

The Acute Hemodynamic Effects of Pneumatic Compression Device in Patients with Chronic CHF

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Background: The use of intermittent sequential pneumatic compression device (PS) to improve the adverse cardiovascular effects induced by positive pressure pneumoperitoneum during laparoscopic surgery is well known. PS is also extensively in use following prolonged operations, to prevent venous stasis. Its use in healthy volunteers led to improved cardiac function. Our aim was to evaluate the effects and safety of PS in adult patients with chronic congestive heart failure (CHF).

Methods: We studied 20 patients with chronic CHF, according to clinical and echocardiographic well-established criteria. Patients were connected to PS, each includes 10 air cells, operated by a computerized compressor that exerts 2 cycles of sequential compression per minute, to a maximum pressure of 50 mmHg. Hemodynamic and echocardiographic parameters were measured before and after sleeve activation (5 and 15 minutes after termination of the previous examination).

Results: Mean age was 68 ± 11 years. Baseline LVEF $28.8 \pm 9.3\%$, systolic pulmonary artery pressure 49.8 ± 9.7 mmHg, LV end-diastolic diameter 55.5 ± 0.9 mm. Cardiac output (4.2 to 4.77 l/min, $p=0.014$) and stroke volume (56.7 to 64.4 ml, $p=0.025$) increased significantly following PS activation, without reciprocal increase in heart rate, and gradually descended the study, after 10 minutes. There was no significant change in diastolic function parameters. Central venous pressure remained high during PS activation. Systemic vascular resistance decreased significantly (1517 to 1205 dyn X s/cm⁵, $p=0.002$), and remained lower than basal level in spite of an increment during the study. We did not observe cardiac deterioration (clinical or functional) following the study, albeit increased pulmonary venous return.

Conclusions: The use of PS is safe for patients with CHF. Its use may even improve cardiac function, as manifested by a significant changes in both preload and afterload parameters.