We study the acceleration of magnetosheath plasma using a semi-analytical magnetic string approach for a range of solar wind Alfvén Mach numbers, $Ma$. We work with an IMF vector perpendicular to the solar wind velocity, $V_{sw}$, and pointing north. We do not invoke magnetic reconnection. We show that magnetosheath speeds can exceed the solar wind speed, and the ratio $V/V_{sw}$ increases with decreasing $Ma$. Analysing the dependence of this ratio on $Ma$, we find that maximum $V/V_{sw} \sim 1.6$ (1.2), and for $Ma = 2$ (15). Maximum speeds occur a few Earth radii (RE) tailward of the dawn-dusk terminator. The thickness of the accelerated flow layer varies as the inverse square of $Ma$. Taking the magnetopause subsolar distance as 10 RE, we find typical values for the thickness of $\sim 4$ RE for $Ma = 3$ and 0.35 RE for $Ma = 10$. The physical mechanism is that of draping of the magnetic field lines around the magnetosphere, and the associated magnetic tension and total pressure gradient forces acting on the flow. For lower $Ma$ the plasma depletion is stronger, and thus the acceleration produced by the pressure gradient is larger. An additional acceleration is produced by the magnetic tension, which is stronger for smaller $Ma$. At the dayside the pressure gradient and magnetic tension forces both act in the same direction. But tailward of the terminator the magnetic tension starts to act in the opposite direction to the pressure gradient. When the resulting force vanishes, the highest speed is attained.