Augmentation with a Gore-Tex patch for repair of large rotator cuff tears that cannot be sutured

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Abstract The objective of this study was to determine the effectiveness of augmentation with a Gore-Tex patch in reconstruction of rotator cuff tears that cannot be repaired by direct suture. Twenty-eight shoulders of 27 patients underwent this procedure. The average age at surgery was 62 years, the average duration of symptoms before surgery was 16 months, and the average follow-up period was 44 months. The shoulders were classified into two groups according to patch size (anteroposterior dimension up to 2 cm or greater than 2 cm). The clinical outcome was evaluated by using the shoulder surgery classification system issued by the Japanese Orthopaedic Association (JOA score), and the postoperative isometric abduction strength at 90° of abduction was assessed by the method of Constant. The average total JOA score improved from 57.7 to 88.7 points, a statistically significant change. There was no difference in the improvement in score between shoulders treated with small patches (12 shoulders) and those treated with large patches (16 shoulders). The average abduction strength was 6.2 kg in the small-patch group and 1.5 kg in the large-patch group, with a statistically significant difference between the two groups. Good clinical results, especially pain relief, could be achieved with this procedure in both the small- and the large-patch groups, but good abduction strength was obtained only in the small-patch group. The mechanism of the improvement by this procedure is still controversial.

Key words Rotator cuff tear · Gore-Tex patch · Abduction strength

Introduction

It is difficult to reconstruct a functional rotator cuff in cases with tears that cannot be sutured directly. In cases with large complete defects, such situations may often arise. Even in cases with small complete defects or incomplete defects, these situations may sometimes arise after resection of a degenerated part of the tendon.

Various treatments have been reported for these patients.14 These include decompression of the subacromial space, tendon transfers, and augmentation with patches. We believe that the defect should not be left unrepaired, and that the rotator cuff should be reconstructed functionally. The use of tendon transfers is limited by the radical nature of such surgery.4,5,7 Accordingly, we considered it reasonable to use a patch method when it was not possible to suture the torn edge of a cuff to the bony trough, even after extensive mobilization of the cuff. Many patch graft methods have been tried in attempts to reconstruct a functional rotator cuff. Neviaser et al. used freeze-driedrotator cuff grafts,8 Tabata et al. used tensor fasciae latae grafts,12 and Ozaki et al. used Teflon felt patches.9 The Gore-Tex soft tissue patch (Gore-Tex Expanded PTFE Patch: W.L. Gore & Associates, Flagstaff, AZ, USA) is generally used for thoracoabdominal surgery and has been associated with a low infection rate, few adhesions, and good mechanical strength and suture retention. We used this type of patch to reconstruction rotator cuff tears that could not be sutured. Clinical outcome and abduction strength after rotator cuff repair with a Gore-Tex patch were assessed with regard to their relationship to the size of patches used to cover the defects.

Patients and methods

Patients

Twenty-eight shoulders of 27 patients (20 men and 7 women) who underwent rotator cuff repair augmented with Gore-Tex patches were the subjects of this study.
The right shoulder was involved in 18 cases, and the dominant shoulder was involved in 16 cases. The average time from the onset of symptoms to operation was 16 months, and the average age at operation was 62 years (range, 44 to 75 years). The mean follow-up period was 44 months (range, 24 to 72 months). Eleven patients had a history of major trauma. Before surgery, tears were estimated by magnetic resonance imaging (MRI) and arthrograms in all patients.

Surgical procedures

Arthroscopy was performed in each patient to identify the rotator cuff tear prior to open surgery. Anterior acromioplasty was routinely performed. The extent of bone resection was determined by assessing the clearance of the cuff and the bursa under the acromion.

The cuff was exposed. The extent of the rotator cuff tear was observed precisely. Because we considered that a degenerated rotator cuff with a horizontal tear was nonfunctional, sufficient rotator cuff debridement was performed. The rotator cuff was then mobilized by releasing the capsule and/or the coracohumeral ligament and was pulled toward the greater tuberosity. When a defect remained between the cuff and the bone, it was detached from the greater tuberosity in the supraspinatus, and the other 19 shoulders had full-thickness tears associated with severe degeneration; six medium tears; nine large, full-thickness tears; and seven massive tears. The tears in nine patients were limited to the supraspinatus, and the other 19 shoulders had full-thickness tears of two or more tendons.

The size of the patch used depended on the residual defect after debridement of the degenerated edges, so large patches were sometimes applied to small, full-thickness tears or partial-thickness tears. The size of the patches used ranged from 1 cm × 1 cm to 5 cm × 5 cm. The shape of the patches used was round or oval. We classified the subjects into two groups by patch size. The size of the patch was defined in the antero-posterior dimension. The small-patch group (patches ≤ 2 cm) consisted of 12 shoulders (9 men and 3 women). The large-patch group (patches > 2 cm) consisted of 16 shoulders (11 men and 5 women). There was no significant age difference between these two groups. The average time from the onset of symptoms to operation was 8 months (range, 2 months to 5 years) in the small-patch group and 22 months (range, 1 month to 10 years) in the large-patch group, a significant difference (P = 0.0412) by the Wilcoxon signed-ranks test. There were four small, full-thickness or partial-thickness tears; four medium tears; three large, full-thickness tears; and one massive tear in the small-patch group. There were two small, full-thickness or partial-thickness tears; two medium tears, six large, full-thickness tears; and six massive tears in the large-patch group.

Postoperative management

Postoperatively, the shoulders were maintained at 70° of abduction and 20° of flexion with an abduction brace. Rehabilitation involved passive elevation exercises starting 3 days after the operation, with active assisted elevation being initiated at about 6 weeks. The brace was removed 6 to 8 weeks after the operation.

Postoperative assessment

The clinical outcome was evaluated by using the shoulder surgery classification system issued by the Japanese Orthopaedic Association (JOA score), which assesses pain, function, activity of daily life, range of motion (ROM), X-ray change, and joint stability (Table 1).

Postoperative abduction strength at 90° of abduction was assessed by using the method of Constant. A spring balance was applied to the wrist with the arm in 90° of abduction, and the abduction strength was measured five times at 5-s intervals. The average value was then recorded.

Statistical analysis

Statistical analyses of the clinical data and the abduction strength were performed by using the Wilcoxon signed-ranks test (for paired data) or the Mann-Whitney U-test (for unpaired data). Probability values less than 5% were considered significant. We used StatView (Abacus Concepts) to perform the statistical analysis.