# Effect of Posture on Popliteal Artery Hemodynamics

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**Hypothesis:** Marked peripheral vasodilation and rubor characterize critically ischemic limbs on dependency. We believe that intermittent claudication is also associated with peripheral hemodynamic changes on postural alteration, which differ distinctly from normal. Evaluation of such differences and understanding of the underlying physiological derangements may be essential in the development of treatments for intermittent claudication. We comparatively assess the effect of posture on lower limb arterial hemodynamics in normal subjects and in patients with intermittent claudication (or Fontaine II) due to peripheral vascular disease, determined in the popliteal artery.

**Design:** A cohort study.

**Setting:** A university-associated tertiary care hospital.

**Patients:** Thirty-seven legs of 29 normal subjects (group A) and 50 legs of 36 patients with intermittent claudication (ankle-brachial index range, 0.39-0.76; median, 0.57) (group B).

**Interventions:** Popliteal artery volume flow (vFl), mean velocity, and luminal diameter were measured on (1) recumbency, (2) sitting, and (3) return to recumbency in groups A and B using color duplex imaging.

**Mains Outcome Measures:** The pulsatility index, peak systolic velocity, and end diastolic velocity (EDV) were measured on (1) recumbency, (2) sitting, and (3) return to recumbency.

**Results:** Popliteal artery vFl in normal subjects decreased from 110 ± 43mL/min on recumbency to 57 ± 27 mL/min on sitting ($p<.001$) and returned to 111± 46mL/min on resumption of recumbency ($p<.001$). Similarly, in patients with intermittent claudication, vFl decreased from 113 ± 52 mL/min on recumbency to 76 ± 41mL/min on sitting ($p<.001$) and increased on resumption of recumbency to 114 ± 53 mL/min ($p<.001$). There was no difference ($p =.97$) in the vFl between the study groups on recumbency, but sitting vFl in normal subjects was significantly lower than in patients with intermittent claudication ($p =.04$). The mean velocity, peak systolic velocity, and EDV displayed a similar pattern of change as vFl. The pulsatility index in both groups increased significantly on sitting ($p<.001$) and decreased on return to recumbency ($p<.001$). All data are given as mean ± SD.

**Conclusions:** Lower limb arterial vFl, mean velocity, peak systolic velocity, and EDV decrease significantly ($p<.001$) when posture is altered from recumbency to sitting, in normal subjects and in patients with intermittent claudication. A decrease in the EDV and an increase in the pulsatility index on sitting indicate enhancement of arterial resistance to flow secondary to peripheral vaso-constriction. Quantitative differences between the groups in vFl ($p<.04$), EDV ($p<.01$), and pulsatility index ($p<.001$) on dependency indicate that the orthostatic vasoactive response in patients with intermittent claudication is significantly subdued, reflecting a marked derangement in venoarteriolar response.