

SIGNIFICANCE STATEMENT

Maturation failure is a common complication after arteriovenous fistula (AVF) creation. The lack of preventive therapies reflects our poor understanding of the biologic mechanisms that control venous outward remodeling. This prospective study quantifies the progression of medial fibrosis, intimal hyperplasia, and collagen fiber organization in native vein and fistula biopsy specimens obtained from patients undergoing surgeries for two-stage AVF creation. Medial fibrosis increased significantly after AVF creation, independent of the preexisting level and of baseline clinical factors. Postoperative medial fibrosis and circumferential alignment of collagen fibers were associated with nonmaturation. Postoperative intimal hyperplasia was only associated with failure in the presence of high medial fibrosis. This work identifies medial fibrosis as a major risk factor of AVF maturation failure.