The venous graft as an effector of early angiogenesis in a fibrin matrix.

Authors: Polykandriotis E, Tjiawi J, Euler S, Arkudas A, Hess A, Brune K, Greil P, Lametschwandtner A, Horch RE, Kneser U

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Abstract:

The arteriovenous loop (AV loop) model is gaining importance as a means of initiating and sustaining perfusion in tissue engineering constructs in vivo. This study represents an attempt to dissect the morphology of early arterialization and angiogenesis in the AV loop in a fibrin matrix with special focus on the interpositional venous graft (IVG) segment. An AV loop was constructed in 30 rats using the femoral vessels and an IVG. The AV loop was encased in an isolation chamber filled with a fibrin matrix. Evaluation methods included scanning electron microscopy (SEM) of corrosion casts, immune histology and micro magnetic resonance angiography (MRA). Direct luminal neovascular sprouting was evident between day 10 and day 14 from the vein and the IVG but not from the arterial segment. Arterialization of the IVG manifested itself on the corrosion casts as a gradual reduction in luminal caliber with onset after day 7. Microdissection of the microvascular replicas could demonstrate for the first time the presence of direct luminal sprouts from the IVG. MRA was used to display the shunt pattern of perfusion in the patent AV loop. From the three segments of the vascular axis in the AV loop the IVG is the most versatile for applications in the clinical as well as the experimental setting. Kinetics of angiogenesis warrant further investigation in the IVG.