Survey of cancellation rate of hypertensive patients undergoing anaesthesia and elective surgery

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Hypertension is the commonest avoidable medical indication for postponing anaesthesia and surgery. There are no universally accepted guidelines stating the arterial pressure values at which anaesthesia should be postponed. The aim of this study was to determine the extent of variation across the South-West region of the UK in the anaesthetic management of patients presenting with stage 2 or stage 3 hypertension. Each anaesthetist in the region was sent a questionnaire with five imaginary case histories of patients with stage 2 or stage 3 hypertension. They were asked if they would be prepared to provide anaesthesia for each patient. The response rate was 58%. We found great variability between anaesthetists as to which patients would be cancelled. Departmental protocols may aid general practitioners and surgeons in the preparation of patients for surgery, but such protocols may be difficult to agree in the light of such a wide variation in practice.

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Arterial hypertension is common, affecting between 4 and 28% of patients presenting for major non-cardiac surgery.1–3 Long-standing hypertension is associated with damage to the coronary, renal, and cerebral circulations. These end-organ changes may lead, in turn, to peri-operative cardiovascular complications.4,5 Hypertension is certainly associated with an increased incidence of both pre-operative and post-operative silent myocardial ischaemia, which are significant predictors of adverse cardiac outcome.6–8 A pre-operative history of hypertension has been shown to be associated with increased risk of peri-operative cardiovascular death in the non-cardiac surgery population.9 However, a clear association has not been demonstrated between admission arterial pressure and major peri-operative cardiac complications.5,10

Initially, studies on hypertension and cardiovascular risk focused on diastolic hypertension. Increasing systolic pressure with age was regarded as a physiological rather than a pathological change. There were also concerns that treating raised systolic pressure would produce an unacceptable decrease in diastolic pressure that would compromise cerebral perfusion. However, in the general population, systolic hypertension is a more potent risk factor for cardiovascular morbidity than diastolic hypertension.11 Recent work has shown that treating systolic hypertension reduces the risk of stroke and myocardial infarction in the elderly population.12,13

The Fifth Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (JNCDET V), classified arterial pressure into four stages; stage 1 to stage 4 (Table 1).14 It is widely accepted that patients with stage 1 hypertension have little or no increased risk of peri-operative cardiac morbidity10 and, therefore, anaesthesia and surgery in such patients can proceed as planned. Similarly, patients with stage 4 hypertension are very likely to have severe end organ damage. Such patients represent a high risk of cardiac morbidity and a major anaesthetic challenge and, unless surgery is urgent, anaesthesia should be postponed to allow their markedly raised arterial pressure to be treated. The intermediate groups, who present for anaesthesia and surgery with stage 2 and stage 3 hypertension present more of a dilemma with regard to peri-operative management. There is a balance to be struck. On the one hand, there are the possible risks of anaesthesia and surgery in patients with raised arterial pressure. Set against these are the inconvenience and distress caused to patients by the cancellation of surgery at short notice and the waste of hospital resources.

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and evidence of target organ damage. Clinical details of the target organ damage were given as described below. We did not ask the anaesthetist to deduce this. Arterial pressure readings were given, but not the stage of hypertension according to the JNCDET V classification (e.g. stage 1, stage 2 etc.). For each case a tick box response was allowed to indicate whether the anaesthetist would anaesthetize the patient as planned, or postpone the patient for further investigations or management. A box for free text comments was also provided at the end of the questionnaire. The questionnaire was anonymous. Information was collected on the grade of anaesthetist and the hospital in which they worked.

postponed. Most textbooks quote a diastolic pressure of 110 or 115 mm Hg as a cut-off for postponing anaesthesia. This uncertainty sets the scene for wide variations in practice. Such variation can be a cause of confusion and uncertainty among general practitioners referring patients for surgery, and among surgical teams referring patients for anaesthesia. The aim of the present study was to determine the extent of variation across the South-West region of the UK in the cancellation rate of patients presenting with stage 2 or stage 3 hypertension.

