Gloucestershire Hospitals NHS Foundation Trust

Management of Post-Carotid Endarterectomy Hypertension

(1) THEATRE RECOVERY: systolic BP >170mmHg

General Points
Is the patient in urinary retention or in pain?
Has the patient received their normal anti-hypertensive medication today?

First line
LABETALOL (*unless contraindicated e.g. bradycardia or brittle asthma*)
100mg Labetalol in 20 mls of 0.9% Saline. (ie. 5mg per ml)
Give 10mg (2 ml) boluses slowly every two mins up to 100mg (ie 20mls given over 20mins)
If BP remains elevated after 20 mins, move to second line agent.
If BP reduces and does not rebound, continue regular BP observations.
If BP reduces but increases again, start infusion at 50-100mg per hour, titrating dose to BP.

Patient remains in Recovery while Labetalol infusion is running. Following cessation of the infusion, the patient should remain in Recovery / ITU for 2 further hours to minimise rebound hypertension.

Consider Clonidine 15-30microgram IV increments up to 150micrograms if Labetalol contraindicated or ineffective. NB causes sedation, and occasionally a transient rise in BP after administration.

Second line
HYDRALAZINE *(unless contraindicated)*
10mg Hydralazine in 10mls of 0.9% Sodium Chloride (ie 1mg per ml)
Give 2mg (2ml) boluses slowly every 5 mins up to 10mg (ie 10mls given over 25 mins)
If BP remains elevated after 25 mins, move to third line agent.
If BP reduces and does not rebound, continue regular BP observations.
If BP reduces but increases again, move to third line agent

Consider ITU if requiring Hydralazine therapy. Following cessation of Hydralazine therapy, the patient should remain in Recovery / ITU for 2 further hours to minimise rebound hypertension.

Hydralazine is a direct acting arteriolar vasodilator which causes minimal venodilatation. It can cause a baroreceptor mediated reflex tachycardia and tends to increase cardiac output. Can precipitate angina, and is contraindicated in the period after myocardial infarction2. This baroreceptor reflex tends to be obtunded in post carotid endarterectomy hypertension3. Metabolised by acetylation in liver and excreted in urine. Metabolism is dependent on acetylator status. T½ = 2-3 hours, less in fast acetylators, prolonged up to 16hrs in renal failure.[2]

Third Line
GTN
50mg GTN in 50mls 0.9% Sodium Chloride (i.e. 1mg per ml)
Start infusion at 5mls/hr (5mg/hr), increasing rate to 12mls/hr (12mg/hr), titrated to BP.

Patient remains in Recovery / ITU while GTN infusion is underway. Following cessation of GTN infusion, the patient should remain in Recovery / ITU for 2 further hours to minimise rebound hypertension.

Author: Dr David Radley
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(2) PATIENT IS BACK ON THE WARD:
systolic BP >170mmHg, but NO headache/neurology

There are three scenarios: (1) Patient is not normally on antihypertensive therapy
(2) Patient is normally on antihypertensive therapy
(3) Patient cannot swallow tablets

(2.1) Patient is <u>NOT</u> normally on antihypertensive therapy

First line
AMLODIPINE (10mg), repeated after 1 hour if no change in BP.
If no reduction in BP, move to second line agent

Second line
BISOPROLOL 5mg.
If contra-indicated, e.g. bradycardia or brittle asthma, move to third line agent.

Third line
RAMIPRIL 5mg, repeated at 3hrs if necessary. Caution in AKI.

Contact Medics/Cardiology for clinical review

(2.2) Patient <u>IS</u> normally on antihypertensive therapy

First line
Check the patient has received normal anti-hypertensive medication. If not, administer this.

Second line
A = ACE inhibitor, B = B-Blocker, C = Calcium Channel Blocker, D = Diuretic
(normal contraindications apply)
If patient is on A, add in C (Amlodipine 10mg)
If patient is on C, add in A (Ramipril 5mg)
If patient is on D, add in A (Ramipril 5mg)
If patient is on A+C, add in D (Bendrofluazide 2.5mg)
If patient is on A+D, add in C (Amlodipine 10mg)
If patient is on A+C+D, add in B (Bisoprolol 5mg)

Contact Medics/Cardiology for clinical review

(2.3) Patient cannot swallow tablets
Pass nasogastric tube and administer appropriate medicines in liquid form as prescribed above.

(3) PATIENT IS BACK ON THE WARD:

systolic BP >160mmHg + headache/ seizure or neurological deficit

- ✓ Treatment should start IMMEDIATELY on the ward using non-invasive monitoring.
- ✓ ABC approach
- ✓ Anti-hypertensive protocol is the same as used in Recovery (see page 1)
- ✓ Vascular Juniors / On call surgical SpR must:

1. Contact on call consultant vascular surgeon to inform him of increase in BP associated with seizure/headache or onset of neurological deficit.
2. SpR or senior to contact on call ITU SpR to discuss urgent transfer to ITU for invasive arterial BP monitoring.
3. Administer 8mg Dexamathasone intravenously
4. Arrange urgent CT head and CT angiogram carotids

Following transfer, patient remains in ITU while anti-hypertensive treatment ongoing. Following cessation of treatment, the patient should remain in ITU for a minimum of 6 further hours to minimise rebound hypertension.

References:

1. Naylor AR, Sayers RD, McCarthy MJ et al. (2013) Closing the Loop: A 21-year Audit of Strategies for Preventing Stroke and Death Following Carotid Endarterectomy European Journal of Vascular and Endovascular Surgery (46) 161-170.
2. Stoneham MD, Thompson JP (2009) Arterial pressure management and carotid endarterectomy BJA (102) 442-452
3. http://www.medicines.org.uk/emc/medicine/10820/SPC/Apresoline+Tablets+25+mg#PHARMACODYNAMIC_PROPS accessed 9/12/17