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ORIGINAL ARTICLE

Paralabral cysts of the shoulder treated with isolated labral repair: effect on pain and radiologic findings

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Background: Paralabral cysts emanating from posterosuperior labral tears may compress the suprascapular nerve and induce neuropathy. This study prospectively assessed patients with labral tears and symptomatic paralabral cysts treated with isolated labral repair. Pain relief, time to cyst resolution, reversibility of muscular edema, atrophy, fatty infiltration, and bone erosion were evaluated.

Methods: Forty-seven patients with symptomatic posterosuperior paralabral cysts were treated with isolated labral repair. Magnetic resonance imaging (MRI) was repeated 6 and 12 weeks postoperatively or until cyst resolution. In a subgroup of 15 patients, MRI was performed the day before the operation, the first postoperative day, and at 2 weeks.

Results: Median cyst size was 6.8 cm³ (range, 2.1-88.9; standard deviation [SD], 18.3 cm³). Preoperatively, 20 patients (43%) presented clinical muscle atrophy and radiologic edema on MRI, 8 had fatty infiltration, and 3 presented bony scapular erosion caused by cyst compression. Median time to cyst resolution and regression of muscular edema was 11 weeks (range, 3-20; SD, 8.8 weeks) and 14 weeks (range, 3-52; SD 10.6 weeks), respectively. Preoperative fatty infiltration grade I and II of the supraspinatus and infraspinatus muscles was reduced in two patients. Bony erosions remodeled after cyst resolution. Mean pain ratings (1-10 scale) improved from 7.7 (SD, 1.8) to 1.3 (SD, 1.3; 95% confidence interval of difference, 5.5-6.8; *P* < .001).

Conclusion: Labral repair leads to significant pain relief with cyst resolution within 2 to 3 months in most patients. Secondary muscle pathology (ie, edema, atrophy and fatty infiltration) may be partially or completely reversed. Bony erosion caused by cyst compression may be remodeled after cyst resolution.

Level of evidence: Level IV; Case Series; Treatment Study

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Keywords: labral tear; spinoglenoid cyst; isolated labral repair; muscular edema; muscular atrophy; muscular fatty infiltration; bony glenoid erosion

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The suprascapular nerve (SSN) is a mixed peripheral nerve.¹⁵ The motor unit supplies the supraspinatus and infraspinatus muscles. The SSN may also innervate the teres minor muscle. German anatomists described this alternative innervation in 1959.²² The sensory unit supplies the acromioclavicular joint and the posterior capsule of the shoulder

joint.^{14,15} In 3.5% to 14.7% of individuals, the nerve has a cutaneous branch innervating the skin at the upper lateral shoulder region.^{6,16}

The most common paralabral cysts of the shoulder emanate from posterosuperior labral tears. The natural history of these cysts is unknown, but they generally persist and will gradually enlarge.¹⁶ The cysts may compress the SSN and induce neuropathy. Compression of the SSN initially leads to edema of the affected muscles. This edema is reversible if the nerve is decompressed.^{1,8,11} Longstanding neuropathy leads to muscle atrophy and fatty infiltration that may be irreversible.^{1,8,11}

Treatment of labral tears with associated paralabral cysts has varied from open excision to various arthroscopic procedures with or without labral repair and with or without cyst decompression. Recent studies with magnetic resonance imaging (MRI) control have shown that labral repair alone leads to cyst resolution, good clinical outcome, and high patient satisfaction.^{9,17,24}

Whether labral repair should be accompanied by cyst decompression is still controversial. Good results are reported after arthroscopic labral repair combined with decompression of the cyst.^{4,10,18,23} The decompression is done intra-articularly or through the subacromial space. A randomized study by Kim et al⁹ found no significant difference between isolated labral repair and labral repair in conjunction with arthroscopic cyst decompression.

Claims have been made that the débridement of the glenoid before the superior labrum is fixed may lead to perioperative unintentional decompression of the cyst. Our hypothesis is that this is not the case and that the cyst resolves gradually when the labrum is repaired. This prospective study evaluated the effect of labral repair on pain relief, cyst resorption, reversal of muscular edema, atrophy, and fatty infiltration, and the consequences of glenoid erosion after isolated labral repair.

