Elbow Arthritis: Current Concepts

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Elbow arthritis is a debilitating condition manifesting as a painful, stiff elbow. The purpose of this article is to provide an update and analyze current management, treatment options, and outcomes of treatment for elbow arthritis. This article focuses on recent developments in the treatment for elbow arthritis. Nonsurgical management may provide symptomatic relief in the majority of patients in the early stages of the disease process. Surgical treatment is guided by disease etiology and severity, patient age, and functional demands. Arthroscopic or open synovectomy, debride-
MENT ARTHROPLASTY, AND INTERPOSITION ARTHROPLASTY ARE GENERALLY RECOMMENDED FOR THE YOUNG AND ACTIVE PATIENT POPULATION, WHEREAS FOR LOW-DEMAND AND ELDERLY PATIENTS WITH END-STAGE PAINFUL ARTHRITIS, TOTAL ELBOW ARTHROPLASTY IS CONSIDERED A MORE SUITABLE SURGICAL OPTION. ADVANCES IN ARTHROSCOPIC TECHNIQUES AND IMPLANT DESIGN HAVE LED TO SUBSTANTIAL IMPROVEMENTS IN THE TREATMENT OF ELBOW ARTHRITIS. (J HAND SURG 2013;38A:605–613. COPYRIGHT © 2013 BY THE AMERICAN SOCIETY FOR SURGERY OF THE HAND. ALL RIGHTS RESERVED.)

KEY WORDS  CURRENT CONCEPTS, ELBOW ARTHRITIS, MANAGEMENT, OUTCOMES.

ELBOW ARTHRITIS REPRESENTS A DIFFICULT THERAPEUTIC CHALLENGE FOR BOTH PATIENTS AND SURGEONS. PATIENTS WITH ELBOW ARTHRITIS TYPICALLY PRESENT WITH COMPLAINTS OF PAIN, WEAKNESS, AND LOSS OF MOTION. FUNCTIONAL RANGE OF MOTION REQUIRED FOR ACTIVITIES OF DAILY LIVING IS CONSIDERED TO BE AN ARC OF MOTION OF 100° (30° OF EXTENSION TO 130° OF FLEXION) AND A 100° ARC OF FOREARM ROTATION (50° OF PRONATION TO 50° OF SUPINATION). ELBOW ARTHRITIS CAN RESULT MOST COMMONLY FROM TRAUMA TO THE ELBOW AND RHEUMATOID ARTHRITIS BUT ALSO FROM PRIMARY OSTEOARTHRITIS, SEPTIC ARTHRITIS, CRYSTALLINE ARTHROPATHY, AND HEMOPHILIA. TREATMENT OPTIONS SHOULD INCLUDE NONSURGICAL AND SURGICAL TECHNIQUES, ALL ATTEMPTING TO PROVIDE PAIN RELIEF AND RESTORATION OF FUNCTION.

DIAGNOSIS

THE DIAGNOSIS CAN BE DETERMINED WITH A DETAILED PATIENT HISTORY, CLINICAL EXAMINATION, AND RADIOPHASIC STUDIES.

PATIENT HISTORY

PATIENTS WITH RHEUMATOID ARTHRITIS OF THE ELBOW USUALLY COMPLAIN OF PAIN THROUGHOUT THE ARC OF MOTION. SOME PATIENTS PRESENT WITH PAIN LOCATED LATERALLY, ALONG THE RADIAL HEAD. LIMITATION IN RANGE OF MOTION AND FOREARM ROTATION IS SEEN IN ADVANCED STAGES OF THE DISEASE. SEVERE AND SYMPTOMATIC INSTABILITY MAY OCCUR DUE TO PROLONGED SYNOVITIS DISTURBING THE JOINT AND SOFT TISSUE RESTRAINTS.

PRIMARY OSTEOARTHRITIS OF THE ELBOW IS MOST COMMONLY SEEN IN MEN WITH A HISTORY OF HEAVY USE OF THE EXTREMITY, SUCH AS MANUAL LABORERS, WEIGHTLIFTERS, AND THROWING ATHLETES. IN THE EARLIER STAGES OF THE DISEASE, WHEN THE JOINT SPACE IS STILL MAINTAINED, PAIN AND RESTRICTION OF MOTION DUE TO THE IMPINGEMENT OF OSTEOPHYTES AT THE EXTREMES OF FLEXION AND EXTENSION ARE COMMON. PAIN PERSISTING THROUGHOUT THE ENTIRE RANGE OF MOTION IS TYPICALLY A LATE FINDING WITH ADVANCED DISEASE. THIS CLINICAL DIFFERENTIATION IS EXTREMELY IMPORTANT IN GUIDING THE OPTIMAL TREATMENT.

