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Is the Case for ABPM as a Routine Investigation in Clinical Practice Not Overwhelming?

Eoin O'Brien

One sometimes has to ponder what it takes to make a technique so indispensable to practice that it must, needs be, become the rule rather than the exception. And yet nothing is new under the sun; it seems to me that ambulatory blood pressure measurement (ABPM) is in much the same historic position at the start of the 21st century as conventional measurement with the mercury sphygmomanometer and stethoscope was at the end of the 19th when one skeptic, while acknowledging that "the middle-aged and successful physician may slowly and imperceptibly lose the exquisite sensitiveness of his finger tips through repeated attacks of gouty neuritis," went on to express his sincere doubts that the sphygmomanometer would ever be welcomed by "the overworked and underpaid general practitioner, already loaded with thermometer, stethoscope, etc., etc.,"¹ ABPM is not exactly new to medicine; in fact it has been with us in one form or another for nearly half a century. In 1964 Sir George Pickering showed for the first time the profound fall in blood pressure recorded during sleep and the fluctuations in pressure during the course of 24 hours. Pickering's group went on to develop an ambulatory technique whereby pressure could be measured directly from the brachial artery with a small plastic catheter, and the first intraarterial ambulatory blood pressure measurement in unrestricted man was performed in 1966. In 1962, Hinman and his colleagues described the first truly portable ambulatory system for the noninvasive measurement of blood pressure, which was subsequently developed commercially by the Remler Company in California. So began noninvasive measurement of ambulatory blood pressure.² We first used ABPM in 1979 when we anticipated that "development of a cheap and accurate means of ambulatory recording would have a considerable impact on the diagnosis of borderline hypertension and the assessment of the efficacy of treatment."³ This forecast has been slow to materialize but the evidence that ABPM is indispensable to good clinical practice has been growing steadily, and during the last

decade the information that can be derived from ABPM has surprised even the most ardent supporters of the technique.^{4,5}

In clinical practice the most common use of ABPM and the only one for which reimbursement is approved by the Centers for Medicare & Medicaid Services (CMS) in the US is to identify patients with suspected white coat hypertension; this is defined as "office blood pressure >140/90 mm Hg on at least 3 separate clinic/office visits with 2 separate measurements made at each visit." In addition "there should be at least 2 blood pressure measurements taken outside the office, which are <140/90 mm Hg and "there should be no evidence of end-organ damage."⁶ Are these stipulations for reimbursement too restrictive and are they, in fact, mitigating against the wider use of ABPM? The CMS decision to permit ABPM in suspected white coat hypertension ignores the fact that there are no clinical characteristics that permit the practicing physician to "suspect" the condition. A number of studies suggest that in untreated subjects with essential hypertension, the probability of white coat hypertension increases in nonsmoking female subjects with mild hypertension of recent origin, who have had a limited number of office blood pressure measurements and who have small left ventricular masses.⁶ But one must ask of what use are these vague and nebulous characteristics to the practicing physician? Another important stipulation in the CMS directive is that potential patients for ABPM should have no evidence of target organ damage. However, the means whereby a practicing physician is to determine the target organ status of a patient is not stipulated. Should all patients being considered for ABPM undergo an echocardiograph or some other measure of target-organ involvement? Indeed 4 years on from the CMS directive, it is difficult not to reiterate with greater conviction (because of stronger evidence) the conclusion from the European Society of Hypertension statement on "When to suspect white coat hypertension": "In truth, it must be admitted that it is difficult to escape the conclusion that all patients in whom a diagnosis of hypertension is being contemplated based on office/clinic blood pressure, should have ABPM to exclude white coat hypertension. . . ."⁶

Let us leave aside white coat hypertension aside for the moment and turn to other potential uses of ABPM that may benefit patients with hypertension. Continuing on the diagnostic front, ABPM can identify patients with masked hypertension (estimated to be present in as many as 10 million people in the US) in whom conventionally measured blood pressure in the clinic setting is normal but ABPM is increased.⁷ Clearly ABPM cannot be performed

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in everyone, but is there not a strong case for performing ABPM in patients who have had a cardiovascular event, simply because the consequence of not prescribing antihypertensive medication to a patient with, for example, a history of a previous stroke, is to deny that patient the most potent medication to prevent stroke recurring? It is a salutary thought that if white coat hypertension is present in 20% of the population when blood pressure is measured conventionally in primary care and if masked hypertension is present in 10% of patients whose blood pressure is measured in similar circumstances, it follows that the diagnosis of hypertension is being misdiagnosed in as many as a third of all patients attending for routine blood pressure measurement.

