

Severe Chondrolysis of the Glenohumeral Joint After Shoulder Thermal Capsulorrhaphy

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Over the past decade, thermal capsulorrhaphy procedures have had relatively few complications.¹⁻³ More recently, reports of glenohumeral chondrolysis after arthroscopy and thermal shrinkage procedures have raised concerns.⁴⁻⁶

In this article, we present the cases of 2 young patients who presented to our institution for evaluation of devastating glenohumeral chondrolysis after shoulder arthroscopy procedures. We obtained informed consent to describe these patients' cases in this article, and each patient was given the opportunity to review our manuscript before submission.

CASE 1

A right-hand-dominant former collegiate softball player in her early 20s presented to our tertiary-care center for evaluation of progressive right shoulder pain 3 years after thermal capsulorrhaphy.

Over the course of her late high school and early college softball career, the woman had developed anterior right shoulder pain with throwing. The pain progressed to a constant ache with significant pain during throwing. As a college sophomore, she underwent thermal capsulorrhaphy for multidirectional instability of the dominant shoulder. Her postoperative course was complicated by decreased range of motion (ROM), particularly with external and internal rotation, and continued pain. Pain and limited ROM prevented her from returning to softball and affected her activities of daily living. Radiographs of the shoulder showed marked degenerative changes of the glenohumeral joint.

At our center, active ROM was forward elevation to 160°, abduction to 140°, external rotation with arm abducted to 90° to 25°, and internal rotation to the L4 vertebra. Strength

testing was 4/5 to forward elevation, 4/5 to abduction, 4/5 to external rotation with pain, and 5/5 to internal rotation with pain. Given the lack of benefit from injections and physical therapy, the counseled patient decided to undergo a humeral resurfacing procedure. Preoperative staging magnetic resonance imaging of the right shoulder showed diffuse grade IV glenohumeral chondromalacia with adjacent bony sclerotic change and minimal foci of subchondral cystic change in the glenoid (Figure 1). The rotator cuff and subacromial space were normal.

At surgery, examination of the humeral head revealed complete chondrolysis with scattered remnants of articular cartilage. The glenoid had lost all its articular cartilage. A medium Copeland EAS Humeral Resurfacing Head (Biomet Orthopedics, Warsaw, IN) was fitted and implanted with a soft-tissue glenoid resurfacing procedure (Figure 2). Unfortunately, 3 years after surgery, right shoulder pain continued to limit functioning.

CASE 2

A right-handed man in his late 30s presented to our tertiary-care center with a 4-year history of progressive right shoulder pain. The man was originally evaluated at an outside institution for shoulder pain of approximately 2 years. History and clinical examination suggested impingement syndrome. Radiographs showed a normal glenohumeral joint (Figure 3). After conservative treatment failed, the patient underwent an arthroscopic subacromial decompression. His postoperative course was complicated by pain and minimal relief of symptoms. Then, on 2 occasions, corticosteroids were injected into the subacromial space, but he experienced only minimal short-term pain relief.

The patient then underwent several months of physical therapy without a significant reduction in shoulder pain. After reevaluation, clinical examination, and repeat magnetic resonance imaging, he was thought to have a type II superior labrum anterior-posterior (SLAP) lesion. Eleven months after the index operation, he underwent an arthroscopy-assisted superior labral repair with suture anchor placement as well as a thermal capsulorrhaphy procedure for inferior capsular laxity. At that time, the glenohumeral joint surfaces were normal.

The patient's postoperative course was complicated by a fall 2 days after surgery. Eight weeks after review of a postoperative radiograph (Figure 4), a shoulder arthroscop-

