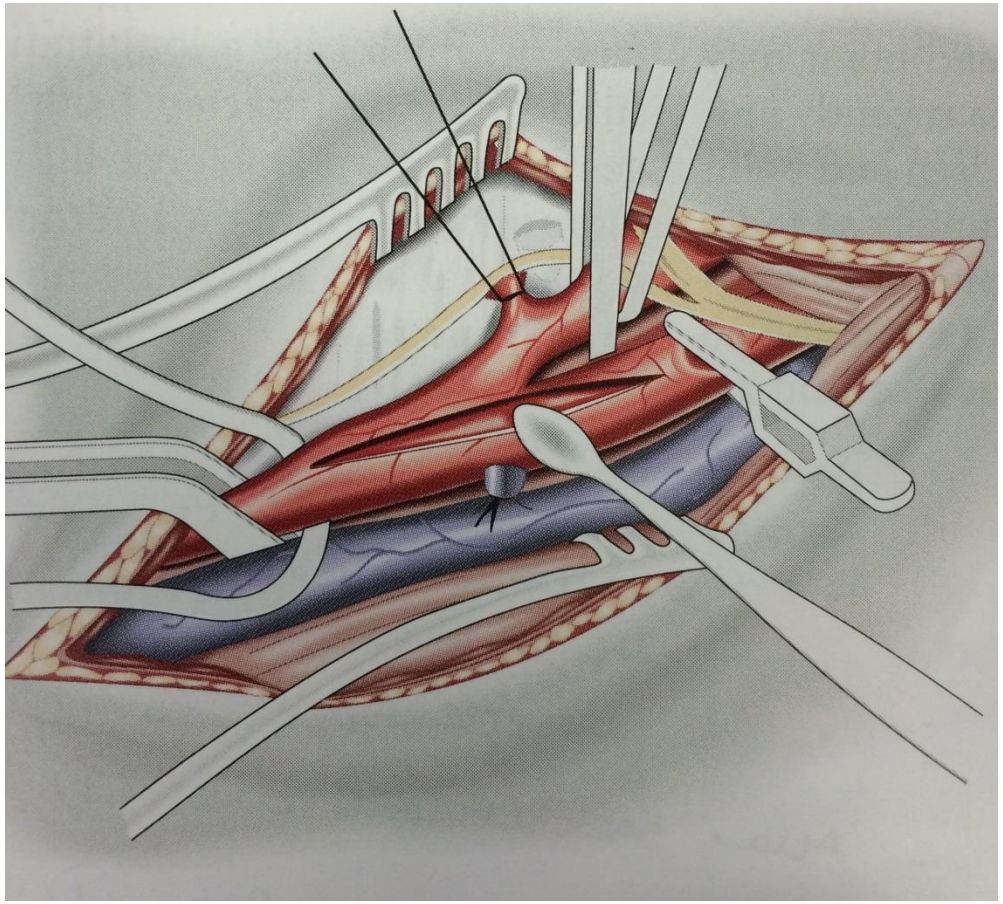
5 – Arteriotomy



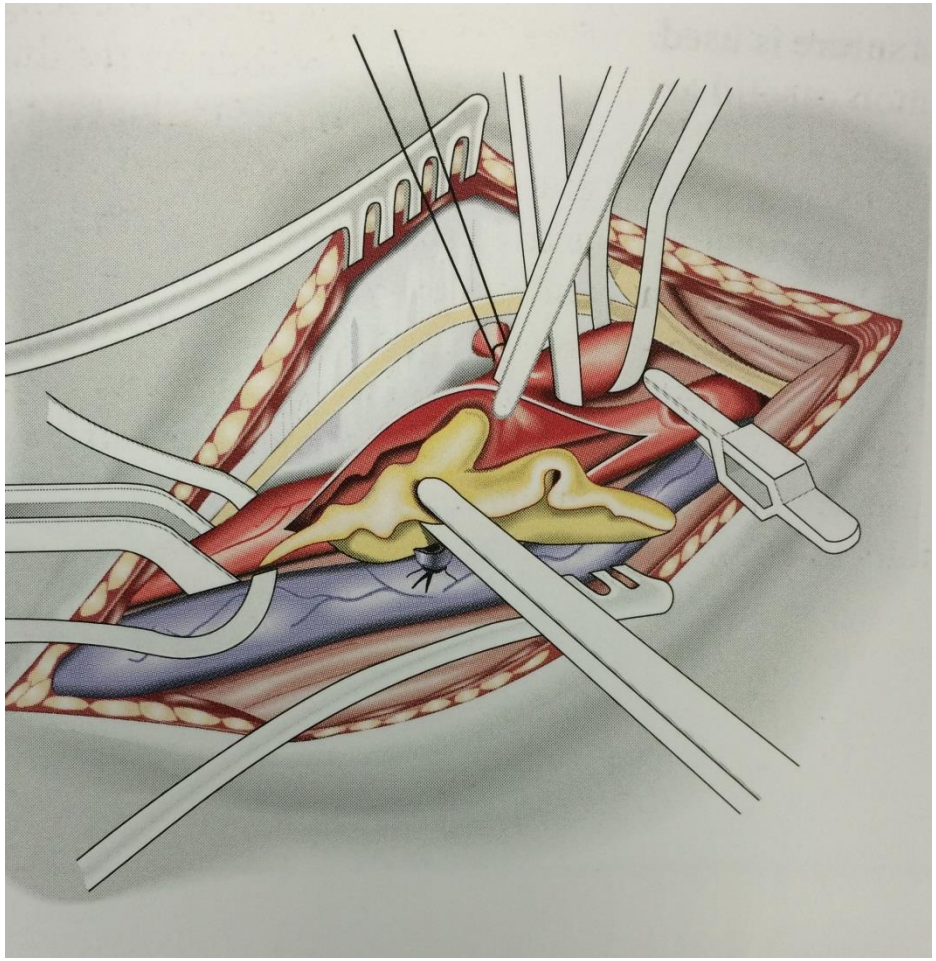
6 – Shunt Insertion



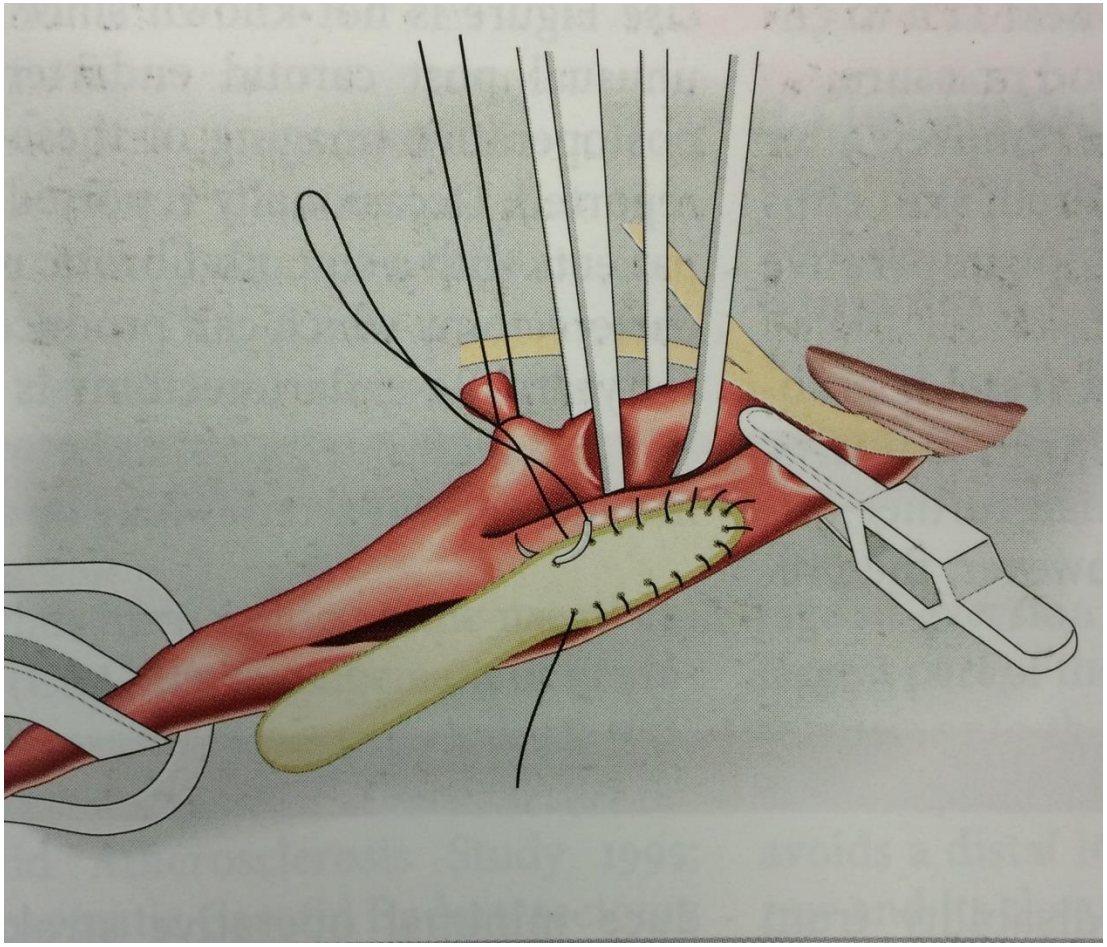
7 – Endarterectomy



8 – Endarterectomy

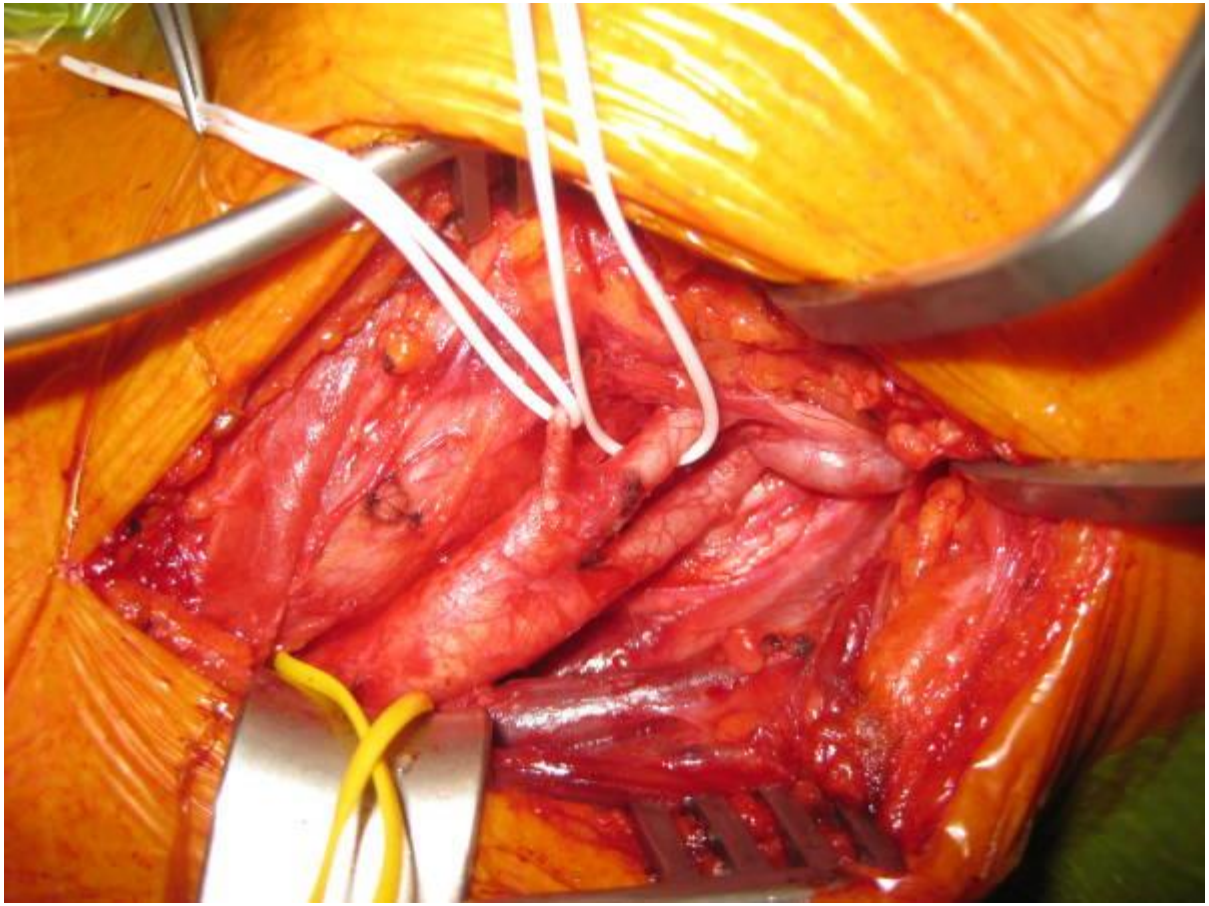


9 – Patch Angioplasty



