FEATURE

Orthostatic and postprandial hypotension in the elderly

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Recognition of orthostatic hypotension and postprandial hypotension is important, regardless of whether they are causing symptoms, because they are associated with recurrent falls, heart disease, stroke and increased cardiovascular and all-cause morbidity and mortality. Initial management focuses on nonpharmacological measures and includes review of medications.

Key points

- **Supine nocturnal hypertension occurs in up to 80% of patients with orthostatic hypotension (OH).**
- **Postprandial hypotension (PPH) should be considered in a patient who experiences falls or syncope in the first two hours after commencing a meal.**
- **OH and PPH are most commonly seen in hypertensive elderly patients who have multiple comorbidities and are taking multiple medications. In this group, judicious control of hypertension is recommended, with ACE inhibitors or angiotensin II inhibitors recommended as first-line therapies.**
- **Marked OH and PPH occur in patients with autonomic failure. In this situation, the underlying cardiovascular defect cannot be cured and management of OH and PPH is directed towards control of symptoms and attenuation of the fall in blood pressure.**

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Orthostatic (postural) hypotension (OH), and its 'cousin' postprandial hypotension (PPH), are common in both community-dwelling elderly and institutionalised elderly patients. The incidence of OH is about 15% in people aged over 65 years and up to 50% in nursing home residents; it occurs with increasing frequency with advancing age and comorbidities.[1,2] PPH is seen in 38% of residents in low level care and in almost 70% of hospitalised patients over the age of 60 years.[3,4] Both conditions are important, regardless of whether they cause symptoms, because they are associated with recurrent falls, heart disease, stroke and increased cardiovascular and all-cause morbidity and mortality.[3,5,6]

Definitions of OH and PPH are given in Box 1.[7,8] PPH can occur in patients with OH, resulting in a further fall of blood pressure around meal times, but it can also occur in the absence of OH. It is usually more prominent in the morning after breakfast, when patients are relatively dehydrated from the night prior, and is exacerbated by the presence of supine nocturnal hypertension (Figure 1). PPH should be considered in patients who experience falls or syncope in the first two hours after commencing a meal, during which time it can also result in periods of unresponsiveness. Often PPH is not considered as a diagnosis, particularly when a patient does not have coexistent OH, which can lead to fruitless searches for a neurological cause of symptoms.

PPH, in this setting, should be distinguished from dumping syndrome, which is seen in patients with rapid gastric emptying after gastric surgery. Although 'early' dumping can be associated

1. Definitions of OH and PPH

Orthostatic hypotension (OH)

OH is defined as a fall in systolic blood pressure of ≥20 mmHg or a fall in diastolic blood pressure of ≥10 mmHg occurring within three minutes of standing.[7]

- Lying blood pressure measurements should be taken after five minutes of quiet rest, and standing blood pressure taken on first standing and then every minute for at least three minutes.
- 'Initial OH' with rapid recovery will be missed by the use of cuff readings and is often associated by a brief rebound increase in blood pressure. It can be suspected when a patient is symptomatic of the change in posture but has an initial rise in blood pressure on the first reading after standing.
- On occasion, a fall in blood pressure with standing can be delayed for many minutes ('delayed OH'). This should be suspected when symptoms suggest OH but it is not documented in the clinic setting.

Postprandial hypotension (PPH)

PPH is defined as a fall in systolic blood pressure of ≥20 mmHg or a fall in diastolic blood pressure of ≥10 mmHg occurring within two hours from the start of a meal.[8]

with PPH, 'late' dumping is associated with hypoglycaemia. Elderly patients with PPH have not had gastric surgery and have normal gastric emptying (or delayed gastric emptying, particularly in the setting of autonomic dysfunction).[9] The fall in blood pressure is not associated with gastrointestinal symptoms or hypoglycaemia.

