# Blood pressure management of patients undergoing carotid surgery

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The death and stroke rate of carotid endarterectomy (CEA) remains high. In the recent general versus local anaesthesia (GALA) trial of 3500 patients [1], the overall stroke and myocardial infarction rate in both groups was 4.7%. Blood pressure instability contributes to this morbidity and mortality and is common during CEA for several underlying reasons.

1. Many patients are 'arteriopaths' with essential hypertension and ischaemic heart disease and therefore have greater lability of blood pressure.
2. One of the major control mechanisms of blood pressure, the carotid baroreceptors, are involved in the disease process.
3. Baroreceptor function is itself altered by carotid endarterectomy surgery [2,3].
4. Patients who have suffered a stroke or transient ischaemic attack are commonly newly-diagnosed hypertensives and may have recently been started on anti-hypertensive treatment.

In addition, specific patient factors also influence perioperative haemodynamic stability, including: uncontrolled hypertension; the presence of bilateral carotid occlusion and whether or not the patient took their anti-hypertensives on the morning of surgery, particularly drugs such as ACE inhibitors, affecting the renin-angiotensin system.

Surgical factors also affect haemodynamic stability. Patients undergoing surgery as opposed to carotid stenting tend to be more hypertensive in the immediate postoperative period. In the UK, the National Clinical Guidelines for Stroke recommend that patients should undergo surgery within 2 weeks of their presenting event (CEA or TIA). There is evidence that the shorter the gap between the presenting event and surgery, the greater the haemodynamic instability. Finally, carotid sinus nerve blockade is no longer recommended as it causes a higher incidence of both hypotension and hypertension. The relatively-recently-introduced surgical technique *eversion endarterectomy*, which by definition involves denervating the carotid sinus, thereby causes more hypertension than the standard surgical approach.

Anaesthetic factors can also influence blood pressure [4]. Patients undergoing CEA under regional anaesthesia tend to be hypertensive during the operation but relatively hypotensive post-operatively compared to GA patients. There is a small amount of evidence that specific anaesthetic techniques may also have some effect: so nitrous oxide should be avoided because it has been shown to be associated with increased myocardial ischaemia [5] whilst a predominantly opioid-based technique was associated with greater haemodynamic instability than a hypnotic-based one [1].

The author has a simple stepwise approach to blood pressure management during CEA as follows: The patient's preoperative 'baseline' BP is estimated from patient records, pre-assessment clinic and the anaesthetic room. This value is taken as the minimum value acceptable during the period of carotid cross-clamping. The systolic IBP alarm limits are altered appropriately e.g. 140<BP<180. Typical postoperative instructions for PACU are as follows: if BP<120, give Hartmann's 250 ml IV stat. If BP>180, administer labetalol 5mg IV up to 100 mg. Haemodynamic instability must be treated promptly but carefully.

## References

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