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Preoperative hypertension: what's new?

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Hypertension affects more than one billion people around the world and is a common condition that will be encountered by anaesthetists. In the United Kingdom (UK), it is estimated that one in four adults has hypertension.[1] In South Africa (SA), data from 2012 estimated the prevalence of hypertension in adults to be 38%, and in 2016 this prevalence was estimated to be an alarming 48%, translating into as many as 20 million people.[2] In SA, these hypertensive patients are more likely to be older, male, white or coloured, and have diabetes, heart disease, hypercholesterolaemia, or cerebrovascular disease.[2] As such, a thorough knowledge of hypertension and an evidence-based approach to patients with elevated blood pressure (BP) is critical to ensure their safety in the perioperative period.

Perhaps more worrying than the large number of patients known to have hypertension is also the large number of people who have undiagnosed hypertension. These patients are often asymptomatic and may be encountered for the first time at the preoperative anaesthetic assessment. This review will briefly discuss the implications and management of hypertension and will focus on the approach to a patient who is discovered to have high BP at the preoperative visit.

Keywords: perioperative hypertension, undiagnosed hypertension, asymptomatic

Classification

Hypertension can be broadly grouped into essential and secondary hypertension. The stages of hypertension are summarised in Table I. Essential hypertension is the most common form of hypertension and accounts for around 95% of all cases.[3] Essential hypertension is a complex entity without a clear single cause; it is a disease of lifestyle, genetics, and the environment. It is generally encountered as patients age and is also associated with obesity, high alcohol and salt intake, and a sedentary lifestyle.[4] As the obesity pandemic has grown worldwide, so has hypertension.

Table I: Stages of hypertension according to the National Institute for Health and Care Excellence (NICE) guidelines[6]

Stage	Clinic BP (mmHg)	Ambulatory BP
Normal	< 140/90	< 135/85
1	140/90–159/99	135/85–149/84
2	160/100–179/119	
3	SBP > 180 DBP > 120	
Isolated systolic hypertension	SBP > 140 DBP < 90	

BP – blood pressure, SBP – systolic blood pressure, DBP – diastolic blood pressure

Secondary hypertension accounts for around 5% of hypertension diagnoses[5] and is most often a symptom of an underlying disease, and should be thoroughly investigated with the potential for cure of the underlying disease leading to resolution of high BP. Common causes include obstructive sleep apnoea, renal disease, and endocrine and hormonal disturbances such as Cushing Disease or phaeochromocytoma.[5] Warning signs to be aware of for secondary hypertension are sudden onset or new hypertension in previously well patients, new onset hypertension in younger patients (< 35 years), and resistant hypertension.[1]

Diagnosis of hypertension

BP should ideally be measured in the primary care setting before a patient is referred for surgery.[7] Patients with BPs of less than 180 mmHg systolic and 110 mmHg diastolic can be referred for surgery without delay. BP should be measured in a relaxed setting with a calm and rested patient. It is also recommended that ambulatory BP readings are offered to patients whose BP is greater than 160/110 mmHg.[7] Ambulatory BP may provide a better picture of the patient's "true" BP and can uncover white-coat hypertension. The diagnosis of hypertension in a patient based on a single BP reading in the ward preoperatively should be discouraged.

Management of hypertension

Lifestyle

Lifestyle changes should be encouraged in all patients with high BP.[6] These include weight loss, exercise, dietary changes, smoking cessation and reduced alcohol intake. These interventions can be curative for the stage 1 hypertensive and should be instituted without delay. Even in patients with higher stages of hypertension, lifestyle changes should accompany pharmacotherapy.

Pharmacotherapy

Pharmacological treatment of hypertension is recommended in all patients under the age of 80 years with stage 1 hypertension, with target organ damage, cardiovascular disease, renal disease, diabetes, or a 10-year cardiovascular risk of more than 10%.[1] Cardiovascular risk can be measured using the UK's QRISK 3 calculator, the European Systemic Coronary Risk Evaluation score, or the American Atherosclerotic Cardiovascular Disease score. For patients over the age of 80, treatment should be initiated if the BP is greater than 150/90 mmHg.[1,5]

