



Elbow arthroscopy: early complications and associated risk factors

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Background: Elbow arthroscopy is increasingly used to treat complex pathology. The purpose of this study was to investigate early complication rates after elbow arthroscopy and identify risk factors for adverse events.

Methods: Consecutive elbow arthroscopies performed during a 13-year period were reviewed, identifying early perioperative complications. Major complications included deep infection, permanent nerve injury, or complications requiring additional anesthesia. Minor complications included superficial wound complications and transient nerve palsies. Complications were compared with a surgical complexity scale based on the procedure performed, the number of arthroscopic portals, and tourniquet time.

Results: Of 417 procedures, there were 37 minor (8.9%) and 20 major (4.8%) complications. The rates of superficial and deep infections were 6.7% and 2.2%, respectively. Major complications included 9 deep infections, 6 cases of heterotopic ossification requiring further surgery, and 4 manipulations under anesthesia. There were 7 transient sensory nerve complications, and no motor deficits. No differences in complication rates were seen between low-, moderate-, and high-complexity (10.2%, 16.3% and 14.4%, respectively) cases. Intraoperative steroid injections were strongly associated with postoperative superficial (14.1% vs 2.0%) and deep infection (4.9% vs 0.4%) in elbows receiving vs those not receiving steroid ($P < .0001$).

Conclusions: Complications of elbow arthroscopy are seen in approximately 14% of cases. Most complications are minor, not affecting clinical outcome. Major complications occur in 5% of cases, often requiring repeat surgery. Intraoperative postsurgical steroid injections are associated with increased risk of perioperative infections. Case complexity does not appear to affect the rate of complications with modern surgical techniques.

Level of evidence: Level IV, Case Series, Treatment Study.

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Keywords: Elbow; arthroscopy; complications; infection

The Washington University in St. Louis Investigational Review Board approved this study (IRB No. 201103403).

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Elbow arthroscopy has seen a rapid expansion in its indications and applications recently despite the technical demands of the procedure. Decreased postsurgical pain, reduced arthrofibrosis, minimized infection risk, and easier postoperative rehabilitation are the driving forces behind

this expansion in elbow arthroscopy. Along with the increase in use, a concomitant increase in the complexity of procedures and pathologies treated arthroscopically has also been observed. Complex procedures, such as total synovectomy, radial head resection, osteocapsular arthroplasty, and medial epicondylectomy, have been performed with increasing frequency in recent years.

With the growth in both popularity and complexity of elbow arthroscopy, concern regarding maintaining patient safety remains paramount. Although catastrophic neurologic complications have been reported, several outcome studies have established that elbow arthroscopy is a generally safe procedure when appropriate precautions are taken.^{1,3-5,7,8,10,12,13,15,18}

Several authors have reported their experience with elbow arthroscopy; however, not since 2001 has there been a comprehensive review of the complications of this surgery in a large series of consecutive patients across multiple diagnoses and procedures.⁸ Given the expanded indications and use of this procedure, the purpose of this study was to report the early complications of modern elbow arthroscopy and to identify potential risk factors for these complications. Through a retrospective review of a large series of consecutive patients, we analyzed early complication rates as they related to pertinent risk factors such as preoperative diagnosis, the use of postoperative antibiotic prophylaxis, and procedural complexity.

Materials and methods

During a 13-year period between 1999 and 2012, 3 orthopedic surgeons who had completed subspecialty training in shoulder and elbow surgery performed 510 elbow arthroscopies. Patient records were retrospectively reviewed to determine preoperative diagnosis, procedural specifics, and perioperative complications. We excluded 93 surgeries for lacking adequate follow-up (at least 2 visits in the first 4 weeks or a single visit between 4 and 6 weeks postoperatively). This left 417 arthroscopic procedures performed in 404 patients.

The following information was obtained from the electronic record: pertinent past medical history, prior surgical procedures performed on the affected elbow, preoperative flexion contracture, preoperative diagnosis, tourniquet time, preoperative and postoperative antibiotic prophylaxis, length of follow-up, and perioperative complications. Complications were further categorized as minor or major.

Minor complications were considered to be (1) superficial infections (cellulitis or prolonged drainage lasting 7 days or longer), (2) any wound complication not requiring surgical intervention (drainage, ganglion cyst formation, etc), and (3) transient sensory paresthesias. Major complications were defined as (1) deep or intra-articular infection resulting in surgical treatment, (2) neurologic sequelae resulting in any motor deficit (transient or permanent) or permanent sensory deficit, (3) compartment syndrome, (4) vascular injury, (5) loss of motion in the immediate postoperative period treated by manipulation under anesthesia, or (6) any outcome necessitating repeat surgery other than the natural progression of the disease. Two independent observers who did not participate in

Table 1 Elbow arthroscopy complexity scale*

Procedure	Points
Limited debridement (single compartment)	1
Extensive debridement (2 or more compartments: anterior, posterior and posterolateral)	2
Capsular release without boney resection	3
Osteocapsular arthroplasty (arthroscopic bony resection with capsular release)	4
Release of posterior band of MCL or medial epicondylectomy	+1
Tourniquet time	
≤60 min	0
60-90 min	1
>90 min	2
Portals	
≤2	0
3-4	1
>4	2
Complexity category	
Low complexity	0-3
Moderate complexity	4-5
High complexity	>5

MCL, medial collateral ligament.

* Procedural complexity scale for elbow arthroscopy consisted of 3 parameters: nature of the procedure, tourniquet time, and number of portals.

the surgical procedures compiled all data. Categorization of complications was determined by consensus between 2 authors.

To aid in the analysis of risk factors, a complexity scale was developed (Table 1) to stratify the perceived risk associated with each procedure. The factors contributing to the complexity scale (ranging from 1 to 9) included procedural specifics (scored as 1-5 points), tourniquet time (scored as 0-2 points), and number of portals used (scored as 0-2 points).

Elbow arthroscopy was performed in a consistent fashion with the patient in the lateral decubitus position and under general anesthesia. The operative shoulder was flexed to 90° and internally rotated. A holster was used to support the operative arm, allowing free elbow motion. The elbow joint was insufflated with 15 to 30 mL normal saline before portal placement. Most often, the proximal anteromedial portal was created first, unless there had been a previous ulnar nerve transposition. In this instance, the medial portal was established initially after dissection and identification of the ulnar nerve, or more commonly, the proximal anterolateral was created initially. In all cases, anterior portals were established with the elbow flexed.

The number of portals was determined by the procedure and concomitant pathology. Accessory anterolateral portals were frequently used in more complicated cases for placement of intra-articular capsular retractors. Arthrotomy was performed to aid treatment if visualization deteriorated, the extent of disease precluded safe arthroscopic surgery, or tourniquet time was exceeded. Patients with contractures associated with loss of flexion motion (approximately 100°-110°) routinely underwent open decompression of the ulnar nerve and release of the posterior band of the medial collateral ligament. Portals were closed with nylon sutures, and sterile dressings were applied. Extension splints were used selectively in patients with advanced flexion contractures.

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