ABSTRACT

The renal lymphatic system plays an important role in removing excess fluid from the kidneys. Unfortunately, the factors influencing lymphatic flow are difficult to measure. We used a simple model to represent renal lymphatics as a single pressure source ($P_L$) pushing lymph through a single resistance ($R_L$). In anesthetized dogs, we cannulated renal lymphatics and measured lymph flow rate ($Q_L$) as we varied pressure ($P_O$) at the outflow end of the lymphatics. There was no significant change in $Q_L$ as we increased $P_O$ from -5 to 0 cm H$_2$O. In other words, there was a plateau in the $Q_L$ vs. $P_O$ relationship. At higher $P_O$'s, $Q_L$ decreased linearly with increases in $P_O$. From this linear relationship, we calculated $R_L$ as $P_O/Q_L$ and we took $P_L$ as the $P_O$ at which $Q_L = 0$ µl/min. At baseline, $R_L = 0.34 \pm 0.14$ (SD) cm H$_2$O min/µl and $P_L = 8.2 \pm 4.4$ cm H$_2$O. When we increased renal venous pressure ($P_V$) from baseline ($3.5 \pm 3.0$ cm H$_2$O), the plateau in the $Q_L$ vs. $P_O$ relationship extended to higher $P_O$'s, $R_L$ decreased, and $P_L$ increased. Renal interstitial fluid volume and interstitial pressure increased following elevation of $P_V$. The extension of the $Q_L$ vs. $P_O$ plateau with increasing $P_V$ suggests that renal interstitial pressure may partially collapse intrarenal collecting lymphatics which may compromise lymph flow.