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30-Day complications, operative time, and overnight admission following elective elbow arthroscopy

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Abstract

Background: Although arthroscopic procedures are generally considered safer than open procedures, they are not without complications. This study's purpose is to characterize patient demographics, medical complications, overnight admissions, and prolonged operative times for patients undergoing elective elbow arthroscopy using a national database.

Methods: This retrospective study used the ACS NSQIP database with data from 2015 to 2020. Patients undergoing elbow arthroscopy were identified, and those undergoing emergent surgery were excluded. Patient demographics, clinical characteristics, medical comorbidities, 30-day complications, overnight admission rates, and operative times were recorded and analyzed.

Results: Overall, 815 patients undergoing elective elbow arthroscopy were included. The mean age was 46.8 years. Mean BMI was 29.7 kg/m^2, and 75.2% (n = 613) were male sex. The most common comorbidity was smoking (14.8%, n = 121). The cumulative complication rate was 2.5% (n = 20). The most common complication was surgical site infection (n = 7, 0.9%). 10.7% of patients required at least one overnight hospital stay. 20.2% of patients had a prolonged operative time ≥ 120 min.

Conclusion: Elbow arthroscopy is not without complications and morbidity despite being a minimally invasive procedure and advances made in surgical technique. Surgeons should use this information to facilitate shared-surgical decision making, preoperative patient counselling, and preoperative patient optimization.

Keywords

Elbow arthroscopy, complications, infection, elbow, arthroscopy

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Introduction

Elbow arthroscopy is an increasingly common and highly useful procedure used for a diverse array of indications including rheumatoid arthritis, lateral epicondylitis, fractures, instability, osteochondral defects, and more.[1] This minimally invasive intervention, which may involve loose body removal, debridement, and synovectomy holds the potential for cure or delaying open procedures. The expanding utility of arthroscopy over the past few decades underscores its significance in orthopaedic practice.

Although arthroscopic procedures are minimally invasive and seek to minimize tissue damage compared to open surgery, the difference in complication rates is not clear, and there remains concern regarding their complications which most commonly include infection, reoperation, and nerve injury.[2–6] There is a need to continually understand how and why complications may occur in order to improve perioperative outcomes and reduce costs and other burdens. Patient selection likely has an impact on outcomes,

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however, there is a significant lack of literature regarding patient characteristics and related complications in elbow arthroscopy. Much of the existing literature consists of studies that are limited by small sample sizes or dated data that does not reflect recent advances in surgical techniques and instrumentation.

Thus, the purpose of this study is to characterize the patient demographics, medical comorbidities, rates of medical complications, rates of overnight admission, and rates of prolonged operative times for patients undergoing elective elbow arthroscopy in recent years using a national database.

Methods

A retrospective study was performed using the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) database with data from January 2015 to December 2020. The ACS NSQIP includes patient demographics, medical comorbidities, and other clinical characteristics for those undergoing surgery from over 700 hospitals.[7–9] Patient outcomes in the ACS NSQIP database are recorded up until 30 days postoperatively. ACS NSQIP has a robust set of protocols and procedures for ensuring the collection of high-quality, reliable data.[10–12] All patient information is de-identified in the database.

Patient selection

To select patients who underwent elbow arthroscopy, the following Current Procedural Terminology (CPT) codes were used: 29830 (Arthroscopy, elbow, diagnostic, with or without synovial biopsy), 29834 (Arthroscopy, elbow, surgical; with removal of loose body or foreign body), 29835 (Arthroscopy, elbow, surgical; synovectomy, partial), 29836 (Arthroscopy, elbow, surgical; synovectomy, complete), 29837 (Arthroscopy, elbow, surgical; debridement, limited), 29838 (Arthroscopy, elbow, surgical; debridement, extensive). Patients who underwent emergent surgery and those with missing baseline demographics were excluded from the study.

