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Bioinductive Collagen vs. Acellular Dermal Matrix Patch Augmentation for Rotator Cuff Repair: A Propensity Score-Matched Comparative Pilot Study for Short-term Follow-up

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Introduction and Background

Biological augmentation techniques in rotator cuff repair are used to improve healing and reduce retear rates. Both acellular dermal matrix (ADM) and bioinductive collagen (BIC) patches have gained attention; however, direct comparative studies remain limited. This study aimed to compare structural integrity, functional outcomes, and cost-effectiveness between ADM and BIC patch augmentation for medium-to-large rotator cuff tears.

Material and Method

Between May 2018 and April 2025, 108 patients with complete supraspinatus and/or infraspinatus tears who underwent arthroscopic rotator cuff repair with patch augmentation were retrospectively reviewed. Patients were divided into Group I (ADM patch, n=95) and Group II (BIC patch, n=11). After propensity score matching (1:3 nearest neighbor, caliper 0.2), 33 and 11 cases were matched, respectively. Clinical outcomes were assessed using VAS pain score, ASES score, and Constant score. Structural integrity was evaluated by follow-up MRI or ultrasonography using Sugaya's classification. Cost-effectiveness was analyzed based on material cost and additional operative time.

Results

After PSM, there were no significant baseline differences between groups. Retear rates were 18% (Group I) versus 27% (Group II) ($p=0.092$). Group I showed significantly better pain VAS (2.5 ± 0.8 vs. 4.8 ± 0.8 , $p=0.031$) and Constant score (87.1 ± 8.6 vs. 73.1 ± 16.4 , $p=0.002$). Three cases of severe early postoperative pain occurred in Group II. Additional operative time was longer in Group I (32 vs. 21 minutes, $p=0.035$), but material cost was significantly lower (600,000 vs. 9,000,000 KRW, $p<0.001$). Incremental cost-effectiveness ratio (ICER) analysis considering retear rate, operative time, and cost demonstrated that ADM patch was dominant, positioned in the cost-effective quadrant.

Conclusions

Both BIC and ADM patches demonstrated similar structural outcomes for rotator cuff repair. However, ADM patch augmentation showed better early clinical outcomes with superior cost-effectiveness. Future randomized controlled trials with longer follow-up are warranted.