POSTTRAUMATIC ARTHRITIS MAY OCCUR AFTER ANY TRAUMATIC INSULT TO THE ELBOW, REGARDLESS OF SEVERITY. THE EVALUATION OF PATIENTS WITH POSTTRAUMATIC ELBOW STIFFNESS SHOULD INCLUDE A REVIEW OF PRIOR SURGERY, POSITION OF HARDWARE, AND HISTORY OF ANY INFECTION. POSTTRAUMATIC ELBOW STIFFNESS IS USUALLY PAINFUL SECONDARY TO ARTHRITIS, IMPINGEMENT, AND/OR ENTRAPMENT NEUROPATHY. LESS COMMONLY, INSTABILITY IS A COMPLAINT. PREVIOUS TREATMENT SHOULD BE NOTED, INCLUDING PHYSICAL THERAPY, SPLINTING, OR SURGERY.

CLINICAL EXAMINATION

INSPECTION SHOULD INCLUDE DOCUMENTATION OF PREVIOUS SURGICAL INCISIONS, SCARS, SKIN GRAFTS, OR AREAS OF FIBROSIS. AN ADEQUATE SOFT TISSUE ENVELOPE IS REQUIRED BEFORE CONSIDERING SURGERY. ACTIVE AND PASSIVE RANGE OF MOTION OF BOTH THE ELBOW AND FOREARM, FOR BOTH FLEXION-EXTENSION AND PRONATION-SUPINATION, SHOULD BE CAREFULLY MEASURED WITH A GONIOMETER. UNLESS THERE IS SEVERE HETEROTOPIC OSSIFICATION OR COMPLETE ANKYLOSIS, THERE IS USUALLY SOME RESIDUAL MOTION. THE CHARACTER OF THE END POINT OF RESTRICTED MOTION (SOFT OR HARD, PAINFUL OR PAINLESS) AND ANY CREPITUS SHOULD BE RECORDED. LOOSE BODIES MAY LEAD TO JOINT “CATCHING” OR “LOCKING” OF THE ELBOW. THE PHYSICIAN SHOULD ALSO ASSESS FOR ANY VARUS, VALGUS, AND/OR ROTATIONAL INSTABILITY OF THE ELBOW.

SPECIAL ATTENTION SHOULD BE PAID TO A THOROUGH NEUROLOGIC EXAMINATION, IN PARTICULAR OF THE ULNAR NERVE, WHICH IS OFTEN IMPAIRED IN PATIENTS WITH PREVIOUS ELBOW TRAUMA OR SURGERY. IN OUR RECENT STUDY, WE FOUND THAT IN PATIENTS WITH ELBOW CONTRACTION RELEASE AND PREOPERATIVE ULNAR NERVE SYMPTOMS OR A POSITIVE TINEL TEST, ULNAR NERVE RELEASE IS ASSOCIATED WITH A LOW RATE OF REPEAT SURGERY FOR ULNAR NERVE DECOMPRESS.1 OUR FINDINGS SUGGEST THAT PROPHYLACTIC RELEASE OF ULNAR NERVE MAY BE ADVISABLE IN ELBOWS WITH < 100° OF PREOPERATIVE FLEXION AND OTHERWISE IS UNNECESSARY. ELECTRODIAGNOSTIC STUDIES MAY BE NECESSARY TO DETERMINE THE EXTENT OF NERVE INJURY. IF THERE IS ANY SUSPICION OF INFECTION, SYNOVIAL FLUID SHOULD BE ASPIRED AND SENT FOR A COMPLETE LABORATORY ANALYSIS. SYSTEMIC BLOOD WORK INCLUDES A COMPLETE BLOOD-CELL COUNT WITH DIFFERENTIAL AND MEASUREMENT OF THE ERYTHROCYTE SEDIMENTATION RATE AND THE C-REACTIVE PROTEIN LEVEL.
Radiographic studies