Baseline patient characteristics

Patient demographics and clinical characteristics were assessed. These included age, body mass index (BMI), sex, race, ethnicity, American Society of Anesthesiologists (ASA) classification, principal anesthesia technique, and operative setting (inpatient or outpatient).

Patient medical comorbidities

Patient comorbidities were also assessed, including diabetes, congestive heart failure, currently requiring/on dialysis, dyspnea, ventilator dependency, history of severe chronic obstructive pulmonary disease (COPD), current smoker, ascites, disseminated cancer, steroid or immunosuppressant use for a chronic condition, more than 10% loss of body weight in the last 6 months, bleeding disorders, and blood transfusion within 72 h before surgery.

Postoperative complications

Thirty-day postoperative complications were assessed. These complications included surgical complications (surgical site infection, wound disruption, reoperation, blood transfusion within 72 h from surgical start time), anesthesia related complications (unplanned intubation, prolonged ventilator > 48 h) and other general complications (pulmonary embolism, pneumonia, sepsis, progressive renal insufficiency, urinary tract infection, stroke/cerebral vascular accident (CVA), deep vein thrombosis (DVT)/thrombophlebitis, myocardial infarction, cardiac arrest requiring cardiopulmonary resuscitation (CPR), unplanned readmission without reoperation, and mortality). Surgical complications did not include nerve injury. Bivariate analyses were performed to compare patient demographics, comorbidities, and clinical characteristics between those who suffered certain complications and those who did not. An overnight admission was defined as a patient who had a total hospital stay of 1 day or longer. A prolonged operative time was defined as 120 min or longer.

Statistical analysis

All analyses for this study were done using the IBM SPSS 28 (SPSS Inc., Armonk, NY) software. Pearson's Chi-Squared test was used when appropriate.

Results

A total of 871 patients underwent elbow arthroscopy. After excluding patients who underwent surgery in the emergent setting (n = 38), such as those with trauma-related fractures, 833 patients remained. Patients with missing demographic values were removed (n = 18). A final total of 815 patients undergoing elective elbow arthroscopy were included.

Baseline patient characteristics

The baseline characteristics of the patients are summarized in Table 1. In those undergoing elective elbow arthroscopy, the mean age was 46.8 years, the mean BMI was 29.7 kg/m^2, and 75.2% (n = 613) were male sex. The majority of patients were of Caucasian race (66.3%, n = 540) and had surgery in the inpatient setting (90.8%, n = 740). The average operative time was 81.5 min (SD 46.3), and average length of total hospital stay was 0.23 days (SD 0.76).

Medical comorbidities

The medical comorbidities are summarized in Table 2. The most common comorbidity was smoking (n = 121,

Table 1. Baseline characteristics of patients undergoing elective elbow arthroscopy.

Baseline Demographics (n = 815)	Value
Mean age	46.8 years (SD 14.4)
Mean BMI	29.7 kg/m^2 (SD 5.9)
Sex	
Female	202 (24.8%)
Male	613 (75.2%)
Race	
Caucasian	540 (66.3%)
Unknown/not reported	199 (24.4%)
African American	55 (6.7%)
Asian	15 (1.8%)
American Indian or Alaska Native	3 (0.4%)
Native Hawaiian or Pacific Islander	3 (0.4%)
Ethnicity hispanic	
No	565 (69.3%)
Unknown	202 (24.8%)
Yes	48 (5.9%)
ASA class	
I	219 (26.9%)
II	451 (55.3%)
III	140 (17.2%)
IV	5 (0.6%)
Principal anesthesia technique	
General	767 (94.1%)
MAC/IV sedation	22 (2.7%)
Regional	22 (2.7%)
Other	4 (0.5%)
Operative setting	
Inpatient	75 (9.2%)
Outpatient	740 (90.8%)

Table 2. Medical comorbidities of elective elbow arthroscopy patients.

