Non-pharmacological treatments for orthostatic hypotension

In a recent issue of Age and Ageing, Fan et al. report negative results in a randomised controlled trial of the use of sleeping in the head-up position (SHU) in the treatment of orthostatic hypotension (OH) [1]. We ask if this treatment or other non-pharmacological therapies should be recommended for use in elderly patients?

Postural or Orthostatic Hypotension is a common clinical problem affecting elderly people. It affects approximately 20% of people over 65 years rising to just over a quarter aged over 85 years [2]. Defined as a fall in blood pressure of ≥20 mmHg systolic or ≥10 mmHg diastolic within 3 min when standing from supine [3], it has been associated with falls, previous myocardial infarction and transient ischaemic attacks as well as systolic hypertension, ECG abnormalities and carotid stenosis [2].

Standing from supine and its associated blood pressure changes require an effective neurohumoral response with functioning renal and cardiovascular systems. Pooling of approximately 500–1,000 ml of blood in the capacitance vessels of the pelvis and legs and the resulting drop in blood pressure reduces firing of carotid and aortic baroreceptors. Messages relayed via the nucleus tractus solitarius result in reflex reduction in vagal tone and sympathetic activation of β-adrenergic receptors. Peripheral vasoconstriction and increased stroke volume results in increased cardiac output [4]. Disruption of any of these systems may lead to symptoms associated with OH.

Causes of OH in the elderly are generally divided into primary causes of autonomic dysfunction such as Parkinson’s disease and multiple system atrophy, and secondary causes such as diabetes, stroke, CKD, infections and certain treatments for hypertension. Importantly older people will have many risk factors that predispose to OH, such as vascular stiffening [5] and decreased baroreceptor sensitivity [6]. Salt and water loss associated with nocturnal polyuria leading to intravascular volume depletion is a particular problem when autonomic failure is present [7] hence treatments that aim to correct this are potentially effective.

Overall management of OH requires a careful geriatric assessment in conjunction with allied health colleagues. Avoiding precipitating factors such as sudden postural change, large meals, hot baths, alcohol and culpable vasodilating medications forms part of the initial treatment strategy. The role of modern antihypertensives in exacerbating OH is controversial. It has been demonstrated that the incidence of OH is reduced after long-term antihypertensive treatment of all classes [8]; however, those that act by peripheral vasodilatation may well exacerbate symptoms especially in the short term.

Non-pharmacological methods for treating OH form an important part in limiting blood pressure reduction on standing. Liberal addition of salt to the diet with the addition of salt tablets aiming for a minimum intake of 150 mmol per day is important to correct salt depletion due to polyuria and poor oral intake [9]. Although exercise can exacerbate symptoms, a programme of moderate exercise training has been shown to improve orthostatic tolerance and symptoms [10]. Abdominal binders, if tolerated are more effective than stockings and work by reducing venous pooling in the splanchnic circulation [11]. Physical manoeuvres that help to raise blood pressure by increasing venous return and increasing peripheral resistance include crossing legs on standing, squatting or bending forwards with the hip flexed [12].

SHU was first described by MacLean and Allen in 1940 in a group of patients with pure autonomic failure who demonstrated significant improvements in symptoms [7]. The main physiological response to SHU seems to be the reduction in nocturnal polyuria. A decrease in renal arterial pressure due to the legs sitting below the heart leads to activation of the renin–angiotensin pathway and vasopressin release [13]. Studies demonstrating the efficacy of this treatment up to now have included only small numbers (less than 12) in younger patients (under 65) with primary autonomic failure [14–16]. Generally higher degrees of head-up tilt were used (10–12°) in these studies than is commonly used in practice [17].

Fan et al. have demonstrated in this trial that despite promising results from observational studies, in a heterogeneous group of older people effectiveness of SHU is more variable [1]. Older people with impairments of other homeostatic mechanisms and not just the autonomic system will be less able to mount an appropriate...
haemodynamic response to raising intravascular volume. It is interesting that difficulties were noted in maintaining adequate fluid hydration in the setting of this monitored trial. This implies that recommending increased fluid intake alone is likely to be ineffective as an overall treatment for OH and may explain in part the lack of a significant effect of SHU. In those who do not respond, or those where raising intravascular volume is potentially risky such as heart failure, therapies that aim to reduce peripheral pooling such as stockings, abdominal binders and physical manoeuvres might be more appropriate. Individualised exercise training should be recommended where symptoms and physical ability allow; swimming being one such example.

This trial highlights a number of areas that remain unexplained. The aetiology of OH and range of co-morbidities were not reported. Sub-group analysis in future studies might identify cohorts that could benefit from SHU therapy. The degree of head-up tilt likely to be effective remains uncertain. Elevation of five degrees seems to reflect common practice [17] and patient tolerability; however, most trials have used higher degrees of head-up tilt, and tolerability of higher elevations is yet to be formally investigated. The effect of antihypertensive agents that may directly interfere with the presumed physiological mechanism of SHU, such as diuretics and ACE inhibitors, remains unclear.

Overall this study has successfully challenged previous assumptions on the effectiveness of SHU with a well-conducted randomised control trial. With so many unanswered questions, it would be a shame that a potentially effective and relatively safe non-pharmacological measure should be completely discarded at this juncture. As the procedure has no proven benefit in elderly community-dwelling people, it should not be recommended routinely; however, it should remain within the armoury of OH therapies for those with profound autonomic failure and little cardiovascular co-morbidity where some benefit may be seen. Where side effects of raising intravascular volume are of concern, other non-pharmacological measures should be considered.

References