Staying with the diagnostic potential of ABPM and turning to the growing interest in prehypertension, which it is estimated occurs in about 28% of American adults, or 59 million people,⁸ we must question the accuracy of these figures, which are derived from conventional blood pressure measurement. If as many as 20% of these patients have white coat hypertension, it follows that the diagnosis of prehypertension will be erroneous in nearly a quarter of the patients diagnosed with this condition. The financial implications for society are obvious, and ABPM provides a cost-effective means of accurately determining the true prevalence of prehypertension.

The evidence for ABPM as a methodology to guide drug treatment in clinical practice is growing. The technique provides evidence for efficacy of blood pressure control over 24 hours, allows resistant hypertension to be differentiated from a white coat reaction that misleadingly suggests resistance to therapy, and provides evidence of overtreatment, particularly in the elderly, who are prone to hypotension.⁹

ABPM is the only accurate means of monitoring nocturnal blood pressure, which has been largely ignored in clinical practice despite many studies showing that nocturnal phenomena such as nondipping, reverse dipping, extreme dipping, nocturnal hypertension, and a morning surge are associated with a poor prognosis.⁵

ABPM is also valuable in special populations, such as the elderly, patients with diabetes in whom optimal 24 hour control of blood pressure is mandatory, and in pregnancy.⁹

Recently ABPM has been used to achieve more subtle insights into circadian hypertension. The Ambulatory Arterial Stiffness Index (AASI), which has been shown to predict cardiovascular mortality in a large cohort of hypertensive individuals, particularly stroke, even in normotensive subjects, may prove to be a readily applicable index that can be derived from a routine ABPM to predict outcome. The practical importance of such an index is that it may permit early categorization of hypertensive patients into those at risk from cardiovascular events and thus indicate those in need of aggressive blood pressure lowering.¹⁰ In the present issue of *Hypertension*, Tatasciore and his colleagues from Milan¹¹ show another interesting association that may be derived from ABPM, namely, the relationship between awake daytime blood pressure vari-

ability (calculated as the standard deviation of mean awake and asleep systolic, diastolic, mean blood pressure, and pulse pressure) and target organ damage in 180 untreated subjects with suspected hypertension. Left ventricular mass index and intima-media thickness, progressively increased across tertiles of awake systolic blood pressure variability without any effect being shown for microalbuminuria. Surprisingly, such relationships were not apparent for asleep and 24-hour blood pressure variability, suggesting perhaps that daytime activity may have influenced variability. The authors conclude that awake systolic blood pressure variability by noninvasive ABPM correlates with subclinical target-organ damage, independently of mean blood pressure levels. Importantly, the fact that such a relationship was present in subjects referred for recently suspected hypertension suggests that increased variability appears early in the natural history of hypertension, and like AASI, may be a useful means of identifying patients at risk early in the course of the disease, who are in need of optimal blood pressure control.

What are the messages from this review and to whom should they be addressed? First, ABPM should be an integral part of good clinical practice and it is up to health care providers to reimburse doctors adequately for the procedure given the assurance of considerable cost savings. Second, practicing physicians must agitate for a technique that will provide them with the means of diagnosing their hypertensive patients more accurately, of guiding drug prescribing more efficiently, and of predicting risk and outcome in individual patients. Third, manufacturers of ABPM devices must improve monitors in keeping with the innovative possibilities that contemporary technology provides to further patient management and hypertension research. Finally, it might not be a bad idea for patients to take a look at ABPM and to ask why the investigation is being denied them so often.

Disclosures

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