Comorbidity	Yes, n (%)	No, n (%)
Current smoker	121 (14.8)	694 (85.2)
Diabetes	47 (5.8)	768 (94.2)
Steroid/immunosuppressant for a Chronic condition	21 (2.6)	794 (97.4)
Dyspnea	17 (2.1)	798 (97.9)
History of severe COPD	13 (1.6)	802 (98.4)
Bleeding disorders	6 (0.7)	809 (99.3)
Ascites	1 (0.1)	814 (99.9)
Congestive Heart Failure	0 (0)	815 (100)
Currently requiring/on dialysis	0 (0)	815 (100)
Ventilator dependent	0 (0)	815 (100)
Disseminated cancer	0 (0)	815 (100)
>10% loss of body weight in last 6 months	0 (0)	815 (100)
Blood transfusion within 72 h before surgery	0 (0)	815 (100)

14.8%). Other comorbidities included diabetes (5.8%, n = 47), steroid or immunosuppressant use for a chronic condition (2.6%, n = 21), dyspnea (2.1%, n = 17), history of severe COPD (1.6%, n = 13), and bleeding disorders (0.7%, n = 6).

30-Day complications

The 30-day complications are summarized in Table 3. The cumulative complication rate was 2.5% (n = 20). The most common complication was surgical site infection (n = 7, 0.9%). Other complications included reoperation (0.7%, n = 6), DVT/thrombophlebitis (n = 3, 0.4%), and unplanned readmission without reoperation (0.1%, n = 1).

There were 87 patients (10.7%) who required at least one overnight admission. Patients above the age of 50 years had significantly higher rates of overnight admission (13.9%, n = 49) (p = .010) compared to those age 50 years or below (8.2%, n = 38). Patients who had inpatient surgery had significantly higher rates of overnight admission (78.7%, n = 59) (p < .0001) compared to those who had outpatient surgery (3.8%, n = 28). Patients with a BMI ≥ 30 also had significantly higher rates of overnight admission (13.4%, n = 45) (p = .038) compared to those with a BMI < 30 (8.8%, n = 42).

There were 165 patients (20.2%) with a prolonged operative time (≥120 min). Patients of male sex had significantly higher rates of a prolonged operative time (23.0%, n = 141) (p = .001) compared to females (11.9%, n = 24).

Table 3. 30-day complications following elective elbow arthroscopy.

Complication	Yes, n (%)	No, n(%)
Surgical site infection	7 (0.9)	808 (99.1)
Reoperation	6 (0.7)	809 (99.3)
DVT/thrombophlebitis	3 (0.4)	812 (99.6)
Wound disruption	1 (0.1)	814 (99.9)
Pulmonary embolism	1 (0.1)	814 (99.9)
Urinary tract infection	1 (0.1)	814 (99.9)
Unplanned readmission without reoperation	1 (0.1)	814 (99.9)
Pneumonia	0 (0)	815 (100)
Unplanned intubation	0 (0)	815 (100)
Prolonged ventilator > 48 hours	0 (0)	815 (100)
Progressive renal insufficiency	0 (0)	815 (100)
Stroke/CVA	0 (0)	815 (100)
Myocardial infarction	0 (0)	815 (100)
Cardiac arrest requiring CPR	0 (0)	815 (100)
Blood transfusion	0 (0)	815 (100)
Sepsis	0 (0)	815 (100)
Death	0 (0)	815 (100)
Cumulative complications	20 (2.5)	—

Patients with a BMI ≥ 30 had significantly higher rates of a prolonged operative time (23.7%, n = 80) (p = .037) compared to those with a BMI < 30 (17.8%, n = 85). Patients of African American race had significantly higher rates of a prolonged operative time (38.2%, n = 21) (p = .011) compared to those of Caucasian race (18.3%, n = 99). Patients who had inpatient surgery had significantly higher rates of a prolonged operative time (33.3%, n = 25) (p = .003) compared to outpatient surgery patients (18.9%, n = 140).