Methods
The study took the form of a postal survey to all the anaesthetists in the South-West Health Service region of the UK. Anaesthetists were sent a questionnaire with five imaginary case histories of patients with stage 2 or stage 3 hypertension and varying degrees of arterial pressure control and target organ damage. They were asked if they would be prepared to provide anaesthesia for each of these patients. Anaesthetic secretaries supplied details of anaesthetists working in each anaesthetic department in each hospital in the South-West region. A four-page questionnaire, covering letter and self-addressed envelope, was sent to each anaesthetist in the region. The questionnaire described five imaginary patients, presenting for elective surgery, with varying degrees of hypertension, symptoms, and evidence of target organ damage. Clinical details of the target organ damage were given as described below. We did not state if the patient had target organ damage, leaving the anaesthetist to deduce this. Arterial pressure readings were given, but not the stage of hypertension according to the JNCDET V classification (e.g. stage 1, stage 2 etc.). For each case a tick box response was allowed to indicate whether the anaesthetist would anaesthetize the patient as planned, or postpone the patient for further investigations or management. A box for free text comments was also provided at the end of the questionnaire. The questionnaire was anonymous. Information was collected on the grade of anaesthetist and the hospital in which they worked.

<table>
<thead>
<tr>
<th>Category</th>
<th>Systolic arterial pressure (mm Hg)</th>
<th>Diastolic arterial pressure (mm Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal</td>
<td>&lt;120</td>
<td>&lt;80</td>
</tr>
<tr>
<td>Normal</td>
<td>120–129</td>
<td>80–84</td>
</tr>
<tr>
<td>High normal</td>
<td>130–139</td>
<td>85–89</td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage 1</td>
<td>140–159</td>
<td>90–99</td>
</tr>
<tr>
<td>Stage 2</td>
<td>160–179</td>
<td>100–109</td>
</tr>
<tr>
<td>Stage 3</td>
<td>180–200</td>
<td>110–119</td>
</tr>
<tr>
<td>Stage 4</td>
<td>≥210</td>
<td>≥120</td>
</tr>
</tbody>
</table>

Case 1 had stage 2 hypertension with end-organ involvement. He was a 50-yr-old coal man presenting for a total knee replacement. He was said to be 5’1” tall, and weighed 95 kg. He was an ex-smoker, with no past medical history. He was on no medication and had no cardiovascular or respiratory symptoms.

On admission, his arterial pressure was 165/100 mm Hg, and did not settle on repeated measurement. An ECG showed left ventricular hypertrophy and strain changes (S wave V2 10 mm, R wave V5 25 mm, with inverted T waves in V4–V6). A full blood count, and urea and electrolytes were normal.

Case 2 had stage 3 hypertension that settled to stage 2 after admission. He had no evidence of end-organ involvement, but had other cardiovascular risk factors. He was a 55-yr-old TV executive presenting for a redo laminectomy at two spinal levels. He was said to be 6’1” tall, and weighed 98 kg. He smoked 20 cigarettes per day, and drank five glasses of wine per day. He had no past medical history, took no regular medications, and had no cardiovascular or respiratory symptoms.

On admission, his arterial pressure was 180/115 mm Hg, which settled to 165/105 mm Hg on subsequent measurements. His full blood count, and urea and electrolytes were within the normal range, and an ECG showed no abnormalities.

Case 3 had stage 3 hypertension that settled to stage 2 after admission. She had end-organ involvement. She was a 67-yr-old retired medical secretary presenting for an open cholecystectomy. She was said to be 5’3” tall, and weighed 86 kg. She was a non-smoker. Her only past medical history was a myocardial infarct 5 yr before. She reported shortness of breath on climbing stairs, but had no other cardiovascular or respiratory symptoms.