Radiographic evaluation should begin with plain radiographs, which usually provide adequate information necessary for planning treatment. Anteroposterior, lateral with the elbow flexed at 90°, and radiocapitellar oblique radiographs are routinely obtained. Radiographic findings typical for rheumatoid arthritis include symmetric joint space narrowing, periarticular erosions, and disuse osteopenia. In contrast, some preservation of the ulnohumeral and radiocapitellar joint spaces is common in elbows with primary osteoarthritis, even those with advanced disease. Radiographs characteristically reveal osteophyte and loose body formation on the olecranon and coronoid processes and extending into the fossae (Fig. 1). Rettig et al² devised a radiographic classification system, with 3 classes or levels of severity of elbow osteoarthritis and showed that the effectiveness of debridement diminishes as the stage of disease increases. Class I is defined by marginal arthritic spurring of the ulnotrochlear joint with a normal radiocapitellar joint. Class II elbows exhibit marginal ulnotrochlear joint arthritis, in addition to arthritic changes in radiocapitellar joint; however, the radiocapitellar joint is congruent, without evidence of subluxation. In addition to changes seen in class I and II, the presence of radiocapitellar subluxation denotes a class III elbow.

Additional studies are not routinely necessary for preoperative planning. However, in patients with heterotopic ossification and in elbows with substantial bony deformities or intra-articular loose bodies, computed tomography or magnetic resonance arthrography can detect these deformities.

MANAGEMENT

Nonsurgical treatment

Nonsurgical treatment of the arthritic elbow should be attempted before surgical treatment is considered. Using novel, disease-modifying anti-rheumatic drugs and biologic therapies, early and aggressive treatment of rheumatoid arthritis is now typical, and complete resolution of signs and symptoms is achievable in approximately 10% of patients.³

In patients with elbow osteoarthritis, rest, nonsteroidal anti-inflammatory medication, and long-term activity modification should be advocated before surgery is considered. However, activity modification is difficult for manual laborers and athletes. Physical therapy and dynamic hinged and static progressive splinting have also been recommended. Viscosupplementation has been used to treat arthritic conditions of the knee, hip, and ankle. However, its effectiveness in the elbow has not been established.

Surgical treatment

Surgical treatment is indicated for elbow arthritis following failure of nonsurgical treatment. Patient age, functional demands, etiology, and severity of elbow arthritis must be carefully considered before surgery. Arthroscopic or open synovectomy can be done in patients with rheumatoid arthritis. Patients with moderate degenerative changes can be treated with arthroscopic and open debridement or the Outerbridge-Kashiwagi ulnohumeral arthroplasty. Patients with severe elbow arthritis can be treated with distraction interposition arthroplasty and total elbow arthroplasty (TEA).

Synovectomy

Open synovectomy, with or without radial head excision, is an established treatment option for patients with rheumatoid arthritis of the elbow. The primary goal of synovectomy is to provide pain relief and prevent destruction of the elbow joint, although the latter remains a controversial issue. Ishii et al⁴ evaluated the long-term results and survival rate of open synovectomy in 64 rheumatoid elbows with a mean follow-up of 15 years. Recurrence of synovitis was obvious in 20 of 64 elbows, and 12 cases had a TEA at a mean of 13 years after the synovectomy. The survival rates for synovectomy after 10-year, 15-year, and 20-year follow-ups were 97%, 75%, and 70%, respectively. In rheumatoid elbows without considerable joint surface erosions, ar-
arthroscopy is useful to remove hypertrophic and inflamed synovial tissue that contributes to pain and cartilage destruction. The advantages of arthroscopic synovectomy include improved enhanced visualization, decreased morbidity, and shorter rehabilitation. Kang et al evaluated the results of arthroscopic synovectomy in 26 rheumatoid elbows with a mean follow-up of 33.9 months (range, 13 to 68 mo). Radiologic assessment showed no change in 13 elbows, improvement in 6, and progression in 7. Clinically apparent synovitis recurred in 4 elbows. The authors concluded that arthroscopic synovectomy for the treatment of mild rheumatoid elbows can effectively alleviate pain, increase the range of motion, and delay radiologic progression, resulting in a high satisfaction rate, although recurrent synovitis can occur in some patients. Recently, Chalmers et al performed a meta-analysis of 58 studies, 36 on open synovectomy and 22 on arthroscopic synovectomy, with a total 2589 patients with rheumatoid arthritis and a mean follow-up of 6.1 years. These authors found that arthroscopic synovectomy, while providing similar pain relief, may place patients at higher risk for recurrence and radiographic progression of rheumatoid arthritis. However, they concluded that more well-designed, randomized clinical trials will be necessary to confirm these findings, and they mentioned that advanced preoperative degenerative joint disease should not be an absolute contraindication to synovectomy. In our experience, conjunction with current biologic disease-modifying antirheumatic drugs is essential to maintain outcomes in patients after arthroscopic synovectomy.