Discussion

While both arthroscopy and open procedures aim to return or preserve function in the elbow, elbow arthroscopy aims to minimize tissue dissection and the complications associated with it. There have only been limited and dated studies to date examining the demographics and safety of elbow arthroscopy. This study utilized a national database to examine the patient demographics, medical comorbidities, and complications following elective elbow arthroscopy. This study found that smoking and diabetes are the most common comorbidities in these patients. Importantly, this study found a cumulative complication rate of 2.5% and 0.9% rate of surgical site infections within 30-days. Additionally, 10.7% of patients require at least one overnight hospital stay and 20.2% of patients have a prolonged operative time ≥ 120 min.

This study found a complication rate of 2.5% within 30 days of elbow arthroscopy. Only one previous study to our knowledge evaluated complications within 30 days. Noticewala et al. evaluated patients undergoing elbow arthroscopy between 2005 and 2014 using a national database and found a 2.83% rate of overall complications within 30 days of surgery.[13] This rate is very similar to our study, which suggests that recent advances in elbow arthroscopy techniques and surgical instrumentation may not have significantly reduced rates of 30 day complications. Nelson et al. also aimed to assess perioperative complications but did not have a 30-day time frame.[14] The authors evaluated 510 elbow arthroscopy patients between 1999 and 2012 with at least 2 visits in the first 4 weeks or a single visit between 4 and 6 weeks postoperatively.[14] The authors found a 4.8% rate of major complications (e.g., compartment syndrome, vascular injury, intraarticular infection resulting in surgery) and 8.9% rate of minor complications (superficial infection, any wound complication not requiring surgery, transient sensory paresthesias).[14] Likewise, Papadonikolakis et al. found a high rate of 7.0% for any complication at a single institution between the years 2006 and 2016 among those with a minimum follow-up of 4 weeks.[15] The much higher figures in these studies may be due to their inclusion of patients with more than 30-days follow-up.

Infection is a major concern following any orthopaedic surgery, especially due to the potential for severe joint destruction and subsequent surgeries, antibiotics, and costs to the patient and healthcare system. This study found that 0.9% of patients will develop a surgical site infection within 30-days of elbow arthroscopy. One study using data from 2005 to 2014 to assess 30-day complications found a cumulative superficial and deep infection rate of 0.94%, which is similar to that in this study.[13] This suggests that the infection risk has continued to remain very low in the 30-day postoperative period over time. One of the most robust prior studies evaluating infection in elbow arthroscopy was conducted by Camp et al. The authors examined 2704 elbow arthroscopies between 2005 and 2012 and found an overall infection rate of 1.55% within 6 months postoperatively.[16] Several independent risk factors for infection were also identified, including steroid injection at the time of surgery, diabetes mellitus, tobacco and alcohol use, and inflammatory arthritis.[16] Higher rates of infection have been reported elsewhere, although most of those studies are from single institutions, used long postoperative periods, or used

historic data that may be less clinically relevant today.[14,17] For example, Nelson et al. showed a combined superficial and deep infection rate of 8.9%, but used data from 1999 to 2012 from only 3 surgeons.[14] Likewise, Intravia et al. reported a combined superficial and deep infection rate of 2.5% but had an average follow-up length of 375.8 days.[17] Overall, as highlighted from this study and previous literature, infection rates are low in the acute perioperative period following elective elbow arthroscopy but may increase at longer postoperative follow-up.

Given the minimally invasive nature of the procedure, most patients undergoing elective elbow arthroscopy are expected to be discharged on the same day. However, this is the first study to our knowledge to show that 10.7% of patients require at least one overnight hospital stay. This study is also the first to demonstrate that patients who underwent inpatient surgery, had a BMI $\geq$ 30, or an age > 50 years had significantly higher rates of at least one overnight stay compared to their respective counterparts. Although no previous studies have evaluated this in elbow arthroscopy, these factors have been shown to influence the risk for a prolonged length of stay in other arthroscopic and orthopaedic procedures.[18–20] For example, age greater than 65 years can increase the risk for overnight hospital stay in those undergoing arthroscopic rotator cuff repair.[20] Likewise, class II (BMI 35–39.99) or III (BMI $\geq$ 40) obesity can increase the risk for overnight admission following ACL reconstruction.[19] A prolonged length of stay can increase the risk for morbidity, mortality, and costs in orthopaedics.[21–24] As such, patients with pertinent risk factors should be counselled preoperatively, and surgeons and other healthcare staff should focus on perioperative optimization for these patients.

