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Paper #74

Biomechanical Effect of Superior Capsule Reconstruction Using a 3-mm and 6-mm Thick Acellular Dermal Patch Graft in a Dynamic Shoulder Model

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Summary:
In a dynamic cadaveric shoulder model, SCR using a 6-mm thick acellular dermal allograft demonstrated superior glenohumeral stability results compared to a 3-mm thick acellular dermal allograft.

Abstract:

Purpose

To evaluate the effect of superior capsule reconstruction (SCR) with a 3-mm and 6-mm thick acellular dermal allograft on shoulder biomechanics.

Methods

Eight fresh-frozen cadaveric shoulders were tested using a dynamic shoulder testing system. Maximum abduction angle (MAA), glenohumeral superior translation (ghST), subacromial peak contact pressure (sPCP) and cumulative deltoid force (cDF) were compared among 4 conditions: (1) intact shoulder, (2) simulated irreparable rotator cuff tear (RCT), (3) SCR using a 3-mm thick acellular dermal allograft, (4) SCR using a 6-mm thick acellular dermal allograft.

Results

A simulated irreparable RCT significantly decreased the MAA compared to the intact rotator cuff state (73% of intact; P < .001); significantly increased ghST (204% of intact; P = .001), sPCP (200% of intact; P < .001) and cDF (158% of intact; P < .001). SCR with a 3-mm thick patch significantly increased MAA (88% of intact; P = .01) and decreased ghST (138% of intact; P = .01) compared to the RCT state, but not sPCP (188% of intact) and cDF (141% of intact). SCR with a 6-mm thick patch significantly increased the MAA compared to the torn state (95% of intact; P < .001) and significantly decreased ghST (77% of intact; P < .001), sPCP (132% of intact; P < .001) and cDF (117% of intact; P = .001). There was no statistical difference in the MAA, ghST, sPCP and cDF when comparing SCR with a 6-mm thick patch to the intact rotator cuff state. GhST (P = .03), sPCP (P < .001) and cDF (P = .02) were significantly different when comparing SCR using a 3-mm thick patch to a 6-mm thick patch; MAA showed no difference.

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Conclusion

SCR with a 3-mm thick acellular dermal allograft improved MAA and ghST in a simulated RCT. Moreover, SCR with a 6-mm thick graft instead of 3-mm thick graft decreased sPCP and cDF.

Clinical Relevance: SCR with a 6-mm thick acellular dermal allograft attached at 45° of shoulder abduction restores superior glenohumeral stability.