
Analysis of the velocity profile of the popliteal artery and its relevance during blood flow studies.


ABSTRACT

The mean blood velocity is required to calculate blood flow and to determine the associated shear rate. The maximal blood flow velocity is assumed to have a parabolic velocity profile; therefore, the mean velocity is half of the maximal value. Previous studies have been carried out on vessels such as the brachial and femoral artery, but none have been reported for the popliteal artery. To assess the velocity profile of the popliteal artery, a spectral Doppler analysis was performed on ten healthy patients during varied flow states (resting, distal occlusion, hyperemia). The results were then averaged over the entire cardiac cycle. The flow described in these patients’ popliteal artery had a blunted parabolic flow profile with a $TAV_{mean}:TAV_{max}$ ratio of $0.68 \pm 0.07$ at baseline. The baseline measures were compared to a $TAV_{mean}:TAV_{max}$ ratio of $0.68 \pm 0.12$ during distal occlusion and $0.67 \pm 0.16$ during reactive hyperemia. These descriptive results may suggest that adjustments may be needed for a blunted parabolic profile, especially when calculating the mean velocity of the popliteal artery.