

Arthroscopic Treatment of the Arthritic Elbow: Ectomy Procedures; Nonprosthetic Treatment

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Summary: Elbow arthroscopy is a challenging but essential skill for orthopaedic surgeons treating patients with elbow arthritis. Arthroscopy allows for excellent visualization of the elbow joint giving access to the surgeon to remove plicae, debride lateral epicondylitis, release contractures, osteophyte excision, synovectomy, and treatment of osteochondritis dissecans as well as other problems. This article discusses arthroscopy of the ectomy procedures about the elbow. **Key Words:** Elbow arthroscopy—Arthritic elbow—Osteochondritis dissecans—Synovectomy—Posteromedial impingement—Ectomy.

Arthroscopy of the elbow is an essential skill necessary in the armamentarium of the orthopaedic surgeon for the treatment of various maladies about the elbow. In its infancy, elbow arthroscopy was used for removal of loose bodies or diagnostic examination of a painful joint. As the surgeon becomes more skilled, more advanced procedures such as resection of symptomatic plicae, debridement for the treatment of lateral epicondylitis, release of the capsule for contractures, osteophytic excision, synovectomy, treatment of osteochondritis dissecans (OCD), and treatment of selected elbow fractures can be performed.

A thorough knowledge of the anatomy of the elbow is essential to avoid the potential for injury to neurovascular structures. The benefit of elbow arthroscopy including better visualization and decreased postoperative pain and faster postoperative recovery make a persuasive argument to force skilled surgeons to become more highly skilled to deal with challenging problems about the elbow.

Treatment of the arthritic elbow with cartilage injuries and capsular contractures continue to require added skills, patience, and diligence with outcomes that can positively alter a patient's quality of life.

INDICATIONS

Loose Body Removal

One of the most common indications for elbow arthroscopy is loose body removal. The most common cause of loose bodies is surface cartilage fragmentation.¹⁴ Patients will present with complaints of pain, loss of joint motion (especially in extension), swelling, catching or clicking, and occasional locking if the fragment is free within the joint. The loose bodies are usually seen on plain radiograph but if it is of cartilaginous origin, the radiograph will be negative (Fig. 1A, B). Magnetic resonance imaging (MRI) maybe helpful in some cases.

Understanding underlying pathology of the elbow will help with locating loose bodies. In patients with osteochondritis dissecans, loose bodies are often located laterally near the radiocapitellar joint. If fragmentation is associated with the loose body, it is usually located near the fracture. Loose bodies associated with synovial chondromatosis are often located anteriorly.

When a loose body is not found in an expected compartment, a shaver can be placed with full suction in the compartment. The mouth of the shaver should be turned away from any vital neurovascular structure. This should be done after all compartments and gutters are visualized during the arthroscopy. Once a loose body is found, restricting the inflow often helps prevent further displacement of a fragment. It is sometimes helpful to impale a loose body with an 18-gauge spinal needle. Larger

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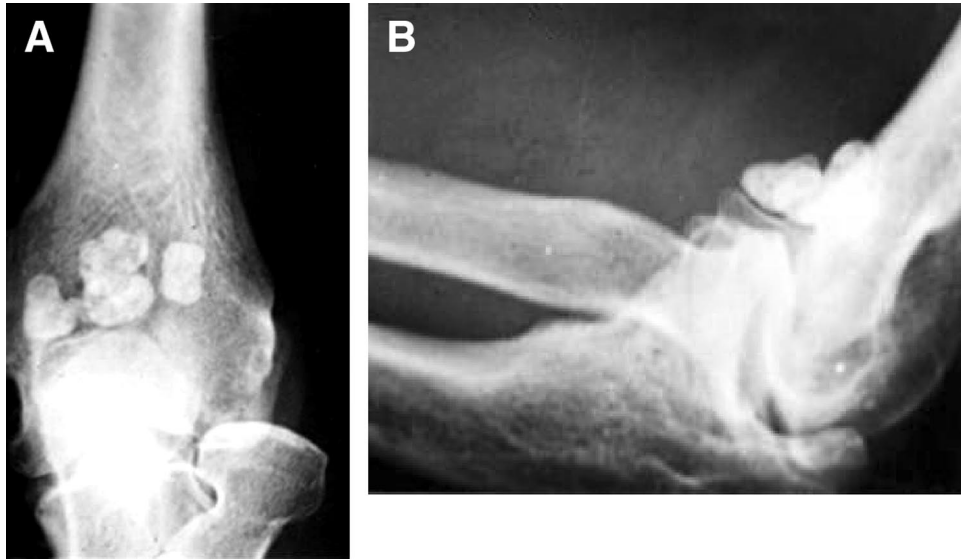