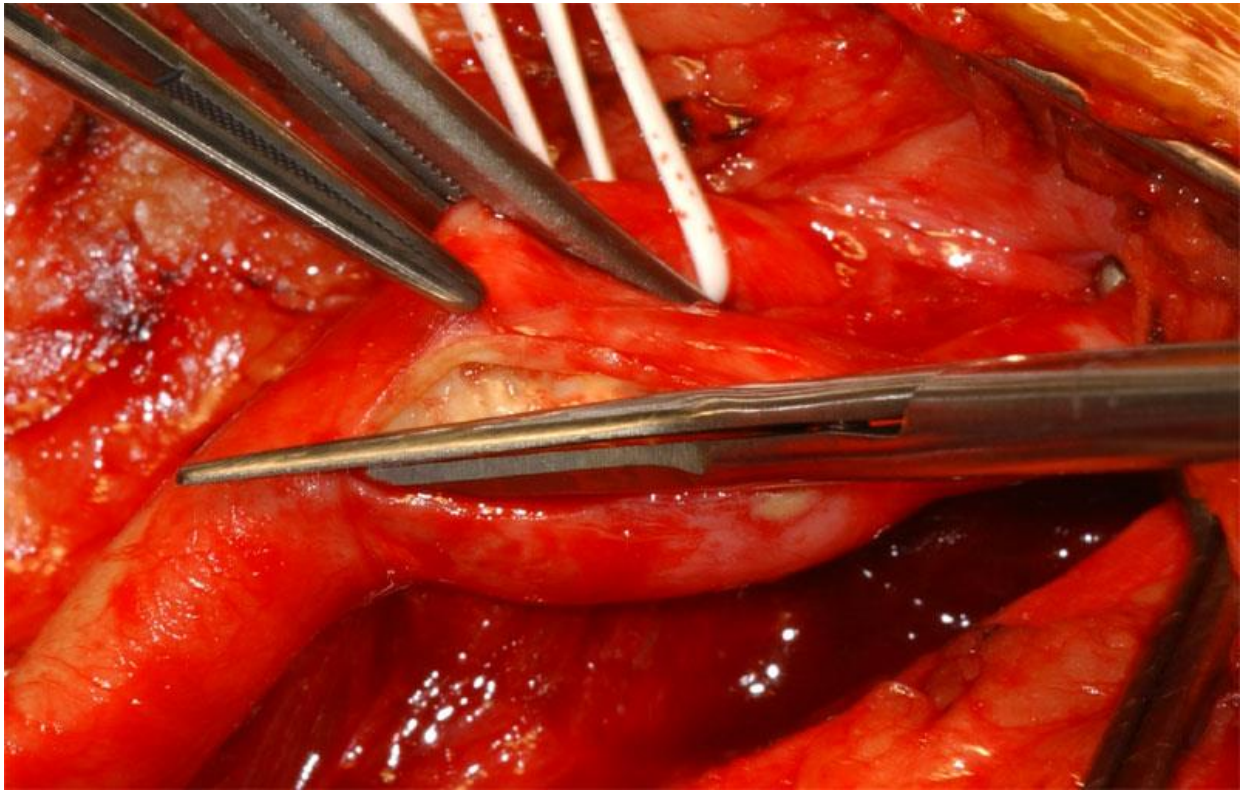
Patient Positioning

Control of Carotid Vessels

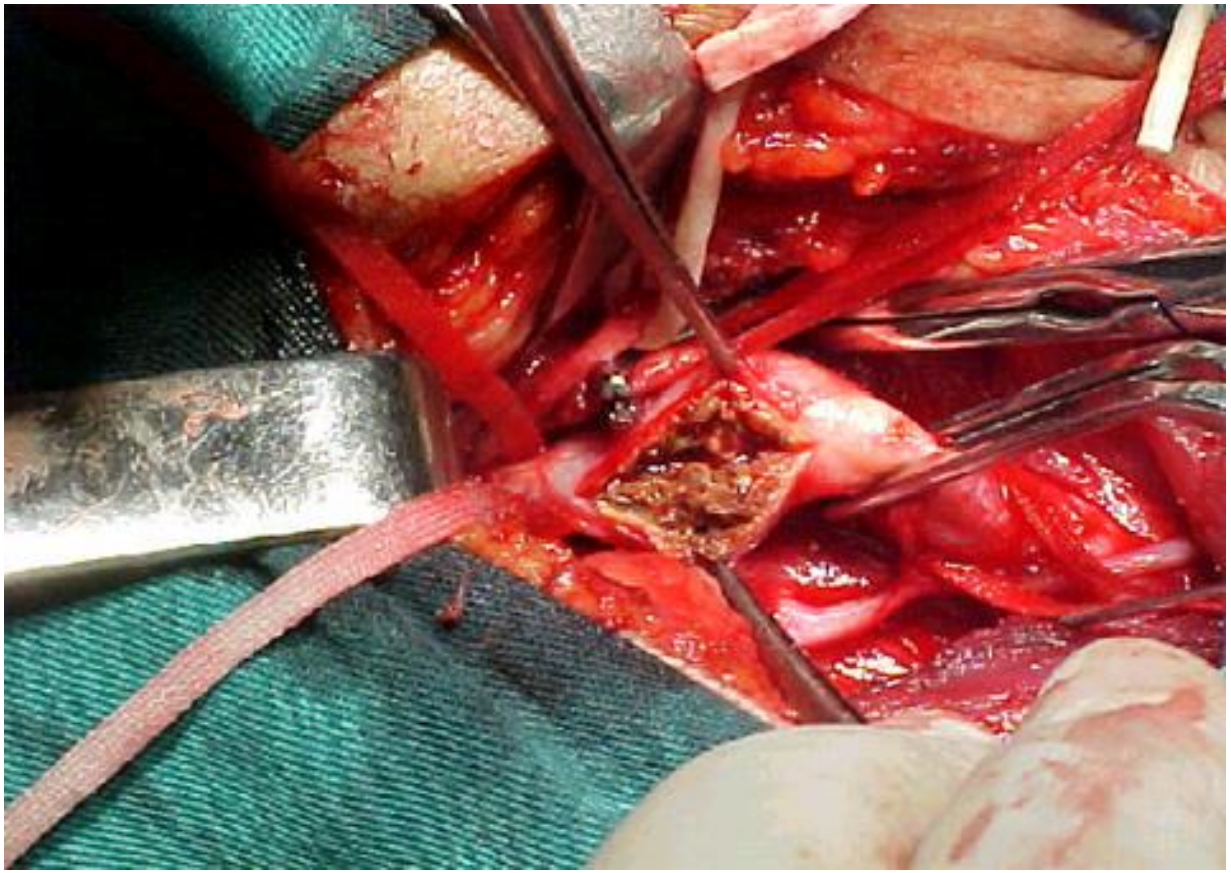


Vessel Clamping

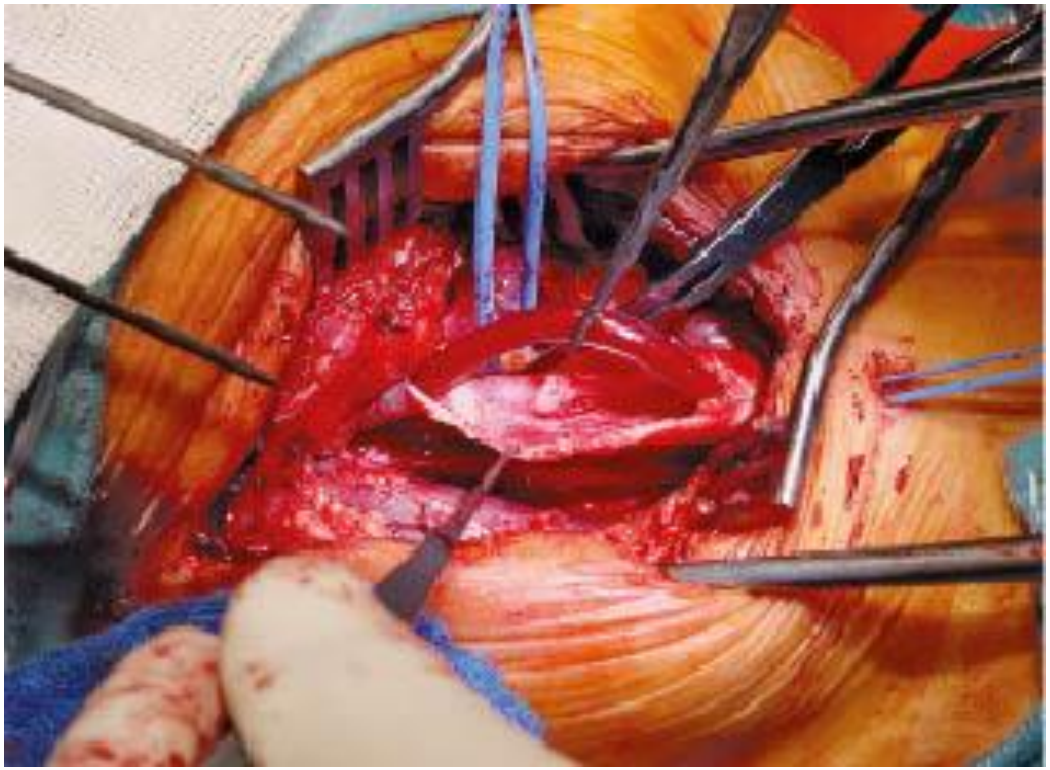
Arteriotomy



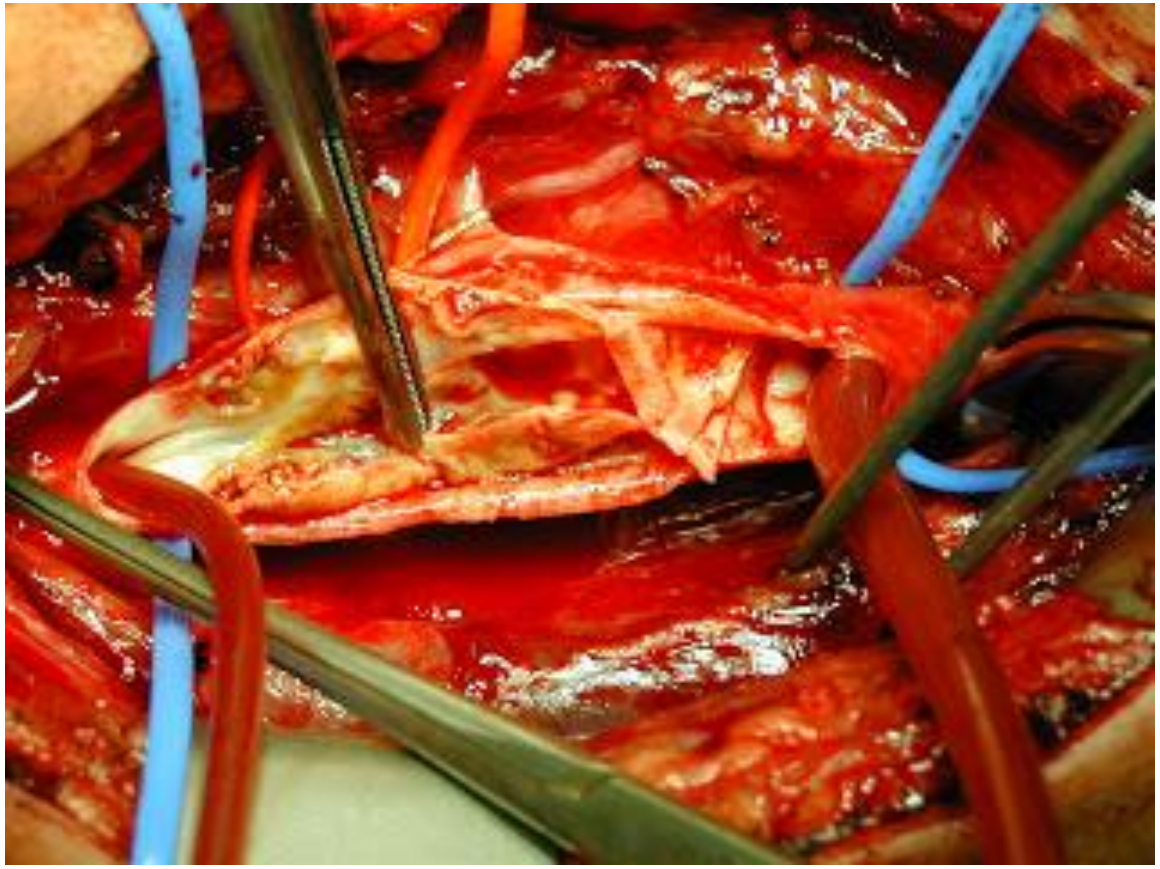
Arteriotomy



Shunt Insertion



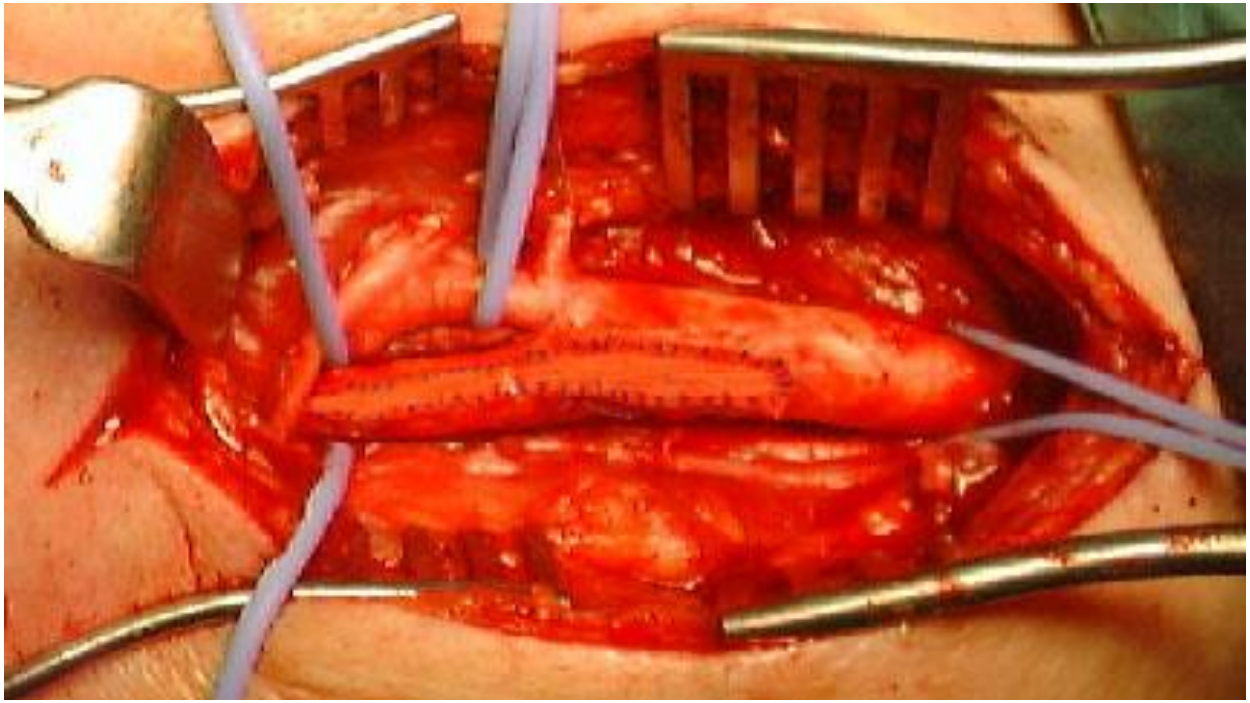
