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Shoulder arthroplasty for chondrolysis

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Background: Chondrolysis is a rare complication after shoulder arthroscopy leading to early joint destruction. Shoulder arthroplasty may be considered for end-stage chondrolysis, but concerns exist about implant survivorship, given the younger age of this population. This study aimed to assess pain relief, function, and survivorship of shoulder arthroplasty for chondrolysis and to assess risk factors for failure.

Methods: Between January 2000 and January 2013, 26 consecutive shoulders with chondrolysis were treated at our institution with shoulder arthroplasty. All shoulders had a prior arthroscopic procedure that predated a phase of rapid joint destruction. Twenty-three shoulders were followed up for a minimum of 2 years or until reoperation (mean, 4.0 years; range, 0.7-8.6 years). The mean age of the patients was 40 years (range, 21-58 years). Outcome measures included pain, range of motion, postoperative modified Neer ratings, American Shoulder and Elbow Surgeons scores, complications, and reoperations.

Results: At most recent follow-up, only 14 of 23 shoulders had no or mild pain. Overall pain scores improved from 4.7 to 2.6 points. Abduction and external rotation improved significantly. Five shoulders required reoperation, 2 for glenoid loosening and 1 each for infection, instability, and stiffness. Subjectively, 8 patients rated their shoulder as much better, 7 as better, 4 the same, and 4 worse. Most recent American Shoulder and Elbow Surgeons scores averaged 64 points (range, 20-95 points).

Conclusions: Shoulder arthroplasty for the treatment of chondrolysis improves pain and range of motion. However, patient satisfaction is variable. Early follow-up shows a higher than expected rate of reoperation (25%). Patients undergoing shoulder arthroplasty for chondrolysis should be counseled appropriately about expectations after surgery.

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

Keywords: Shoulder arthroplasty; chondrolysis; arthroscopy; postarthroscopic; young; active

Multiple potential causes have been cited for chondrolysis, including gentian violet, local anesthetic pain pumps, radiofrequency ablation probes, suture material, bioabsorbable anchors, and low-grade infection.[5,11,16,20-22] Regardless of the initial insult, the final common pathway leads rapidly to joint destruction, pain, and limited function. Most of these patients are relatively young and present with cartilage destruction on both sides of the joint. Total shoulder arthroplasty (TSA) in this population of patients is an attractive salvage option and at the same time concerning because of the characteristics of these patients. In an attempt to avoid TSA, various authors have reported treatment of this condition with meniscal allograft, tissue interposition, osteoarticular allograft, and microfracture.[4,5,12,13]

With end-stage joint destruction, limited goals operations, such as arthroscopic débridement, may offer only temporary relief. Ultimately, prosthetic arthroplasty may represent the final option. Currently, studies on shoulder

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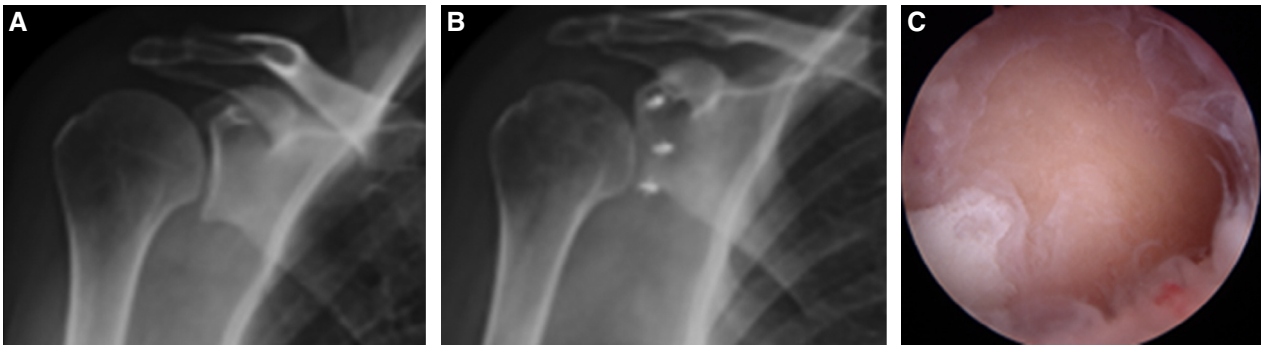

Figure 1 Preoperative (**A**) and 1-year postoperative (**B**) radiographs of a 46-year-old status post Bankart repair with loss of the joint space. (**C**) Fourteen months postoperatively, arthroscopic views of the glenoid showed extensive cartilage loss, with anchors having previously been removed. Ultimately, the patient underwent a TSA.

arthroplasty for chondrolysis are limited to case reports and 1 small series of 11 shoulders.[8,10,12] The purpose of this study was to report our experience treating shoulder chondrolysis with arthroplasty and to assess pain relief, function, survivorship, and risk factors for failure.