FIG. 1. (A) AP and (B) Lateral radiographs of an elbow with arthritis and many loose bodies (Copyright Kevin D. Plancher, M.D.).

fragments can be sectioned with an osteotome through a small incision or accessory portal can be made to accommodate the evacuation of any fragment (Figs. 2–4).

Osteochondral Lesions

Osteochondritis dissecans (OCD) of the elbow or Panner's Disease are typically seen in the young throwing athlete or gymnast. These injuries affect the capitulum although some osteochondral lesions can be found in the radial head. The cause of these injuries is usually caused by repetitive microtrauma to a vulnerable epiph-

ysis with a precarious blood supply.¹⁷ The patients usually present with a dull pain on the lateral aspect of the elbow with a loss of joint motion, usually in extension. The elbow may also catch, lock, or both. On physical examination, the elbow usually is swollen, has a decreased range of motion, and tenderness over the radiocapitellar joint. Radiographs usually show radiolucent changes in the area affected although sometimes radiographs can be negative requiring an MRI (Fig. 5).

Indications for surgery with OCD are a failure of conservative treatment, a loose fragment, loose bodies, or a locked elbow. During the elbow arthroscopy a complete examination is completed with the excision of



FIG. 2. Arthroscopic view of the elbow with many loose bodies (Copyright Kevin D. Plancher, M.D.).



FIG. 3. Clinical picture of loose bodies removed from an elbow during an arthroscopy (Copyright Kevin D. Plancher, M.D.).

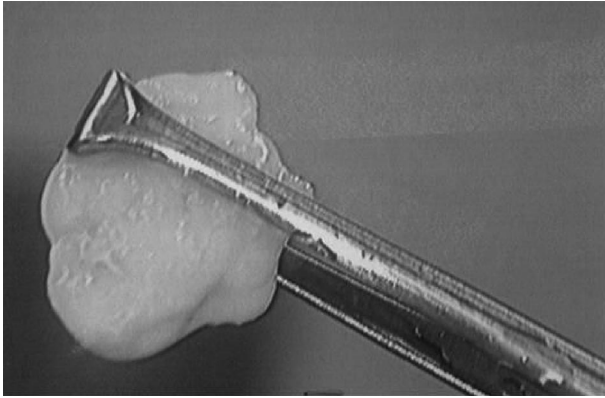


FIG. 4. Clinical picture of a large, single loose body removed from an elbow during an arthroscopy (Copyright Kevin D. Plancher, M.D.).

loose detached cartilage, along with curettage and microfracture to promote bleeding of the site.¹⁹ If no disease is appreciated on the anterior surface of the capitellum, a posterolateral portal is made and inspection of the posterior capitellum is carried out.

Primary Degenerative Arthritis

As with most joints with primary degenerative arthritis, osteophytes, loose bodies, and capsular contractures are usually encountered. Patient complaints include pain, usually at extremes of the arc of motion, and often in the elbow, decreased joint motion. Mid-arc motion pain is not usually a problem for these patients. Loose bodies, impinging osteophytes and tight, thickened capsules are released arthroscopically in the treatment of primary osteoarthritis of the elbow (Figs. 6 and 7).



FIG. 5. AP radiograph of an elbow with a large capitellar Osteochondritis Dissecans Lesion (Copyright Kevin D. Plancher, M.D.).



FIG. 6. Lateral radiograph of an arthritic elbow with multiple osteophytes and loose bodies (Copyright Kevin D. Plancher, M.D.).

Arthroscopic debridement of an elbow with osteoarthritis begins in the posterior aspect of the joint. The most common cause of bony mechanical block to full extension is caused by a posteromedial osteophyte (Fig. 8). Utilizing the posterolateral portal, the posterior compartment is visualized while using the direct posterior portal as a working portal (Figs. 9 and 10). It is important



FIG. 7. Sagittal, T1 MRI of an elbow with posteromedial impingement with a mechanical block (Copyright Kevin D. Plancher, M.D.).