BP targets depend on age and target organ damage, but the general aim for patients less than 80 years of age is less than 140/90 mmHg in the clinic and less than 135/85 mmHg at home. In patients over the age of 80 years, the recommendation is less than 150/90 mmHg in the clinic and less than 145/85 mmHg at home.[1]

Some guidelines recommend aiming for the lowest tolerated BP and advocate for the reduction of systolic blood pressure (SBP) to less than 129 mmHg. Furthermore, there are also some recommendations for lower BP targets for diabetics.[5]

A stepwise approach to antihypertensive therapy, along with continued reinforcement of compliance and lifestyle changes, is recommended. Initial medication may include diuretics, calcium channel blockers, angiotensin-converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARBs). Beta blockers and potassium-sparing diuretics may be added as further treatment. It is important to recognise that BP should be treated systematically, and that BP should be lowered gradually. There is little evidence that the acute reduction of BP in the perioperative period has benefit and may in fact cause harm.[8] Patients with routine BPs of less than 160/110 mmHg can be referred for surgery without delay and those whose BP is being measured for the first time only at the preoperative assessment can proceed if their BP is less than 180/110 mmHg.[8]

Complications of hypertension

Hypertension is associated with target organ damage, otherwise called "hypertension-mediated organ dysfunction".[1] This damage can affect a number of organs and should be screened for and evaluated at both the primary care level and at the preoperative assessment. Complications of hypertension include ischaemic heart disease, congestive cardiac failure, stroke, renal failure, peripheral vascular disease, and aortic aneurysm and dissection. It is important to the anaesthetist that the cardiovascular, cerebrovascular, and renal systems are thoroughly evaluated at the preoperative assessment.

Heart

Hypertension leads to an increase in myocardial wall stress and an increase in myocardial oxygen demand. Concentric hypertrophy and diastolic dysfunction then ensue. There is the added increased risk of atherosclerotic coronary artery disease and this, coupled with the increased myocardial oxygen demand, places patients at increased risk of myocardial ischaemia and ischaemic events.[9] It is critical to maintain a normal or above normal diastolic blood pressure (DBP).

Brain

Long-standing hypertension is a known risk factor for both ischaemic and haemorrhagic strokes. Coupled with an increased risk of carotid artery disease, hypertensive patients are predisposed to both transient ischaemic attacks and stroke.[9] These patients have alterations to their autoregulatory thresholds maintaining cerebral perfusion pressure, and as such require a higher BP to maintain normal blood flow and cerebral oxygenation. They are at a higher risk of postoperative cognitive dysfunction.

Kidneys

Patients with hypertension are at increased risk of glomerular injury with proteinuria and eventual loss of glomerular function. These patients develop arteriolosclerosis of the arterioles providing blood to the nephron and also have abnormalities of sodium exchange and renin-angiotensin-aldosterone function.[9] Again, adequate perfusion pressure is required to preserve renal and glomerular function.

Preoperative hypertension and high blood pressure

Many anaesthetists are faced with the challenge of encountering a patient with elevated BP at the preoperative assessment. A single BP reading at the preoperative visit should always be interpreted with caution. It is ideal to determine if previous BP readings at the primary care level were consistently less than 180/110 mmHg because these patients can be sent for surgery.[1] Most of these patients will be asymptomatic and thus require a thorough history to determine symptoms. Patients who are acutely symptomatic of their high BP should have everything, except emergency surgery, delayed. Furthermore, same-day cardiology review is recommended for symptomatic patients with a BP above 180/120 mmHg.[7]

In the absence of this, a history and clinical review of the patient for cardiovascular risk, overall health, and target organ damage should be conducted. Preoperative investigations should include urea and electrolytes, lipogram, urinalysis and 12-lead electrocardiogram. Further investigations should be guided by findings and risk.[1] This emphasis on overall risk is a shift in the traditional approach to perioperative high BP. The anaesthetist is encouraged to use a risk calculator tool that uses parameters such as age, smoking status, diabetes, cholesterol, and others, to calculate overall cardiovascular risk. BP is only one component of these tools. A risk of less than 10% is considered acceptable to proceed to surgery.[1]

It has traditionally been routine to delay patients with elevated BP for elective and semi-urgent surgery. This approach was based on anecdote and poor evidence and should no longer be practised. Rather, it is vital that the anaesthetist approaches the

patient with elevated BP, whether known or newly diagnosed, in terms of their overall cardiovascular risk.[7] The perioperative risk for patients does indeed probably not change when their surgery is delayed for BP evaluation and workup. An observational study showed that there was no association between stage of hypertension and perioperative haemodynamic instability.[10] There is also no good evidence that acutely lowering BP in patients without target organ damage has any impact on perioperative morbidity and mortality.[7]

Therefore, there is no evidence to cancel surgery based on elevated blood pressure in an otherwise asymptomatic patient.