Endarterectomy



Completed Endarterectomy

Carotid Plaque

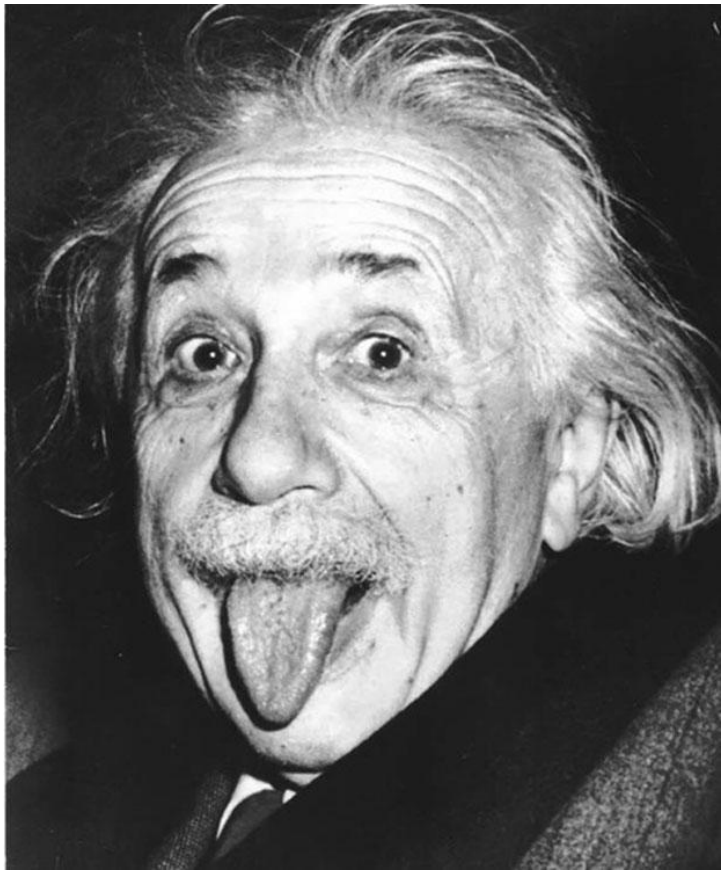
Patch Angioplasty



Post-procedural care

- Strict blood pressure monitoring.
- Neurovascular assessment.
- Restoration of best medical therapy.
- Most patients discharged days 1-2.