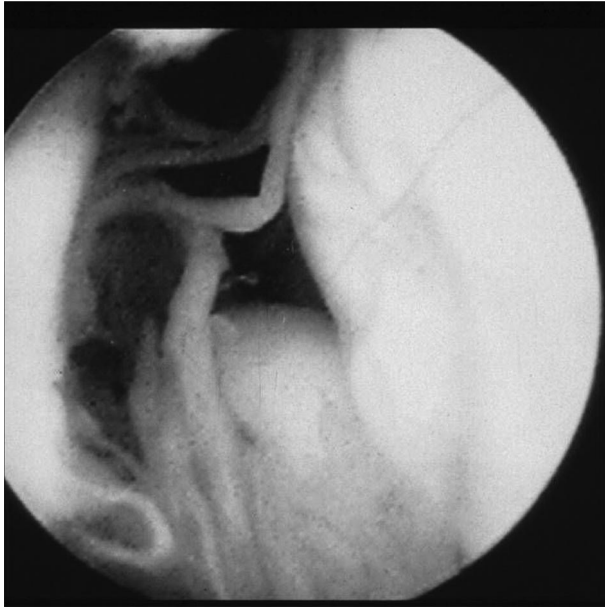


FIG. 8. Arthroscopic view of an elbow with arthritis. Cartilaginous fibrillation is seen throughout the elbow (Copyright Kevin D. Plancher, M.D.).

to remove all osteophytes and debride the olecranon for osteophytes. A shaver or burr can be used to remove osteophytes from the olecranon fossa of the humerus. If large osteophytes are encountered, a small incision or an accessory portal can be made to allow an osteotome into the joint utilizing fluoroscopy for placement (Figs. 11–13). The osteophytes are removed and the elbow is again assessed arthroscopically through a range of motion to confirm that the impingement has been treated (Fig. 14).

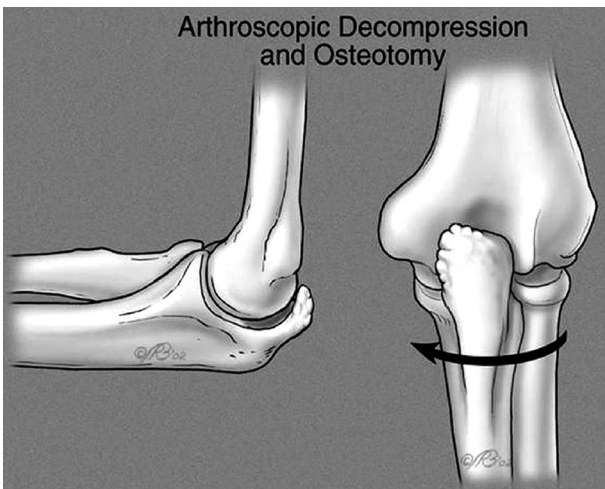


FIG. 9. Artistic rendition of posteromedial impingement of the elbow (Copyright Kevin D. Plancher, M.D.).

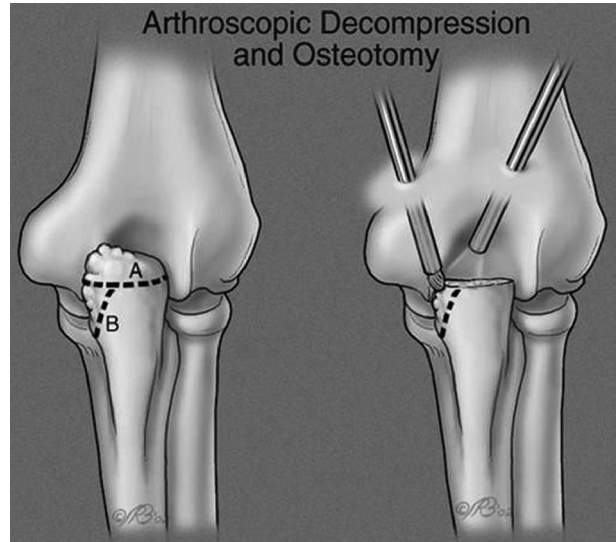


FIG. 10. Artistic rendition of posteromedial impingement of the elbow with preoperative planning of osteotomies (Copyright Kevin D. Plancher, M.D.).