The Perioperative Quality Initiative consensus statement regarding perioperative BP makes the following consensus statements: "Preoperative arterial pressure values may be used to define targets for perioperative management; however, these should ideally reflect the patient's usual preoperative BP." And "Although extremes of preoperative BP may be associated with increased perioperative risk, there is insufficient evidence to recommend a specific threshold of BP upon which to decide whether or not to proceed with surgery, unless the extreme arterial pressure is associated with a medical emergency." [8]

Management of antihypertensives

There is a risk of profound hypotension in patients taking ACE inhibitors or ARBs. The practice of withholding these drugs varies, but there is some evidence that withholding them on the day of surgery was associated with a lower risk of death and adverse events.[11] If they are omitted, they must be started as soon as possible after surgery. Beta blockers should not be started or stopped in the perioperative period and must be continued.[8] Decisions on other classes of antihypertensive medication should be made on an individual level but usually these drugs are continued.

Intraoperative blood pressure

It is important to note that there are no consensus guidelines on the management of intraoperative BP, but there are some key pieces of evidence and some statements that can be made. There is strong evidence that periods of intraoperative hypotension with a mean arterial pressure of less than 55 mmHg was associated with cardiac and renal injury.[12] Hypotension is certainly more deleterious than hypertension in the intraoperative period. Historic focus on preventing hypertensive responses to intubation and surgical incision may have led to less emphasis on preventing hypotension in patients with elevated BP. While the anaesthetist should, of course, focus on preventing large increases in BP due to intubation or surgical incision, this should not be at the expense of inducing hypotension. The avoidance of hypotension is key in order to maintain end-organ perfusion to organs whose autoregulation may be impaired.[1]

Many patients who have taken antihypertensive medication, especially diuretics, are intravascularly fluid-deplete and may develop exaggerated hypotension under anaesthesia. This should be treated aggressively with fluids and vasoconstrictors. Any prolonged period of hypotension must be avoided, and this requires vigilance from the anaesthetist.[13]

Also important is to note that there is no consensus as to what the intraoperative BP targets should be. But a comprehensive literature review by Meng et al.[13] made some suggestions regarding considerations in determining BP targets. They recommend keeping BP 90–110% of baseline and therefore treating any drop in pressure of more than 10%.[13] This is a much tighter range than has been the usual intraoperative approach. Maintaining a mean arterial pressure above 60 mmHg and a systolic pressure above 100 mmHg should be a minimum target.[1] A summary of recommendations is listed below:[13]

1. Maintain BP 90–110% of baseline
2. Allowable BP decrease/increase 10%
3. Maintain mean arterial pressure (MAP) of at least 65–95 mmHg
4. If there is a risk of organ dysfunction, maintain BP at the higher allowable range
5. Use clinical judgement for each patient and rather aim for a higher BP

Postoperative hypertension

Patients with preoperative hypertension are at an increased risk of postoperative hypertension and the incidence can be as high as 20%.[14] While evidence is limited as to which BP threshold should be used for treatment, the anaesthetist should first ensure that the patient is not in pain or some other form of distress. If there is no treatable cause for the hypertension, then treatment should be initiated at an SBP above 180 mmHg.[14]

Conclusion

Patients with high BP, especially when first detected at the preoperative assessment, should be treated according to their overall cardiovascular risk rather than based only on a BP reading. The anaesthetist is encouraged to view BP as just one piece of information when determining a patient's risk for anaesthesia and surgery. While most of the evidence is from observational studies, there is a consensus that hypertension alone is not a significant risk factor for perioperative morbidity or mortality.

Furthermore, in patients with high BP, it is perhaps hypotension in the perioperative period that is more deleterious to them. Periods of hypotension under anaesthesia must not be ignored and must be treated promptly. The avoidance of hypotension should be a key goal for the anaesthetist in a patient with a history of high BP.

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