Abstract:

Rotator cuff reconstructions may be improved by adding growth factors, cells, or other biologic factors into the repair zone. This usually requires a biological carrier (scaffold) to be integrated into the construct and placed in the area of tendon-to-bone healing. This needs to be done without affecting the constructs mechanics. Hypothesis: The hypothesis was that scaffold placement, as an interposition, has no adverse effects on biomechanical properties of double-row rotator cuff repair. The purpose of this study was to examine the effect of scaffold interposition on the initial strength of rotator cuff repairs. Controlled laboratory study. Twenty-five fresh-frozen shoulders (mean age: 65.5 ± 8.9 years) were randomly assigned to 5 groups. Groups were chosen to represent a broad spectrum of commonly used scaffold types: (1) double-row repair without augmentation, (2) double-row repair with interposition of a fibrin clot (Viscogel), (3) double-row repair with interposition of a collagen scaffold (Mucograft) between tendon and bone, (4) double-row repair with interposition of human dermis patch (ArthroFlex) between tendon and bone, and (5) double-row repair with human dermis patch (ArthroFlex) placed on top of the repair. Cyclic loading to measure displacement was performed to 3000 cycles at 1 Hz with
an applied 10- to 100-N load. The ultimate load to failure was determined at a rate of 31 mm/min. There were no significant differences in mean displacement under cyclic loading, slope, or energy absorbed to failure between all groups (P = .128, P = .981, P = .105). Ultimate load to failure of repairs that used the collagen patch as an interposition (573.3 ± 75.6 N) and a dermis patch on top of the reconstruction (575.8 ± 22.6 N) was higher compared with the repair without a scaffold (348.9 ± 98.8 N; P = .018 and P = .025). No significant differences were found for repairs with the fibrin clot as an interposition (426.9 ± 103.6 N) and the decellularized dermis patch as an interposition (469.9 ± 148.6 N; P = .73 and P = .35). Scaffold augmentation did not adversely affect the zero time strength of the tested standard double-row rotator cuff repairs. An increased ultimate load to failure was observed for 2 of the augmentation methods (collagen patch as an interposition and decellularized dermis patch on top of the reconstruction) compared with the nonaugmented repairs. Scaffolds intended for application of growth factors or cellular components in a repair situation did not adversely jeopardize the stability of the operative construct.