Correspondence

Perioperative cardiac risk

Editor—I read the article by Howell, Sear and Foëx with great interest. As a review it will be widely read and quoted, and may have a major impact on clinical practice. It is therefore all the more unfortunate that the section entitled ‘Historical background’ contains a number of errors of quotation; such that a current or future reader might conclude that the data described in my original paper, and thus the interpretations and conclusions drawn from them, were incorrect.

The first error concerns the number of patients in the study: the total number should be 23, not 34 as quoted. The second error is more serious in that Howell and colleagues claim that ‘fifteen of the patients were classified as normotensive, although by current standards all of their control patients would now be considered to be hypertensive’. The data in Table V of my original paper clearly show that Group 1, of elderly normotensive patients, was seven in number (not 15), and their mean (SD) blood pressures, awake and lying supine, were 130 (11) and 73 (7) mm Hg systolic and diastolic, respectively. These patients were normotensive by any of the modern classifications quoted by Howell.

At the end of the ‘historical background’, Howell and colleagues restate the erroneous claim that ‘all of the control patients in the study by Prys-Roberts and colleagues would now be considered to be hypertensive’. This is followed by: ‘the recommendations of Prys-Roberts and colleagues therefore [my emphasis] need to be reconsidered in the light of the modern views of hypertension and its management’. Which recommendation? In the middle of this section Howell and colleagues claim that ‘the authors recommend that, where possible, hypertensive patients should have anaesthesia and surgery deferred [my emphasis again] to allow their hypertension to be treated’. Nowhere in that first paper, nor in the subsequent four papers, was there a recommendation that patients should have their surgery deferred in order to institute antihypertensive therapy. In the early 1970s in Oxford, and subsequently in Bristol, I encouraged the local surgeons to check each patient’s blood pressure at surgical outpatients and, when a patient had a diastolic pressure in excess of 110 mm Hg, to encourage the referring general practitioner or physician to establish appropriate antihypertensive therapy before the patient was admitted for surgery. The adoption of a diastolic pressure of 110 mm Hg as a threshold evolved from the findings of Goldman and Caldera, and my editorial on that article.

In the summary of their article, Howell and colleagues state that ‘we recommend that anaesthesia and surgery should not be cancelled on the grounds of elevated preoperative arterial pressure’. Yet, in the body of the article (p. 577, column 1) they state ‘we suggest that it is appropriate to defer anaesthesia and surgery where the JNC V and JNC VII classifications. Here I made my second error in stating that these patients were classified as normotensive, whereas they were, in fact, classified as treated hypertensive.

While I regret these errors, I do not believe that they detract from the core point we sought to make in the section on historical background; i.e. that our definitions of what constitutes hypertension have changed considerably since 1971. Prys-Roberts states in his 1971 paper that ‘the results of this study show that untreated high arterial pressure constitutes a serious risk to patients undergoing anaesthesia and surgery’. The general understanding of what constitutes high arterial pressure has been steadily revised downwards since 1971. This fact is illustrated by the blood pressures of the patients in Table 2 of Prys-Roberts’ 1971 paper. The fact that these patients were treated hypertensives (rather than untreated or control patients as I erroneously described them) shows how treatment targets have changed. This downward revision of blood pressure thresholds has led to increasing confusion among clinicians as to what constitutes an unacceptably high admission blood pressure in patients presenting for elective surgery. The recommendations section of Professor Prys-Roberts’ 1971 paper states that ‘the important question would now seem to be whether one should or should not recommend an otherwise symptom-free patient for antihypertensive therapy before anaesthesia and surgery. In view of the high incidence in

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Editor—I am grateful for Professor Prys-Roberts’ comments. He is quite correct in pointing out my error with regard to the number of patients studied in his paper. I was a little confused on revisiting this paper as the number of treated hypertensives studied varied amongst the different aspects of the study. I incorrectly cited the number of patients studied through a simple typographical error, for which I apologise.

With regard to the number of hypertensive patients, I refer to the 15 patients listed in Table 2, all of whose admission blood pressures as listed in this table would be consistent with various degrees of hypertension under the British Hypertension Society Guidelines and the JNC V and JNC VII classifications. Here I made my second error in stating that these patients were classified as normotensive, whereas they were, in fact, classified as treated hypertensive.

I raised the issue of isolated systolic hypertension many years ago in a review of anaesthesia in the aged hypertensive patient, and more recently in an editorial. In subsequent correspondence, I presented a modification of an earlier flow-diagram indicating the criteria for potential deferment of surgery in patients with Stage 3 hypertension, and the perioperative use of a β-adrenoceptor antagonist to ameliorate the factors that might cause myocardial ischaemia. The latter was based on the recommendations made in our 1973 article, which have since been upheld by the subsequent outcome studies quoted in Spahn and Priebe’s editorial.

