

Orthostatic hypotension (OH) is the most disabling and serious manifestation of adrenergic failure, occurring in the autonomic neuropathies, pure autonomic failure (PAF) and multiple system atrophy (MSA). No specific treatment is currently available for most etiologies of OH. A reduction in venous capacity, secondary to some physical counter maneuvers (e.g., squatting or leg crossing), or the use of compressive garments, can ameliorate OH. However, there is little information on the differential efficacy, or the mechanisms of improvement, engendered by compression of specific capacitance beds. We therefore evaluated the efficacy of compression of specific compartments (calves, thighs, low abdomen, calves and thighs, and all compartments combined), using a modified antigravity suit, on the end-points of orthostatic blood pressure, and symptoms of orthostatic intolerance. Fourteen patients (PAF, $n = 9$; MSA, $n = 3$; diabetic autonomic neuropathy, $n = 2$; five males and nine females) with clinical OH were studied. The mean age was 62 years (range 31–78). The mean \pm SEM orthostatic systolic blood pressure when all compartments were compressed was 115.9 ± 7.4 mmHg, significantly improved ($p < 0.001$) over the head-up tilt value without compression of 89.6 ± 7.0 mmHg. The abdomen was the only single compartment whose compression significantly reduced OH ($p < 0.005$). There was a significant increase of peripheral resistance index (PRI) with compression of abdomen ($p < 0.001$) or all compartments ($p < 0.001$); end-diastolic index and cardiac index did not change. We conclude that denervation increases vascular capacity, and that venous compression improves OH by reducing this capacity and increasing PRI. Compression of all compartments is the most efficacious, followed by abdominal compression, whereas leg compression alone was less effective, presumably reflecting the large capacity of the abdomen relative to the legs.

Keywords: orthostatic hypotension; antigravity suit; pure autonomic failure; multiple system atrophy; blood pressure

Introduction

Orthostatic hypotension (OH) is the most serious manifestation of adrenergic failure, occurring in the progressive autonomic disorders such as the autonomic neuropathies, pure autonomic failure (PAF) and multiple system atrophy (MSA). OH is also a common problem in old age.¹

No specific treatment is currently available for most of the underlying etiologies of OH.² The therapeutic approaches primarily consist of the use of vasoconstrictor drugs, increasing blood volume, and the use of compression garments. Vasoconstrictor drugs, while of value, are not universally successful, and cause supine hypertension.³ Volume expansion, acutely by infusions of saline, or chronically by fludrocortisone and a high-salt diet, causes sustained supine hypertension.

Crile introduced lower body positive pressure with the antigravity suit (G suit) or medical anti-shock trousers in 1903. The principle of the G suit has been applied to the treatment of OH. The development of new materials and advances in garment design have now allowed the fabrication of an elastic suit that can apply effective even pressure without being inordinately restrictive.⁴ However, there is little systematic

Efficacy of compression of different capacitance beds in the amelioration of orthostatic hypotension

J.-C. Denq MD¹, T.L. Opfer-Gehrking²,
M. Giuliani MD³, J. Felten², V.A. Convertino PhD⁴
and P.A. Low MD²

¹Department of Neurology, National Defense Medical Center, Tri-Service General Hospital, Taipei, Republic of China, ²Autonomic Disorders Research Center, Department of Neurology, Mayo Clinic, Rochester, Minnesota, ³Department of Neurology, University of Pittsburgh, Pittsburgh, Pennsylvania and ⁴Physiology Research Branch, Clinical Sciences Division, Brooks Air Force Base, Texas, USA

Correspondence and reprint requests: Phillip A. Low, Department of Neurology, Mayo Clinic, Rochester, MN 55905, USA.
Tel: (+1) 507 284 3375; fax: (+1) 507 284 1814;
e-mail: low.phillip@mayo.edu

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information about the effects of compression of the various venous capacitance beds.

We used a modified G suit to evaluate the effectiveness of compression of different capacitance beds. The aim of this study was to evaluate, in patients with chronic symptomatic OH, the differential efficacy of compression of the limbs versus the abdomen versus combined compression.

Materials and methods

Patients

Studies were carried out on 14 patients who had been confirmed to have neurogenic OH. OH was defined as being present when there was a sustained (over 3 min) orthostatic decrement in blood pressure (BP) of: systolic BP (SBP) ≥ 30 mmHg or mean BP (MBP) ≥ 20 mmHg. The age range was 31–78 years (62 ± 12 years, mean \pm SD); nine were females and five males. All had symptoms of OH; duration of symptoms ranged from 2 to 10 years.

Inclusion criteria

Patients were required to be adult males or females, age 18 years or older, with clinically definite MSA, PAF or