On admission, her arterial pressure was 190/105 mm Hg, which subsequently settled to 165/100 mm Hg. The full blood count was normal, and urea and electrolytes showed a creatinine of 125 μmol litre⁻¹. An ECG showed Q waves inferiorly.

Case 4 had isolated systolic hypertension. She had stage 3 hypertension with no end-organ involvement and no other cardiovascular risk factors. She was a 70-yr-old retired teacher presenting for a total hip replacement. She was said to be 5’2” tall, and weighed 50 kg. She was a non-smoker, took no medication, and had no cardiovascular or respiratory symptoms.

On admission and subsequent readings, her arterial pressure was 200/85 mm Hg. A full blood count, and urea and electrolytes were normal, as was an ECG.

Case 5 had stage 2 hypertension with no end-organ involvement and no other cardiovascular risk factors. He was a 51-yr-old ex-professional footballer presenting for a total knee replacement. He was said to be 6’1” tall and weighed 91 kg. He was a non-smoker, who swam regularly. He had a 2-yr history of poorly controlled hypertension, for which he took nifedipine. He had no other past medical...
Results of postal questionnaire, showing numbers of anaesthetists prepared to anaesthetize each imaginary hypertensive patient

<table>
<thead>
<tr>
<th>Case number</th>
<th>Hypertension Stage</th>
<th>End-organ disease</th>
<th>Number (%) of anaesthetists prepared to anaesthetize case</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Consultants n=153</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>Yes</td>
<td>66 (25.9)</td>
</tr>
<tr>
<td>2</td>
<td>3, settled to 2</td>
<td>No</td>
<td>107 (41.9)</td>
</tr>
<tr>
<td>3</td>
<td>3, settled to 2</td>
<td>Yes</td>
<td>135 (52.9)</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>No</td>
<td>186 (73)</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>No</td>
<td>193 (75.6)</td>
</tr>
</tbody>
</table>

A total of 488 questionnaires were sent out, of which 283 (58%) were returned. There were 255/488 (52.3%) usable replies. The remainder of the replies failed to report the hospital and/or grade of anaesthetist. Between hospitals, the response rate varied from 18/25 (72%) to 1/11 (9%). The response rate for this survey was relatively low (52%), although comparable with that reported for other postal surveys of British anaesthetic practice. This low response rate may have introduced bias into our results, if the views of those anaesthetists who responded to the questionnaire are not representative of the study population as a whole. It is certainly possible that the anaesthetists who responded were those with strong views on the peri-operative care of patients with hypertension. However, the wide variation in opinion among the 52% of anaesthetists who did reply is of note and suggests that practice may vary widely. Furthermore, it seems unlikely that the remainder of anaesthetists are absolutely consistent in their views on the management of hypertensive patients. There was no suggestion from our survey of a single consistent view held by a significant minority of anaesthetists. Rather there was a decreasing tendency to postpone surgery as respondents worked their way through the questionnaire, although there was not a trend to decreasing severity of hypertension across the five cases. Only 26% of respondents were prepared to anaesthetize case one. The percentages for the subsequent four cases were 42, 53, 73, and 76%. This trend was statistically significant. It suggests that respondents considered incompletely controlled hypertension to be a cause
for concern, but did not have clearly articulated views on what constitutes unacceptable hypertension and did not feel it would be acceptable to cancel all five cases.

The decision to postpone a patient after their admission for surgery has psychological, social, and economic implications, and is not only based on clinical considerations. The overall cancellation rate has been reported at between less than 1 and 27%.\textsuperscript{17-20} In a large orthopaedic audit, hypertension was the commonest reason for deferring surgery, accounting for 16.2\% of medical cancellations.\textsuperscript{17} Another smaller audit found that at orthopaedic pre-operative assessment clinic (PAC), 16.7\% patients were deferred because of hypertension, accounting for 55.5\% of cancellations for medical reasons.\textsuperscript{21} While the postponement of an operation in PAC, rather than at admission for surgery, facilitates the efficient use of resources, cancellation within 1–2 weeks of surgery may still cause distress and inconvenience to patients.