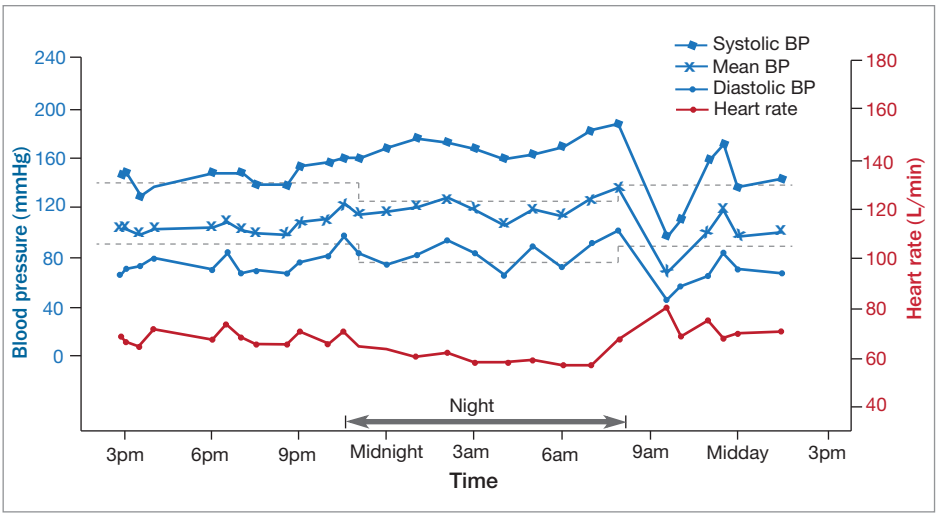

Figure 1. Results of a 24-hour blood pressure monitor in a 95-year-old woman with recurrent syncope between 8 am and 10 am. The patient was asymptomatic on the day of this recording. A marked increase in supine blood pressure overnight was demonstrated, with a fall in blood pressure from 180 mmHg systolic to 95 mmHg systolic within one hour of breakfast. Dashed grey lines represent the upper limits of normal for systolic and diastolic blood pressure for night and day. A heart rate response to the fall in blood pressure can be seen (in red).

Causes and contributing factors

OH and PPH are hallmarks of autonomic failure (permanent damage to the autonomic nervous system). In this situation, the cardiovascular defect cannot be repaired, and OH and PPH management is directed towards control of symptoms and attenuation of the fall in blood pressure. Autonomic failure should be considered in a patient with OH or PPH who has:

- comorbidities that affect the autonomic nervous system (Parkinson's disease, Lewy body dementia and diffuse Lewy body disease, multiple system atrophy)
- a history of extensive neck surgery or irradiation to the neck
- diabetes with marked OH (although patients with diabetes often have subclinical cardiovascular autonomic neuropathy, severe autonomic neuropathy manifesting with OH is infrequent)[10]
- persistent marked OH (which may be minimally symptomatic) without an increase in heart rate
- multisystem complaints referable to the autonomic nervous system (e.g. constipation, symptoms suggestive of oesophageal dysmotility, impotence, reduced sweating and urinary symptoms in the absence of prostate disease).

More commonly, however, OH and PPH are seen in hypertensive elderly patients who have multiple comorbidities and are taking multiple medications. These factors exacerbate the age-related changes in the function of the autonomic nervous system, impairing normal blood pressure regulation and blunting the normal responses to the 'stress' of upright posture and of pooling of blood in the gut with a meal.[11]

Assessment

Assessing patients for OH and PPH can be difficult within the time constraints of general practice, but there are opportunities to incorporate blood pressure measurement for detecting OH and PPH into clinical care. OH can be sought during a health assessment (particularly for patients aged ≥75 years) and as part of a medication review. It can be helpful to educate a practice nurse or residential care staff in the measurement of postural blood pressures and/or to teach patients or their relatives how to measure postural blood pressures using an automated blood pressure machine at home. For a patient in whom OH has been detected, 24-hour blood pressure monitoring can reveal nocturnal hypertension and guide the adjustment of medications (Figure 1). Home blood pressure readings and 24-hour blood pressure monitoring will also assist in the detection of patients with white-coat hypertension who are being over-treated.

When PPH is suspected, 24-hour blood pressure monitoring will often demonstrate a fall in blood pressure after a meal (particularly breakfast) even when there is a lack of symptoms on the day (Figure 1). Patients (or their relatives and residential care staff) can be taught how to measure blood pressure (in the seated patient) prior to commencing the morning meal and then at 30, 60 and 90 minutes after completing the meal.

Management

Review of medications

In the past, the initial response to the patient with OH and PPH has often been to withdraw antihypertensive medications. However, there is accumulating evidence of increased prevalence of OH in patients with uncontrolled hypertension compared with patients with controlled hypertension.[12,13] In addition, patients who have controlled hypertension and OH have been shown to have a lower incidence of falls than patients with uncontrolled hypertension and OH.[14] Therefore, management should be directed towards optimising hypertension control, which often involves altering the timing of medication administration to mid-afternoon or evening and changing the antihypertensive medications used.

A number of commonly used medications have been shown to exacerbate OH and PPH. The α- and β-adrenergic blockers (which block the normal responsiveness of the sympathetic nervous system) and diuretics (which cause volume depletion) have frequently been associated with OH and should be ceased when possible, as should nitrates and tricyclic antidepressants. ACE inhibitors and angiotensin II inhibitors are recommended for first-line management of hypertension in these patients.[13] The dihydropyridine calcium antagonists have been associated with reduced blood pressure lability and are good second-line agents in this population.[15] The 'start low and go slow' strategy should be used for antihypertensive medications – gradual up-titration (over many weeks) is advisable, rather than rapid up-titration.[11]

Figures 2a and b. Leg muscle tensing techniques can be used with (or without) leg crossing in situations of prolonged standing.

2. Nonpharmacological measures for OH and PPH

The measures discussed in this 'tool box' for managing OH and PPH are suitable for all patient groups, but they are not always practical or tolerated by all individuals. They should only be continued when beneficial and acceptable to a patient.

