Editorial Commentary: Bone Marrow Stimulation and Losartan Augmentation of Shoulder Rotator Cuff Repair

Noboru Taniguchi, M.D., Ph.D.

Abstract: Rotator cuff retear rates after repair have been variously reported as ranging from 5% to 40% for small to mediums tears and as high as 40% to 94% for large to massive tears. Thus strategies to enhance structural healing are relevant. In rabbits, combining oral losartan (which has antifibrotic effects by downregulating transforming growth factor-β1) and bone marrow stimulation (BMS) of the greater tuberosity, showed improved rotator cuff repair pull-out strength and highly organized tendon matrix in a chronic injury model, whereas BMS alone did not improve the mechanical properties. However, clinical studies show that BMS techniques have a positive impact on healing and retear rates. BMS stimulates migration of mesenchymal stem cells from bone marrow to the lesion, and this approach has been widely used to fill cartilage defects by fibrocartilage metaplasia. BMS is a straightforward and cost-effective technique; the use of multiple deeper bone tunnels is recommended.

See related article on page 2408

Rotator cuff retear rates have historically varied, ranging from 5% to 40% for small- to medium-sized tears and as high as 40% to 94% for large- to massive-sized tears.[1-5] Given the significant impact of retear rates on outcomes after rotator cuff repair,[1] it is crucial to explore alternative strategies that can enhance structural healing. The bone marrow stimulation (BMS) technique aims to stimulate the migration of mesenchymal stem cells (MSCs) derived from the bone marrow to the lesion. This approach has been widely used to fill cartilage defects by promoting fibrocartilage secretion,[6,7] although it is worth noting that vented anchors have a less pronounced impact than unvented anchors.[8] The scientific basis of the BMS technique lies in its recruitment of MSCs from the surface of the bleeding bone. The rationale for the current experimental study comes from a recent prospective randomized clinical study conducted by Milano et al.,[9] who compared single-row repair with and without microfracture and found a higher healing rate of chronic large-to-massive tears in the microfracture group, although no significant clinical differences were observed between the 2 groups. Bilsel et al.[10] discovered that applying BMS to the tuberosity of a repaired chronic rotator cuff tear resulted in dynamic tendon healing, with a significant increase in the ultimate load to failure, thicker collagen bundles, and increased fibrocartilage in a rabbit chronic rotator cuff tear model. Similar findings were reported by Nakagawa et al.,[11] who demonstrated that drilling the footprint and preserving the fibrocartilage can enhance the repair of tendon-to-bone insertion.

In a study on the molecular mechanism of BMS for rotator cuff repair, Jo et al.[12] reported that cells recruited from the proximal humerus after implementing this technique exhibited characteristics similar to those of endogenous MSCs. Specifically, these cells tested positive for CD73, CD90, and CD105 while showing negativity for CD45. In an animal study, Kida et al.[13] demonstrated that bone marrow-derived cells can pass through holes drilled into the humerus footprint, infiltrate the repaired rotator cuff, and promote postsurgical rotator cuff healing. Using a bone marrow chimeric rat model, where green fluorescent protein (GFP) was exclusively expressed in bone

Kagoshima University

The author reports no conflicts of interest in the authorship and publication of this article. Full ICMJE author disclosure forms are available for this article online, as supplementary material.

0749-8063/231002/$36.00

https://doi.org/10.1016/j.arthro.2023.07.020