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Patch Augmentation Promotes Early Functional Recovery After Repair of Massive Rotator Cuff Tears with Osteoporosis: A 2-Year Follow-Up Study

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Introduction and Background

The repair of massive rotator cuff tears (MRCTs) in patients with osteoporosis faces challenges such as a high re-tear rate and slow functional recovery. Patch augmentation techniques have been used to reinforce repairs, but their medium- to long-term benefits in terms of early functional recovery and structural tendon healing in osteoporotic patients require further validation.

Material and Method

A retrospective cohort analysis was conducted on 80 osteoporotic patients who underwent repair of MRCTs. Among them, 40 patients received patch augmentation (using autologous fascia lata, Lars, or REGENETEN patches), while the other 40 underwent conventional repair (control group). Primary outcome measures included range of motion (ROM), visual analog scale (VAS) score, American Shoulder and Elbow Surgeons (ASES) score, and Constant-Murley score. All patients were evaluated clinically before surgery and at 3 months, 6 months, 1 year, and 2 years after surgery. Tendon healing was assessed via MRI at 3 months and 1 year postoperatively, using the Sugaya classification (types I–V) to evaluate structural integrity. Tendon thickness and signal intensity were also measured.

Results

There were no significant differences in baseline characteristics such as age, gender, severity of osteoporosis, or preoperative shoulder function scores (VAS, ASES, Constant) between the two groups ($p > 0.05$). All patients showed significant functional improvement after surgery. However, the patch augmentation group demonstrated significantly better recovery at the early follow-up points of 3 and 6 months. Specifically, the patch group had significantly lower VAS pain scores than the control group (3 months: 2.1 ± 0.8 vs. 3.8 ± 1.1 , $p < 0.01$; 6 months: 1.2 ± 0.5 vs. 2.5 ± 0.9 , $p < 0.01$), along with significantly higher ASES and Constant scores ($p < 0.05$). The 3-month MRI evaluation revealed significantly better tendon healing in the patch augmentation group, with a higher proportion of Sugaya type I and II healing (72.5%, 29/40) compared to the control group (45.0%, 18/40) ($p < 0.01$). Correspondingly, the complete re-tear rate (Sugaya type V) was 7.5% (3/40) in the patch group, significantly lower than the 25.0% (10/40) in the control group ($p < 0.05$). The 1-year MRI results showed that the tendon healing advantage was maintained in the patch group, with Sugaya type I & II healing rates of 70.0% (28/40) versus 42.5% (17/40) in the control group ($p < 0.01$). The complete re-tear rate was 10.0% (4/40) in the patch group, significantly lower than the 27.5% (11/40) in the control group ($p < 0.05$). Additionally, the average tendon thickness was greater in the patch augmentation group, and the signal intensity was closer to normal low signal, indicating better tendon structure and quality.

Conclusions

For patients with osteoporosis and massive rotator cuff tears, patch augmentation effectively reduces initial repair tension, minimizes postoperative tissue absorption and thinning, significantly accelerates early functional recovery, effectively alleviates pain, and improves medium-term structural healing rates.