- Maintaining intake of noncaffeinated fluids is essential, particularly in the early part of the day. Aim for an intake of at least 1.5 L. Boluses of water are a simple but effective way for elderly patients and those with autonomic failure to raise their blood pressure. A 350 to 500 mL bolus of water acts to stimulate the sympathetic nervous system, and is particularly beneficial when ingested 30 minutes before meals to minimise PPH. The mechanism relies on the low osmolality of water, and thus other fluids (or water with additives) will not have the same effect. Consider charting this on the medication chart for residential care patients.
- Liberalise salt intake. Increased salt results in increased intravascular volume and can stimulate thirst. This is particularly useful in patients who do not have coexistent hypertension.
- Alcohol should be avoided, even in small amounts. Alcohol acts as a vasodilator.
- Changing posture slowly, particularly sitting on the edge of the bed before standing, is helpful because it allows time for the blood pressure to adjust, particularly in those with initial OH.
- Patients should avoid activities that involve warmth and prolonged standing or sitting, such as showering, trips to the hairdresser, long shopping trips or travel on public transport in the postprandial period because these may exacerbate the fall in blood pressure at these times.
- Leg tensing manoeuvres with leg crossing can be helpful for circumstances of prolonged standing (such as a supermarket queue), when blood will pool in the legs (Figures 2a and b). Less steady patients can be encouraged to perform the tensing manoeuvre without leg crossing and while using an item like the four-wheel frame of a shopping trolley to steady themselves.
- Daytime bed rest should be avoided because it results in deconditioning and exacerbates OH. However, a short rest after meals can be considered in patients with autonomic failure and severe PPH.
- Compression stockings can be useful, noting that these need to include the abdomen to be beneficial. Consider use of an abdominal binder.
- It can be helpful to elevate the head of the bed by 10 to 12 degrees (30 to 40 cm), noting that lower levels of elevation have been shown to be ineffective.[17] This is often impractical in the home setting, but may be more easily achieved in residential care environments.
- Participation in an exercise program can improve muscle tone and increase blood volume. Seated or semi-recumbent exercise can be considered.

Supine nocturnal hypertension occurs in up to 80% of patients with OH. The use of 24-hour blood pressure monitoring is recommended to assess for this pattern. If elevated night-time blood pressures are documented on 24-hour monitoring then it is particularly important to administer antihypertensive medication in the mid-afternoon or evening.[16]

Nonpharmacological measures

Nonpharmacological measures are a recommended part of management for all patients with OH and PPH. These are summarised in Box 2.

Referral

Although many patients respond to nonpharmacological measures and medication adjustments, those with autonomic failure or persistent OH and PPH may require more complex treatment, and thus require specialist referral. There are specialists in a number of fields who have an interest and expertise in the management of OH and PPH, which can make appropriate referral difficult. In general, patients who have OH and PPH in the setting of a movement disorder are best referred to a hospital neurology movement disorders clinic, and those with dementia to a geriatric or specialist dementia clinic. Patients with suspected autonomic failure should be considered for referral to a neurologist because OH and PPH can precede the defining features of a movement disorder. For a patient who has persistent OH or PPH after exclusion of an underlying medical problem and initial management, referral to a specialist with an interest in the management of these disorders should be considered.

Medication that may be initiated in the specialist management of OH and PPH include the following daytime pressure agents.

- **Fludrocortisone.** This agent acts to increase blood volume and sensitises α-receptors. Fludrocortisone is generally only used in patients with autonomic failure and OH for symptom relief. It has the disadvantage of exacerbating supine hypertension.
- **Midodrine and dihydroergotamine.** These short-acting vasoconstrictor agents (duration of action is four to six hours) are used in the early part of the day to increase blood pressure and minimise the postprandial fall in blood pressure. They are used in patients with autonomic failure and in a small group of patients with symptomatic OH and PPH despite simple measures. Midodrine and dihydroergotamine, which are available through the Special Access Scheme, are only prescribed by specialists with extensive experience in the management of complex cases of OH and PPH.

Short-acting nocturnal antihypertensive medications are also used in the specialist setting. These include the nitrate patch, applied at bedtime and removed before rising, or captopril in a patient with diabetes and autonomic failure. These agents may be used in such patients to minimise severe supine nocturnal hypertension. In these circumstances, particular care and education must be given regarding the risk of falls during night time toileting.

Management of these patients remains complex, and a partnership between the specialist and GP is the optimal long-term approach.

Conclusion

OH and PPH are difficult conditions to manage and require patients to be educated about nonpharmacological measures and exacerbating factors. Home blood pressure monitoring, combined with periodic 24-hour blood pressure monitoring, can be helpful in guiding treatment. Many patients will respond to nonpharmacological measures and alteration of antihypertensive medications and their timing. Referral for specialist assessment is appropriate for patients who have ongoing significant OH or PPH despite these measures. **CT**

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