With capsular flexion contractures, the anterior capsule needs to be released and the opposite for capsular extension contractures where the posterior capsule needs to be released. It is important to keep in mind that the ulnar nerve sits posterior to the posterior medial capsule, therefore care should be taken during this point of the operation. The posterior capsular release is easiest and safest to be done at the beginning of the surgery before any swelling or fluid extravasation has occurred.

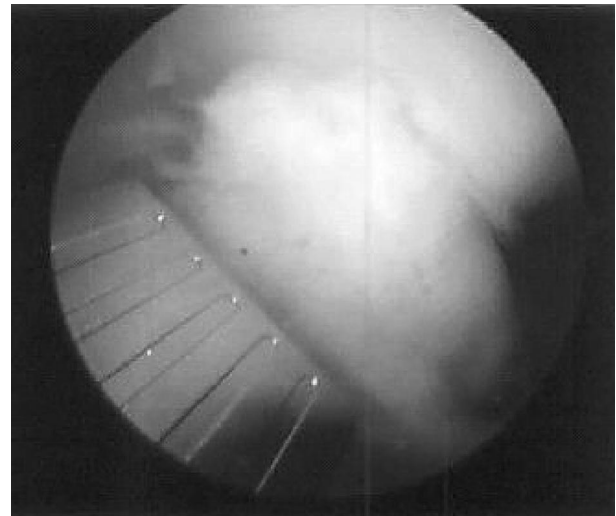


FIG. 11. Arthroscopic view of the posteromedial olecranon through a posterolateral portal with an osteotome in place (Copyright Kevin D. Plancher, M.D.).

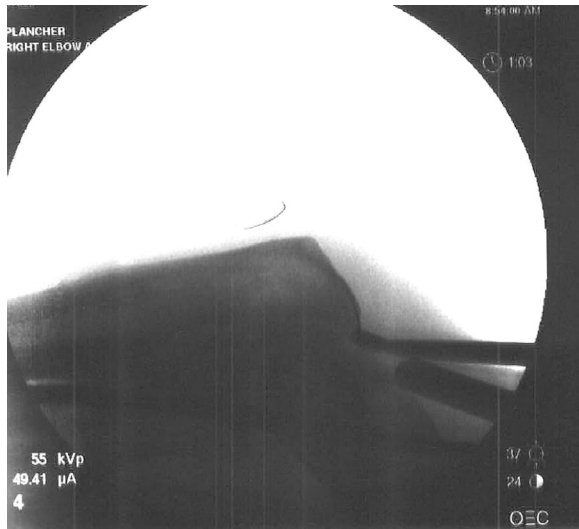


FIG. 12. Lateral fluoroscopic view of the elbow showing the proper placement of the osteotome on the olecranon (Copyright Kevin D. Plancher, M.D.).

Moving to one of the anterior portals, the anterior osteophytes are removed from the radial and coronoid fossae as they are often missed and only the tip of the coronoid is excised. It is of note that the medial aspect of the coronoid should be visualized as osteophytes can form in this area and would be missed if not visualized.

If a mechanical block persists from bony overgrowth in the olecranon fossa causing ulnohumeral arthritis, an arthroscopic modification of the open Outerbridge-Kashiwagi procedure can be done. Utilizing a 5-mm drill placed in the center of the olecranon fossa, a hole is

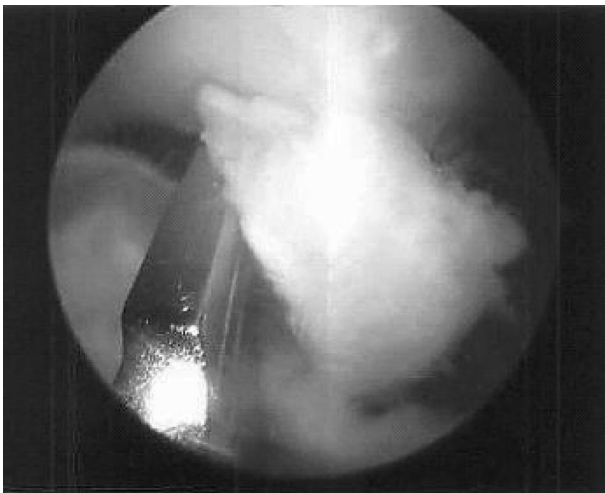


FIG. 13. Arthroscopic view of the posteromedial olecranon through a posterolateral portal with an osteotome elevating a large osteophyte (Copyright Kevin D. Plancher, M.D.).