Methods

Between January 2000 and January of 2013, 26 consecutive shoulders with chondrolysis were treated at our institution with shoulder arthroplasty after failure of conservative treatment measures. All surgeries were performed by a fellowship-trained shoulder surgeon (6 participating surgeons). Twenty-two shoulders underwent TSA. Four patients did not want to accept the restrictions of a TSA and chose to undergo hemiarthroplasty (HA) despite glenoid cartilage loss. Twenty-three shoulders (19 TSAs, 4 HAs) were followed up for a minimum of 2 years or until reoperation. One patient died during the first 2 years after surgery, 1 patient was lost to follow-up, and 1 chose to be removed from research. These 3 shoulders were eliminated from the clinical analysis but included in survival analysis. Therefore, 92% (23/25) of eligible shoulders were available for clinical analysis.

Unfortunately, no standardized diagnosis of chondrolysis has been accepted among orthopedic surgeons. For inclusion purposes in the current study, we used the definition by Provencher et al: "surgical, radiographic, or imaging findings demonstrating diffuse cartilage loss of joint-space narrowing due to involvement of apposing articular surfaces, and rapid cartilage destruction"[17] (Fig. 1). Cases were identified by crossmatching patients in our institution's arthroplasty database with a clinical chart text search (terms: chondrolysis, rapid cartilage loss, postarthroscopic, and pain pump). All cases were then reviewed independently by 2 orthopedic surgeons to confirm the diagnosis of chondrolysis. Any disagreements were then reviewed by all authors to determine if a final diagnosis of chondrolysis was appropriate. Shoulders were documented to undergo rapid cartilage loss, within 2 years, after initial arthroscopic surgery. Evidence of cartilage loss before index arthroscopy was considered degenerative, thus excluding the shoulder from a diagnosis of chondrolysis. Any shoulder with a confirmed infection identified at any time point preoperatively or intraoperatively was excluded. All cultures at our institution are held for 14 days to assess for *Propionibacterium acnes*.

Patients' charts were reviewed for preoperative risk factors as well as for clinical and radiographic outcomes. Risk factors from the prior surgery were reviewed and included local anesthetic pain pumps, radiofrequency ablation probes, suture material, bioabsorbable anchors, and low-grade infection. Twenty-three shoulder arthroplasties were performed at an average age of 40 years (range, 21-58). Arthroplasties were performed at an average of 71 months (range, 14-162) after the index arthroscopy. Eleven of 23 shoulders had undergone more than 1 previous surgery, with the average shoulder undergoing 2 surgical procedures before arthroplasty. A list of prior surgeries is outlined in Table I. Only 2 patients were confirmed to have prior postoperative pain pumps.

After arthroplasty, all shoulders were followed up at regular intervals.[2] Shoulders are routinely observed at 6 weeks, 3 months, 1 year, 2 years, 5 years, and every 5 years thereafter. Shoulders were followed up for an average of 4.0 years and a minimum of 2 years or until reoperation (range, 0.7-8.6 years). The patients' charts were reviewed to assess preoperative and postoperative pain (scale of 1 to 5).[14] Patient satisfaction was recorded as "much better," "better," "the same," or "worse" compared with immediately before index arthroplasty. Active abduction and external rotation were measured in degrees. For those patients unable to return for inpatient evaluation, range of motion (ROM) was assessed using a validated questionnaire.[18] Internal rotation was recorded as the most cephalad vertebrae reached by the thumb. Modified Neer ratings and American Shoulder and Elbow Surgeons (ASES) scores were determined at follow-up.[3,14] Ten shoulders returned for in-person examinations, and the remaining 13 were followed up by questionnaire.

Preoperative radiographs were available for all shoulders (Fig. 2). These included a standardized 40° posterior oblique view with internal and external rotation of the humerus and axillary radiographs. Postoperative radiographs at a minimum of 1 year were available for 20 shoulders at a mean of 4.1 years (range, 1.4-8.3 years). All radiographs were reviewed by 2 orthopedic surgeons. Discrepancies were reviewed with the senior author for final grading. Preoperative radiographs were evaluated for preoperative subluxation, cartilage loss, and glenoid erosion. Glenohumeral subluxation was evaluated according to the direction and amount of central humeral head subluxation in reference to the center of the glenoid. Subluxation was graded as none, mild (<25% displaced), moderate (25%-50% displacement), or severe (>50% displacement). Glenoid erosion was classified as none, mild (to the subchondral plate), moderate (through the subchondral plate), or severe (to or beyond