**Arthroscopic debridement**

For young (<60 y) and active patients with degenerative arthritis, improved functional range of motion and pain relief can be expected after arthroscopic debridement (also known as arthroscopic ulnohumeral arthroplasty and osteocapsular arthroplasty). This technique includes removal of impinging osteophytes or loose bodies, and in some cases, the anterior capsule is released to improve elbow extension, if necessary. Previous substantial elbow trauma is a relative contraindication for elbow arthroscopy because of altered anatomy and potential risk of injury to adjacent neurovascular structures. Nerve injury remains the most feared and devastating complication of elbow arthroscopy. Surgeon experience and knowledge with this technique are perhaps the most important factors in preventing iatrogenic neurovascular injury.

Adams et al recently reported on a large cohort of patients who had had arthroscopic osteophyte resection and capsulectomy for elbow osteoarthritis. At an average 3-year follow-up, significant improvement was noted in pain ($P < .001$) and motion (average 27°; $P < .001$). Good to excellent results were observed in 34 of 42 elbows. Complications were rare, with heterotopic ossification in one patient and ulnar dysesthesias in another. Krishnan et al reported on 11 patients under age 50 with primary degenerative arthritis of the elbow treated with arthroscopic ulnohumeral arthroplasty. All patients were followed up for at least 24 months. They reported significant short-term pain relief and an average improvement of 73° in the total arc of motion ($P < .01$).

Arthroscopic radial head excision can also be performed in those patients with radiocapitellar disease, although the indications, timing of surgery, and benefits of the procedure remain controversial. Progressive ulnohumeral arthritis has been observed in some elbows after radial head excision because of the resultant altered force transmission across the ulnohumeral joint. Kelly et al concluded that excision of the arthritic radial head is not an essential part of the surgery, as they demonstrated good results without radial head excision, even in patients with severe radiocapitellar cartilage loss.

Our experience agrees with that of Kelly and colleagues: Unless the patient has painful forearm rotation, arthroscopic radial head excision is not necessary. Furthermore, arthroscopy provides excellent visualization of the olecranon and coronoid fossae (Fig. 2). The surgeon can accurately judge the exact amount of bone needed to be removed from the humerus and olecranon for restoring functional motion.

**Open debridement arthroplasty**

The indications for open debridement arthroplasty are similar to those for arthroscopic osteocapsular arthroplasty. Joint debridement, capsular release, and removal of impinging osteophytes is performed in the younger and active patient who has impingement pain at the extremes of motion due to mild or moderate elbow arthritis. The Outerbridge-Kashiwagi ulnohumeral arthroplasty was designed to remove loose bodies and coronoid osteophytes from the anterior compartment through a posterior approach and a fenestration of the olecranon fossa. After removal of all impinging osteophytes and loose bodies, anterior capsular release can also be performed if a marked flexion contracture persists. Although most describe an open posterior technique, it can be done either arthroscopically or through a lateral column approach. Rettig et al evaluated the outcomes of ulnohumeral arthroplasty in 21 elbows.
with primary osteoarthritis. At a mean follow-up of 65 months, using an open lateral collateral approach, they reported that the mean elbow flexion arc improved by 30° and all patients had notable improvement of performance score and returned to their occupations without restriction at an average 12 weeks after surgery. These authors found that patients with more severe radiocapitellar arthritic changes had less pain relief and poor overall performance scores.

We have encountered good success with the so-called lateral column approach combined with a minimal posterior approach.11,12 The technique is simple and effective, with few complications. The patient is positioned supine, with the affected upper extremity placed on an arm board. With tourniquet control, a limited Kocher skin incision from the lateral epicondyle to the radial head is performed, and debridement of the anterior elbow is performed initially. The extensor musculature is incised along the line that connects the tip of the lateral epicondyle to a point bisecting the width of the radial head. Care is taken to stay anterior to the supracondylar ridge to avoid injury to the lateral ulnar collateral ligament. The extensor muscles are then partially reflected from the anterior surface of the supracondylar ridge to expose the anterior capsule. A long, right-angle retractor is used to retract the brachialis (and the neurovascular structures anterior to it) off of the capsule. Under direct vision, the anterior capsule is released from lateral to medial. The coronoid and radial fossae are debrided, and any coronoid osteophytes and loose bodies are removed. In cases of marked radiocapitellar arthritis with painful restrictions in pronation-supination, radial head excision may be necessary to improve function. Wound closure is performed in a layered fashion.

