[F-PO1565] Changes in Wall Shear Stress Influence Changes in Intima-Media Thickening in a Pig Model of Arteriovenous Fistula Stenosis

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Arteriovenous fistula (AVF) failure is a significant clinical problem in the hemodialysis population in the United States. Although the pathogenesis of AVF failure is poorly understood, changes in wall shear stress (WSS) are likely to play an important role in determining final venous stenosis. The aim of this study was to (a) identify differences in wall shear stress between AVFs placed in two different configurations and (b) establish linkages between WSS and intima-media thickening. Bilateral AVFs were created in curved (C) and straight (S) configurations in our pig model of AVF stenosis. 64 slice CT angiography and flow measurements with duplex doppler ultrasound were performed at different time points in order to generate computer models of WSS at the 2d, 7d and 28d time points.
WSS was maximal at 2d in both the curved and straight configurations but returned back to baseline more quickly in the C-AVFs as compared to the S-AVFs, suggesting a more physiological pattern of remodeling with this configuration. Performance of a pooled correlation analysis of differences in WSS with differences in intima-media thickness at opposite walls of the venous segment, demonstrated that the change in intima-media thickening was linked with the magnitude of change in WSS.
Our results (using a CT based analysis of WSS) suggest that differences in anatomical configuration can result in differences in WSS which can in turn influence intima-media thickening. Optimization of anatomical configuration and WSS could result in a reduction of clinical AVF failure.

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Location: Exhibit Halls A/B/C