FIG. 14. Arthroscopic view of the posteromedial olecranon through a posterolateral portal after the osteotomy with the resection of the impingement (Copyright Kevin D. Plancher, M.D.).

drilled from posterior to anterior until the posterior olecranon fossa is connected with the anterior surface of the humerus. The drill is angled toward the center of the coronoid fossa. The intersection of the long axis of the humerus with the inflow cannula in the anterior proximal medial portal serves as a guide for proper orientation of the drill. A burr can be used to make this hole larger up to 1 cm in diameter or until full flexion (≥ 135 degrees) and extension (≤ -5 degrees) is achieved.

After the osteophytes are removed anteriorly and posteriorly, attention should be turned to the anterior aspect of the capsule. To excise the capsule great care should be taken as all the neurovascular structures are just anterior to the anterior capsule. The median nerve is closest and sits posterior to the brachialis muscle. It is helpful to initially remove the capsule off the humerus as this increases the work space in the anterior compartment. Using the lateral side as the viewing portal, the surgeon excises the anterior aspect of the capsule with a shaver or punch. Once the capsule is released to the midline, the arthroscope should be changed to the medial side and shaver placed through the lateral portal. On the anterolateral aspect of the capsule, care should be taken as the radial nerve is at greatest risk of injury during this portion of the case. At this location a fat pad is often seen, just anterior to this fat pad is the radial nerve.

When the arthroscopy is completed the portals are closed and the arm is placed in extension and wrapped in a circumferential compressive dressing. Keeping the arm in extension limits the swelling and accumulation of intra-articular fluid. Elbow flexion allows for the maxi-

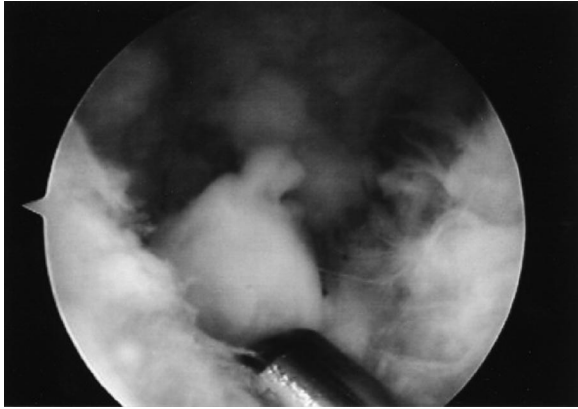


FIG. 15. Arthroscopic view of the elbow in a rheumatoid patient with synovitis (Copyright Kevin D. Plancher, M.D.).

mal amount of fluid to collect in the elbow joint. A postoperative assessment should be done in the recovery room when the patient is awake and alert to assess the neurovascular status. Elevating the extended arm into a “Statue of Liberty” position overnight also helps decrease swelling. Continuous passive motion or alternating splinting in flexion and extension can be used starting on the first postoperative day.

Rheumatoid Arthritis

Over 50% of patients with rheumatoid arthritis have elbow involvement with polyarticular disease. It is common for bilateral involvement and the dominant elbow is more severely affected.⁷ Patients with rheumatoid arthritis and elbow problems usually complain of pain and swelling because of synovitis and an effusion. These patients also have cartilage destruction, ligament attenuation, osseous erosions, and deformity progression as the disease becomes more severe. In some cases, secondary capsular contractures develop, resulting in increasing stiffness.

Arthroscopic synovectomy for patients with rheumatoid arthritis is a less invasive means of synovectomy compared with open approaches (Fig. 15). The indications for this surgery are persistent elbow synovitis that cannot be controlled by medical management and is associated with pain, stiffness, and loss of function. If a patient has complete loss of articular cartilage, a total elbow arthroplasty is the surgery of choice. An arthroscopic approach should only be done for this patient if the patient is younger or has pauciarticular disease.