Next, the arm board is removed, and the arm is draped over the patient’s body, with the elbow flexed to 90°. A midline, posterior skin incision is made, starting

![FIGURE 2: A] A curette in the transticipital portal is used to remove or disengage loose bodies in the olecranon fossa. [B] Olecranon fossa cleared of debris. [C] Olecranon process following removal of osteophytes.
2 cm distal to the tip of the olecranon and extending 2 cm proximal to the olecranon. The triceps tendon is sharply incised longitudinally to the tip of the olecranon, and the triceps muscle fibers are bluntly dissected and spread down to the posterior capsule. A capsulotomy is performed, and posterior osteophytes are removed from the olecranon with an osteotome to minimize impingement in extension. A rongeur is used to smooth the edges. After anterior and posterior capsular releases have been completed, a gentle elbow manipulation using a short lever arm is used to maximize motion. At the end of the procedure, a well-padded, long-arm posterior splint is applied with the forearm in neutral and the elbow in 20° of flexion. The splint is removed 1 week later, physical therapy is initiated for active range of motion, and a removable splint is used that provides passive stretching in flexion and extension (Fig. 3).

Interposition arthroplasty

Interposition arthroplasty may be indicated in young, active patients with severe inflammatory arthritis (< 30 y old) or posttraumatic arthritis (< 60 y old), particularly those with severe joint destruction. Interposition arthroplasty does not carry the same weightlifting restriction as total elbow arthroplasty does (5-kg lifting restriction) and may be more durable in active patients. A fixed varus or valgus deformity of > 10° is considered to be a contraindication because of the resultant increased shear stresses across the graft.

Larson and Morrey reported their outcomes of interposition arthroplasty performed with an Achilles tendon allograft, ligamentous reconstruction, and an articulated external fixator to protect the soft tissues during the healing phase. In their study of 45 patients, the underlying elbow arthritis was inflammatory in 11 patients and posttraumatic in 34. At a mean follow-up of 6 years, in the group of 38 patients with surviving allografts, the mean flexion-extension arc improved 46°. The authors concluded that interposition arthroplasty is a reasonable interim treatment for severe elbow arthritis, providing improved motion with fair to good functional outcomes. In addition, successful revision interposition arthroplasty or conversion to TEA is possible. However, despite efforts to reconstruct the collateral ligaments, elbow instability was the major complication. Nolla et al raised the same concern among their 13 patients with posttraumatic arthritis. Two patients failed treatment because of early postoperative instability, and another 4 patients developed severe instability associated with bone loss of the distal humerus and/or trochlear notch. They found that substantial bone loss (1 column of the distal humerus or a major portion of the coronoid process) was associated with severe postoperative instability and suggested that the key to preserving elbow alignment appeared to be an adequate capture of the forearm (radial head or ulna) between 2 columns of distal humerus.

Radiocapitellar hemiarthroplasty

Radiocapitellar arthritis can result from trauma or primary degenerative arthritis. In cases of previous excision of the radial head and with the increasing use of metallic radial head prostheses, radiocapitellar arthritis can be expected to be seen more frequently. Although the preliminary results of the radiocapitellar hemiarthroplasty appear to be good, additional studies are needed to confirm its value.
Total elbow arthroplasty

Currently, TEA is indicated for patients with severe elbow pain throughout the range of motion, limited motion, and functional deficits, and for whom the previously described nonsurgical interventions have failed. Patients who have TEA are instructed to avoid lifting weight greater than 2.5 kg (5 lb) and to avoid repetitive lifting of more than 1 kg (2 lb) after the procedure. Due to these activity restrictions, TEA is best performed in low-demand and older patients. Painful rheumatoid arthritis and posttraumatic arthritis are the most common indications for TEA (Fig. 4). Active infection is an absolute contraindication to TEA. Relative contraindications include inadequate soft tissue envelope, pre-existing neurologic deficit, and patients who are unwilling to comply with postoperative limitations. Potential complications associated with TEA include wound breakdown, ulnar nerve irritation, deep infection, aseptic loosening, triceps deficiency, periprosthetic fracture, joint instability, implant failure, and bushing failure.