It is difficult to defend the wide variations in practice with regard to the management of hypertensive patients presenting for surgery. From the comments made in response to this questionnaire, there seems to be little awareness of either the UK or US hypertension guidelines. The trend in the responses suggests that many anaesthetists feel that hypertension is relevant, but do not have clearly formed views on the appropriate management of these patients.

We offer guidelines below for the peri-operative management of hypertensive patients. These guidelines use the JNCDET V classification of arterial pressure (stage 1, stage 2, etc.). They are consistent with the American College of Cardiology/American Heart Association (ACC/AHA) guidelines, which recommend deferring anaesthesia if the diastolic pressure is above 110 mm Hg.\textsuperscript{22} The ACC/AHA guidelines make no recommendation regarding systolic pressure. There is now clear evidence that systolic arterial pressure is independently associated with target organ damage.\textsuperscript{1} We suggest that guidelines for the peri-operative management of hypertensive patients should take into account both systolic and diastolic arterial pressure. Our use of the JNCDET V classification is consistent with this in that it takes into account both systolic and diastolic pressure.\textsuperscript{14}

\textbf{Stage 1 and stage 2 hypertension}

Anaesthesia and surgery may proceed in patients with stage 1 and stage 2 hypertension.

Goldman and Caldera were unable to demonstrate an association between poorly controlled hypertension (defined as arterial pressure >160/100 mm Hg) and cardiac complications.\textsuperscript{9} A more recent case control study showed no difference in systolic or diastolic pressures between patients who died of a cardiovascular cause within 30 days of anaesthesia and surgery, and controls who did not.\textsuperscript{10} The majority of patients in this study had stage 1 or stage 2 hypertension. On the basis of these data there seems little justification for deferring anaesthesia and surgery in patients with stage 1 and stage 2 hypertension.

\textbf{Stage 3 hypertension}

For stage 3 hypertension, it may be wise to be a little more circumspect.

Prys-Roberts and colleagues demonstrated an association between poorly controlled hypertension and the occurrence of intra-operative myocardial ischaemia and arrhythmias.\textsuperscript{23} Patients classified as poorly controlled hypertensives in this study had stage 3 or stage 4 hypertension. Another prospective study demonstrated an increasing incidence of post-operative myocardial ischaemia with increasing arterial pressure.\textsuperscript{24} On the basis of these findings, we would recommend deferring anaesthesia and surgery in patients with stage 3 hypertension, to allow the arterial pressure to be treated. We would especially recommend this course of action in patients with other cardiovascular risk factors (target organ damage) that may further increase the peri-operative risk.

\textbf{Stage 4 hypertension}

Patients with stage 4 hypertension have severe disease and anaesthesia and surgery should be deferred whenever possible and the arterial pressure treated.

In patients in whom anaesthesia and surgery are deferred, it is clearly important that appropriate anti-hypertensive therapy is started and appropriate follow-up arranged. The most recent UK guidelines recommend use of a thiazide or beta-blocking agent initially.\textsuperscript{25} In the elderly, a thiazide is recommended initially. On the basis of studies of peri-operative beta-adrenergic block by Mangano and Poldermans, a beta-blocking agent should probably be the first choice unless contra-indicated.\textsuperscript{26,27} The sequelae of hypertension, such as coronary artery disease and heart failure, appear in a number of risk scoring systems for non-cardiac surgery, including that published recently by Lee and colleagues.\textsuperscript{28} Although these conditions may be associated with hypertension, they should be considered as separate risk factors. The ACC/AHA guidelines provide a framework for this.\textsuperscript{22} The guidelines assume easy access to non-invasive cardiac testing, coronary angiography and coronary revascularisation before surgery, and may be difficult to apply in settings where these resources are limited. However, the guidelines can be modified for local use, and would help to ensure optimal medical treatment.

\textbf{Acknowledgements}

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References


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