As with all elbow arthroscopy, the ulnar nerve should be palpated and marked out along its course. Preoperative range of motion should be documented with a goniometer. A final range of motion should also be documented. If there is a problem with pronation and

supination, the distal radial ulnar joint should be examined clinically and radiographically. Radial head excision should be considered for patients with articular deformity impeding rotation only in the presence of a competent medial collateral ligament, assessed arthroscopically. Capsulectomy can be performed arthroscopically if there is a need to improve motion.⁵ The highest risk of neurovascular injuries are in patients with rheumatoid arthritis and a contracture.

Postoperatively, if only a synovectomy is completed, a regular circumferential compressive dressing is placed on the arm and the patient can use a sling for comfort. Early active range of motion is important as well. If a more extensive debridement is done in addition to a capsulectomy or capsulectomy, the patient will use a continuous passive motion machine or alternating splinting.

CONTRAINDICATIONS

There are very few contraindications to elbow arthroscopy. One absolute contraindication is if the patient has distortion of normal bony or soft-tissue anatomy that would preclude safe portal placement.¹⁶ In patients with extensive heterotopic ossification, extensive anatomic distortion can also be unsafe for arthroscopic intervention. Previous submuscular or subcutaneous transposition of the ulnar nerve is a relative contraindication for safe portal and cannula placement on the medial side of the elbow. To make a portal after transposition, a small incision can be made utilizing skin retraction before making the portal through the capsule. Also, local skin infection in the area of the portals is a contraindication.

POSTOPERATIVE REHABILITATION

Restoration of the motion is paramount. Based on the amount of debridement in the elbow joint, early active motion should begin on postoperative day 1. If radial head excision is completed, a continuous passive motion maybe helpful to restore motion.

COMPLICATIONS

Compartment syndrome, septic arthritis, and neurovascular injuries all occur from arthroscopy of the elbow. Kelly and associates, in 2001, reported on 473 elbow arthroscopies listing 4 types of minor complications including: infection, nerve injury, prolonged drainage, and contracture. All complications combined for a 10% complication rate. The most common complication was persistent drainage. In their study, there were no permanent neurologic complications, only transient.⁹ In a review of 465 elbow arthroscopies,

pies, Savoie and Field reported a 3% prevalence of neurologic complications. As for specific nerves, the radial nerve and the lateral antebrachial cutaneous nerve are at risk for injury during the placement of the anterolateral portal. The median nerve and the medial antebrachial cutaneous nerve are at risk for injury during the placement of the anteromedial portal.²⁰ The ulnar nerve can be injured with multiple portals. There have been reports of injuries to the radial nerve, the superficial radial nerve, the posterior interosseous nerve, the median nerve, and the ulnar nerve during elbow arthroscopy.^{6,12,18,23} To date, no report exists in the literature of a main trunk brachial artery injury.

RESULTS

Primary Degenerative Arthritis

Many recent studies have looked at the results of arthroscopic treatment of the primary degenerative arthritic elbow. Cohen et al., in 2000, reported excellent pain relief without major complications in 26 patients with an O-K procedure.⁴ McLaughlin et al., in 2006, followed 36 patients with radiocapitellar arthritis who received a radial head excision. Twenty-eight of the 36 also had an arthroscopic modification of the Outerbridge-Kashiwagi procedure. Utilizing the Andrews-Carsons rating system, patients receiving the radial head excision alone had an average increase of 20 points whereas with both procedures there was an average increase of 58 points.¹³

Rheumatoid Arthritis

Results with rheumatoid arthritis have a propensity to correlate with the progression and severity of the disease. It is important to note, patients with rheumatoid arthritis tend to have better outcomes if they have less destruction of their articular cartilage.^{7,8} Lee and Morrey in 1997 reported 93% good to excellent results at the initial postoperative follow up but decrease to 57% at 42 months postoperatively.¹⁰ Horiuchi and associated in 2002, had similar findings with 71% rate of good to excellent results at 2 years but decreased to 43% at 8 years follow up.⁸

SUMMARY

Elbow arthroscopy affords the skilled orthopaedic surgeon a less invasive operation that can be indicated for many different elbow ailments including osteoarthritis or rheumatoid arthritis, loose bodies, osteochondritis dissecans, and osteochondritis dissecans. This procedure has shown to be beneficial to the patient for pain relief and

restoration of motion. Elbow arthroscopy does have its inherent risks and knowledge of anatomy about the elbow is essential. Keeping the possible complications in mind while being meticulous and methodical during the procedure, elbow arthroscopy should be used to treat our patients safely.

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