Total elbow prostheses may either be linked with a hinge (constrained or semiconstrained) or unlinked (unconstrained). Conversion from an unlinked to a linked constraint can be performed at any time with the new-generation, “convertible” implants. Currently, the indication for a fixed-hinge design, constrained TEA is extremely limited. Contemporary linked prostheses have a “loose hinge” that more accurately replicates the semiconstrained kinematics of the native elbow, allowing 6° to 8° of varus/valgus motion and rotational motion. Semiconstrained implants are the most common types of elbow replacement used today in North America. Such implants include the Coonrad-Morrey (Zimmer, Warsaw, IN), GSB III (Zimmer), and Dis-
covery (Biomet, Warsaw, IN). Advances in unlinked prosthetic design have favored a more anatomic and bone-preserving ulnohumeral articulation. Such designs include the Souter-Strathclyde prosthesis (Howmedica, Rutherford, NJ) and the Kudo elbow system (Biomet). The next generation of unlinked TEA has an additional radial head component in an effort to improve elbow stability by balancing the distribution of forces between the humerus, ulna, and radius, and thus replicate the normal anatomic structure of the elbow. An example is the Sorbie-Questor total elbow system (Wright Medical, Arlington, TN). Elbow instability, advanced osseous deformity, and preexisting bone loss are limitations for unlinked arthroplasty.

The advantage of a convertible implant is that it allows the surgeon great versatility in selecting an unlinked or linked TEA. A convertible prosthesis also allows for a subsequent, minimally invasive conversion of an unlinked to a linked articulation, and vice versa, without the need to revise well-fixed components. The Acclaim prosthesis (DePuy, Warsaw, IN) and the Latitude total elbow system (Tornier, Stafford, TX) currently offer these options. Hemiarthroplasty of the distal humerus is also possible with the Latitude system for the reconstruction of osteopenic, comminuted fractures of the distal humerus in elderly patients.

Several studies have demonstrated good results of TEA in rheumatoid arthritis using both linked and unlinked implants. Recently, Sanchez-Sotelo18 and Sanchez-Sotelo and Morrey19 reported their outcomes of 461 linked semiconstrained elbow arthroplasties in patients with rheumatoid arthritis. At a mean follow-up of 8 years (range, 2 to 25 y) 418 (90.7%) implants of elbows were retained, 10 (2.2%) had been removed or revised for infection, 25 (5.4%) had been revised for loosening, 8 (1.7%) had been revised for polyethylene wear, and 3 patients had internal fixation of a periprosthetic fracture. The 20-year survivor rate with revision for loosening, 8 years (range, 2 to 25 y) 418 (90.7%) implants of elbows were retained, 10 (2.2%) had been removed or revised for infection, 25 (5.4%) had been revised for loosening, 8 (1.7%) had been revised for polyethylene wear, and 3 patients had internal fixation of a periprosthetic fracture. The 20-year survivor rate with revision for loosening as the end point was 90% (95% confidence interval [CI], 97% to 94%), with revision for mechanical failure as the end point was 78% (95% CI, 65% to 89%), and with revision for mechanical failure or deep infection as the end point was 72% (95% CI, 58% to 85%).

Celli and Morrey20 published their results of 58 semiconstrained TEAs in patients < 40 years of age (mean, 33 y). At a mean follow-up of 91 months, the revision rate was 22%, and the rate of revision was significantly higher for patients with posttraumatic arthritis. Despite this revision rate, 51 elbows (93%) had a good or excellent elbow performance score.

Cil et al21 reported 25% mechanical implant failure for 92 elbows that had TEA for the treatment of a distal humeral nonunion with the Coonrad-Morrey prosthesis. Aseptic loosening was the major reason for implant failure. The age of the patient significantly affected the survival of the implant (P < .01). Elbow implants in patients < 65 years of age were 3 times more likely to require revision secondary to mechanical failure compared with those in patients ≥ 65 years of age.

Although far fewer elbow arthroplasties than lower extremity arthroplasties are performed, the proportion of complications is greater with elbow arthroplasty. The most recognized complications include infection, implant loosening, periprosthetic fracture, implant failure, triceps insufficiency, and nerve palsy. Fortunately, revision techniques developed over the last few years allow successful treatment of some of these complications.

The treatment of elbow arthritis must be individualized, and the appropriate treatment depends on the etiology, severity, patient age, and functional demands. Better understanding of the pathophysiology and illness behavior of elbow arthritis will likely lead to better treatments and appropriate patient expectations. Pain at the extremes of motion should be treated by either arthroscopic or limited open techniques. To determine the relative risks and benefits of arthroscopic and open debridement of elbow arthritis, large, randomized, controlled trials with independent blinded observers and both short-term and long-term follow-up are required. Pain throughout the arc of motion is generally considered an indication for TEA. Prosthetic longevity due to loosening and bushings wear has been a limiting factor to long-term success. Refinement of prosthetic design and implantation techniques is necessary to promote future improvements in treatment of the arthritic elbow.

REFERENCES