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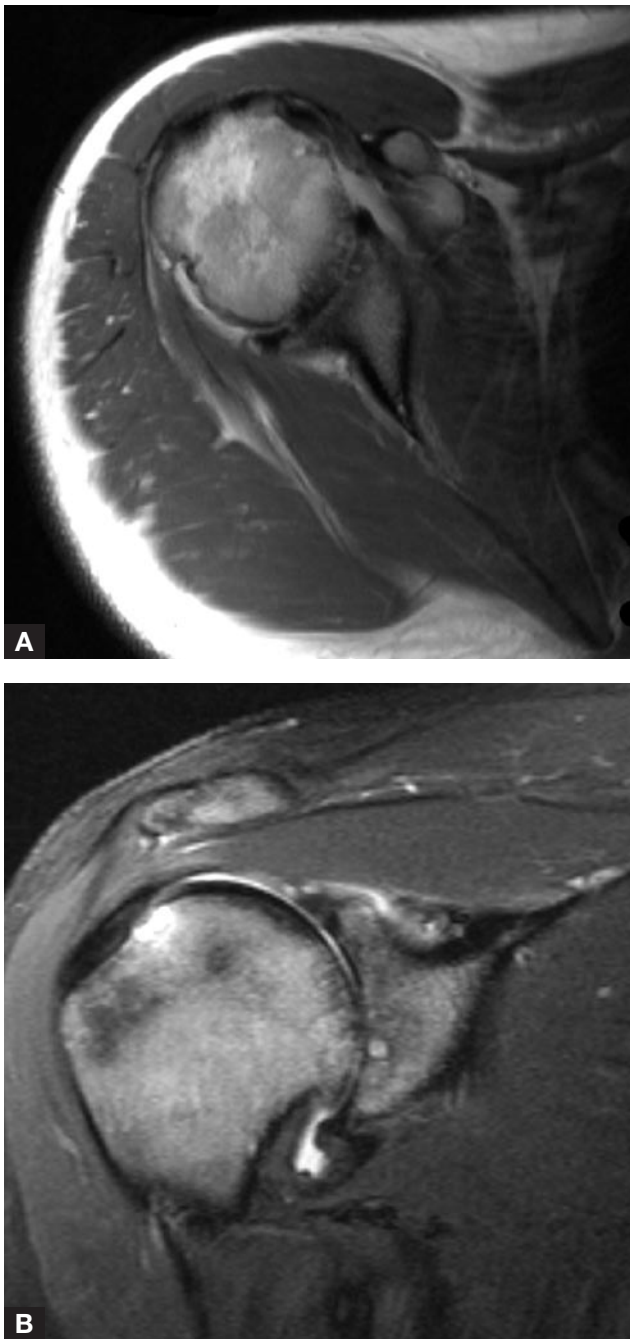


Figure 1. Case 1: (A) Axial magnetic resonance imaging (MRI) of right glenohumeral joint shows significant arthritis in a woman in her early 20s after thermal capsulorrhaphy. (B) Coronal MRI of right glenohumeral joint shows significant arthritis.

ic procedure was performed to retrieve a dislodged metallic suture anchor. As was found on previous arthroscopic examinations, the articular cartilage of the glenohumeral joint was normal, and there were no degenerative changes.

The patient presented to our sports medicine clinic 31 months after the index operation and 19 months after thermal capsulorrhaphy of the glenohumeral joint. Active ROM of the right shoulder was forward flexion to 70°, abduction to 60°, external rotation to 45°, and internal rotation to the sacroiliac joint. Strength testing revealed



Figure 2. Case 1: Anteroposterior radiograph of right shoulder after humeral head resurfacing for severe glenohumeral degeneration.

decreased strength on the right side with biceps, triceps, deltoid, and rotator cuff muscles to a grade of 4/5.

Over the next several months, the patient underwent non-operative treatment, consisting of intra-articular corticosteroid injections, a series of intra-articular hyaluronic acid viscosupplementation injections, and extensive physical therapy, without significant improvement in symptoms. Twenty-one months (Figure 5) and 33 months (Figure 6) after thermal capsulorrhaphy, radiographs of the shoulder showed progression of glenohumeral chondrolysis with marked arthrosis of the joint. Forty-seven months after the index operation and 36 months after arthroscopy with capsular shrinkage, the patient underwent a humeral head arthroplasty with a soft-tissue glenoid resurfacing procedure (Figure 7). Three years after surgery, he noted good pain relief but had not been able to return to work.