Finally, I must draw readers’ attention to a potential serious problem relating to the measurement of blood pressure. Up to the present, blood pressures upon which various classifications and guidelines are based have been measured with a mercury sphygmomanometer using the disappearance of the Korotkoff sounds as the criterion for diastolic pressure. Pereira and colleagues showed that at a true intra-arterial diastolic pressure of 110 mm Hg, the sphygmomanometer underestimated this value by 10.5 mm Hg, but that the 95% confidence limits for a single observation were ±19 mm Hg. I am not aware of any studies of risk assessment in hypertensive patients that have taken account of the substantial scope for error in measuring diastolic pressure. The sphygmomanometer will shortly disappear from clinical practice, largely on the basis that the 130 g of mercury contained in each instrument represents a serious environmental hazard. It has already been banned in The Netherlands and Scandinavia. How then shall we be able to check the calibration and accuracy of the numerous aneroid and electronic measuring devices on the market, which will be used to define whether or not a patient has hypertension?

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this study of myocardial ischaemia in patients with high initial arterial pressures exposed to anaesthesia, we would consider such a course of action desirable.\textsuperscript{2,7}

If the goalposts have moved, and lower levels of blood pressure than previously are now considered by many clinicians to constitute unacceptable arterial hypertension, then we must surely consider how the above recommendation should be interpreted in the light of this change. I do not seek to undermine previous work. Indeed, our review points out that it was the work of Prys-Roberts and colleagues that led to a sea-change in the perioperative management of hypertensive patients. I simply seek to review this work in the context of a changing medical landscape.

Professor Prys-Roberts also takes issue with us with regard to our two statements: ‘We recommend that anaesthesia and surgery should not be cancelled on the grounds of elevated pre-operative arterial pressure’ and ‘we suggest that it is appropriate to defer anaesthesia and surgery where possible in patients with admission arterial pressures consistent with Stage 3 hypertension’.

If taken out of context, these statements do indeed appear contradictory. However, the issue here is not the level of blood pressure per se, but the associated target organ damage. I would agree that high blood pressures in the presence of such target organ damage should make us concerned. Thus, the complete quotation from our review states: ‘we suggest that it is appropriate to defer anaesthesia and surgery where possible in patients with admission arterial pressures consistent with Stage 3 hypertension, especially where there is evidence of target organ damage’.

Subsequently we write that ‘if the patient is considered fit for surgery in other respects, their operation should not be deferred simply on account of an elevated admission blood pressure’.

The work of Mancia and colleagues makes clear the difficulties of measuring blood pressure in the hospital setting. In their study, hospital patients visited by a physician experienced mean rises in systolic pressure of about 30 mm Hg and in diastolic pressure of about 20 mm Hg. The changes produced by a visit from a nurse were less marked, but still significant. There was a wide spread of blood pressures about these mean values and some patients experienced very considerable increases.\textsuperscript{13} Thus, deferring anaesthesia and surgery on the basis of such unreliable measures is most inappropriate. It is for this reason that we state that an operation ‘should not be deferred simply on account of an elevated admission blood pressure’. The presence of target organ damage, implying sustained hypertension, produces rather a different picture. In this case, while the evidence is limited, it would seem appropriate to defer anaesthesia and surgery if the blood pressure is consistently elevated to very high levels and we suggest a cut-off of blood pressures consistent with Stage 3 hypertension. Even in these circumstances, the risk–benefit balance may not favour deferring surgery. For example, surgery for malignancy should probably proceed in most cases. Thus, we suggest that ‘surgery may proceed, but care should be taken to ensure perioperative cardiovascular stability’.

The comments from Professor Prys-Roberts regarding blood pressure measurement are very apposite. For the epidemiologist, the sphygmomanometer provides a common standard. So long as the same device is used on all patients within a study, the association between cardiovascular morbidity and a given level of blood pressure as measured with that device can be studied, and valid conclusions drawn. Recommendations for the assessment of automated sphygmomanometers have been described and the British Hypertension Society have published one such standard.\textsuperscript{16} However, it is impossible for the clinician to have a detailed knowledge of every device he may encounter. Furthermore, intra-arterial blood pressure may differ from the ‘cuff’ pressure, and also vary depending on the site of arterial cannulation.

I would reiterate that we do not seek to overturn the work of Prys-Roberts and colleagues, which undoubtedly produced a paradigm shift in perioperative management of patients with elevated blood pressure. We do seek to end the practice of deferring anaesthesia and surgery in patients who have an elevated admission blood pressure, but no other cardiovascular risk factors, and whose perioperative risk is probably very small.

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