- Review 3 months with carotid duplex.

Important Literature



GALA Trial

- General Anaesthesia versus Local Anaesthesia for carotid surgery Trial.
- 3526 patients with symptomatic or asymptomatic carotid stenosis randomised to GA or LA.
- No difference between anaesthetic groups.
- Outcome – clinical judgement call by vascular team members.

Lancet 2008; 9656: 2132-42.

CREST Trial

- Carotid Revascularisation Endarterectomy versus Stenting Trial.
- 2502 symptomatic and asymptomatic patients randomised to CEA or CAS.
- Age: CAS better < 70 years, CEA better > 70 years.
- Higher risk of stroke with CAS compared to subgroup analysis of higher MI risk with CEA.

Stroke 2011

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Cases

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Case 1

- 72 year old male patient presents following a fall with associated left arm weakness;
  - Lives alone.
  - Two recent episodes of eye blurring.
  - Past medical history of angina, COPD and smoking.

Case 2

- 89 year old female patient presents from ED after being found non-communicative with a dense weakness of right arm and leg;
  - Lives in a nursing home.
  - Doesn't mobilise.
  - Past medical history of right above knee amputation.

Case 3

- 64 year old female presents with fainting episodes and unsteady gait;
  - Occasional forget-fullness.
  - Retro-orbital pain.
  - Lives in a residential home.
  - Past medical history of rheumatoid arthritis.

Questions