DISCUSSION

Shoulder arthroscopy with thermal capsulorrhaphy is usually a well-tolerated procedure with few complications and encouraging short-term results.^{1-3,7-10} In 2001, Wong and Williams³ reviewed short-term follow-up survey responses for rates of recurrent instability after laser, monopolar radiofrequency, and bipolar radiofrequency capsulorrhaphy procedures. Rates of recurrent instability for laser, monopolar, and bipolar thermal shrinkage were 8.4%, 8.3%, and 7.1%, respectively. In cases that required revision surgery, the complication of capsular attenuation after laser, monopolar, and bipolar capsulorrhaphy occurred at rates of 33%, 18%, and 20%, respectively. Postoperative axillary neuropathy, most commonly with sensory deficit only, was another complication. The rate of postoperative injury to



Figure 3. Case 2: Original preoperative anteroposterior radiograph of right shoulder in a man in his late 30s.



Figure 4. Case 2: Anteroposterior radiograph of right shoulder 8 weeks after arthroscopy with thermal capsulorrhaphy and labral repair shows dislodged suture anchor with normal glenohumeral joint.

the axillary nerve was 1.4% for all forms of the procedure. Adhesive capsulitis occurred in less than 1% of patients treated with thermal capsulorrhaphy. There were no cases of glenohumeral joint chondrolysis.

Glenohumeral joint chondrolysis after thermal capsular shrinkage has seldom been reported, and the etiology of chondrolysis remains unclear.⁴⁻⁶ Recently, joint space over-



Figure 5. Case 2: Anteroposterior radiograph of right shoulder 21 months after thermal capsulorrhaphy shows glenohumeral joint space narrowing with subchondral cystic changes.



Figure 6. Case 2: Anteroposterior radiograph of right shoulder 33 months after thermal capsulorrhaphy shows glenohumeral joint space narrowing with subchondral cystic changes.

heating was proposed as a possible mechanism of chondrocyte death; study results indicated that joint temperatures can exceed the recommended 65°C and potentially elicit glenohumeral chondrolysis.¹¹ Basic science studies have shown that thermal energy applied with radiofrequency devices alters the connective tissue of the joint capsule, initially causing collagen fibril rearrangement and tissue

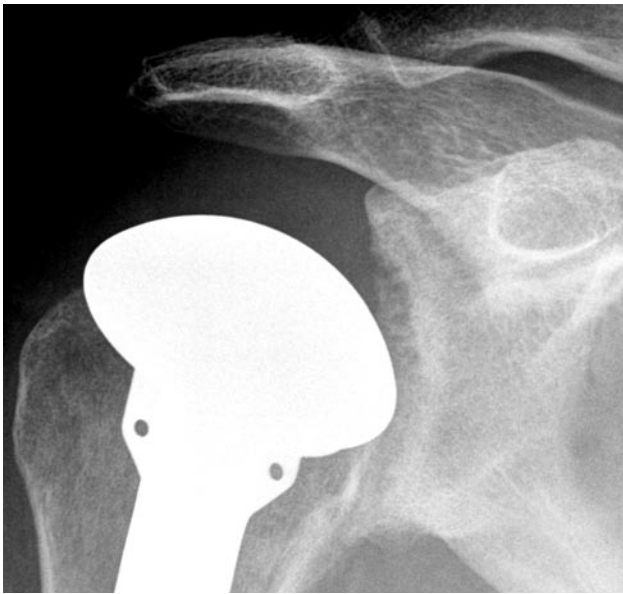


Figure 7. Case 2: Anteroposterior radiograph of right shoulder 47 months after index operation with humeral implant hemiarthroplasty.

weakness.¹² Tissue healing and active repair of damaged collagen eventually cause joint capsular thickening and restoration of mechanical properties of joint stability. However, overtreatment with the thermal device can immediately and permanently damage the capsule.⁷ The mechanism of this process can potentially play a role in the chondrolysis that occurred in our patients.

Glenohumeral joint chondrolysis occurring after thermal procedures can lead to significant morbidity, as was the case in the 2 young patients described in this article. To our knowledge, these patients represent the first in a very limited population to have data available from midterm

clinical follow-ups. At follow-up in both cases, morbidity was significant: function limited by continued pain (case 1) and failure to return to work (case 2). More studies are needed to identify the cause of these seldom reported poor outcomes and to minimize the incidence of this devastating complication.

AUTHORS' DISCLOSURE STATEMENT

The authors report no actual or potential conflict of interest in relation to this article.

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