Materials and methods

This prospective study evaluated the effect of labral repair and was conducted at Lovisenberg Diaconal Hospital between January 2009 and January 2014. Inclusion criteria were (1) chronic pain at the posterior aspect of the shoulder joint, (2) weak or painful active external rotation, or both, and (3) presence of a posterosuperior paralabral cyst ≥ 1.0 cm³ on MRI. Included were 47 consecutive patients (17 women, 30 men) with oral and written consent. Patients were a median age of 37.0 years (range, 17-54; standard deviation [SD], 9.4 years).

All patients underwent arthroscopic labral repair in the lateral decubitus position under general anesthesia. The glenoid rim at the site of the labral tear was débrided. No attempt was made to decompress the cyst. The surgeon repaired the labrum with single suture anchors and vertical stitches. The shoulder was immobilized in a sling for 3 weeks, but immediate passive range of motion was allowed. Pain was assessed preoperatively and at the last follow-up using a visual analog scale (VAS) of 1 (no pain) to 10 (worst pain ever).

MRI was performed 6 and 12 weeks postoperatively or until the cyst was resolved or the muscular edema disappeared, or both. Fifteen patients also agreed to additional MRI examinations the day before

Table I Grading of fatty infiltration of rotator cuff muscles according to Goutallier et al⁵

| Grade | Description |
|-----------|---|
| Grade 0 | Completely normal muscle |
| Grade I | Some fatty streaks |
| Grade II | Amount of muscle is greater than fatty infiltration |
| Grade III | Amount of muscle is equal to fatty infiltration |
| Grade IV | Amount of fatty infiltration is greater than muscle |

the operation and postoperatively on the first day and at 2 weeks. This was done to assess whether the débridement of the glenoid rim performed in preparation for the labral repair unintentionally led to a decompression of the cyst.

An experienced musculoskeletal radiologist (R.K.) evaluated the MRI images. Maximal diameter of the cyst was measured in 3 planes, and the preoperative and postoperative cyst volume was estimated using the prolate ellipsoid formula²¹: volume = $d1 \times d2 \times d3 \times (\pi/3)L \times W \times H \times (\pi/3)$.

Muscular edema was evaluated on T2-weighted sequences with fat saturation and proton density sequences with fat saturation. Fatty infiltration was classified according to the Goutallier et al classification adapted to MRI specifications^{3,5,11} using sagittal oblique spin-echo T1-weighted images without fat saturation (Table I). Postoperative MRI examinations were assessed to document time to cyst resolution, the presence of muscular edema, and the course of muscle atrophy and fatty infiltration.

Patients presenting glenoid erosion were also examined with computed tomography (CT) to evaluate bone remodeling after labral repair. CT scans were performed on a 64-slice multidetector CT (Brilliance; Philips Healthcare/Philips Medical Systems B.V5656 AE, Eindhoven, The Netherlands), with images reformatted in planes and a 3-dimensional model.

Data were analyzed using SPSS for Windows 24.0 software (IBM Corp., Armonk, NY, USA). Descriptive statistics (mean, median, range, SD, and frequencies) were used to summarize patient outcomes. Paired-sample *t* tests were used to compare VAS ratings of pain.

Results

Median follow-up was 6 months (range, 3-60; SD, 9.6 months). The median preoperative cyst size was 6.8 cm³ (range, 2.1-88.9; SD, 18.3 cm³; (Figs. 1 and 2). Preoperative pain ratings were a mean of 7.7 (range, 4-10; SD, 1.8). Of the 47 patients, 16 (34%) reported a traumatic onset of symptoms, and 24 (51%) presented no secondary radiologic pathology of muscle or bone, with pain in the posterior aspect of the shoulder being their main symptom. On preoperative MRI, 20 of the 47 patients (43%) presented muscular atrophy and radiologic edema. Images demonstrated edema lasting 3 to 6 months preoperatively for 15 patients, lasting 8 months for 3 patients, and lasting only 2 months preoperatively for 2 patients. Among these 20 patients, only the infraspinatus muscle was affected in 13 (Figs. 3 and 4), and 4 demonstrated changes of the supraspinatus and infraspinatus muscle. The infraspinatus and teres minor muscle were affected in 2 patients, and 1 patient presented with edema and atrophy of all 3 muscles.

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