This is the first study to show that 20.2% of patients undergoing elbow arthroscopy have a prolonged operative time $\geq$ 120 min. Nelson et al. utilized tourniquet time as one of many variables to determine a composite surgical complexity variable but did not directly assess risk factors for prolonged tourniquet time.[14] Longer operative times can increase the risk for morbidity, mortality, and costs in orthopaedics.[25–27] In knee arthroscopy, an increased operative time can increase the risk for blood transfusion, mortality, infection, and readmission.[26] Identifying modifiable and non-modifiable risk factors for a prolonged operative time can improve patient counselling and strategic preoperative optimization. This is the first study to directly explore variables with higher rates of a prolonged operative time in elbow arthroscopy. This study found that patients with male sex, BMI $\geq$ 30, African American race (versus Caucasians), and inpatient surgery had significantly higher rates of a prolonged operative time ($\geq$120 min) compared to their respective counterparts. Given the higher rate of a prolonged operative time in patients with a BMI $\geq$ 30 found in this study, preoperative weight management counselling could be considered in those undergoing elbow arthroscopy but should be further explored.

This study is not without limitations. This national database may have errors in data entry or omission, although this likely occurs at a low rate and is unlikely to significantly influence our results due to NSQIP quality control measures. Additionally, the database includes data from surgeons from over 700 hospitals, which renders it impossible to eliminate the discrepancy between and variability of surgical techniques and their application. Thirdly, important data was not available in the database for analysis. This includes complications such as compartment syndrome, heterotopic ossification, and nerve injury, the latter of which being of particular concern in arthroscopic elbow surgery when compared to open surgery nerve injury. Finally, surgeon-specific variables including whether they were fellowship-trained and experienced in elbow arthroscopy were not available and could not be assessed.

Conclusion

The cumulative 30-day complication rate following elective elbow arthroscopy between the years 2015 and 2020 was 2.5%, with a 0.9% surgical site infection rate and 0.7% reoperation rate. This study showed for the first time that 10.7% of patients require at least one overnight hospital stay and 20.2% of patients have a prolonged operative time $\geq$ 120 min. Patients with a BMI $\geq$ 30 or inpatient operative setting have significantly higher rates of at least one overnight admission and a prolonged operative time compared to those with a BMI < 30 or outpatient operative setting, respectively. Patients with age > 50 years have significantly higher rates of overnight stay compared to patients with age $\leq$ 50 years. Patients of male sex or African American race have significantly higher rates of a prolonged operative time compared to those of female sex and Caucasian race, respectively. Surgeons should use this information to facilitate shared-surgical decision making, preoperative patient counseling, and strategic preoperative patient optimization.

Declaration of conflicting interests

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References

1. Pederzini LA, Di Palma F, Safran MR, et al. Elbow arthroscopy: state of the art. *J Isakos* 2017; 2: 279–294.

2. Moradi A, Pasdar P, Mehrad-Majd H, et al. Clinical outcomes of open versus arthroscopic surgery for lateral epicondylitis, evidence from a systematic review. *Arch Bone Jt Surg* 2019; 7: 91–104.
3. Kelly BC, Constantinescu DS, Pavlis W, et al. Arthroscopic versus open rotator cuff repair: fellowship-trained orthopaedic surgeons prefer arthroscopy and self-report a lower complication rate. *Arthrosc Sports Med Rehabil* 2021; 3: e1865–e1871.
4. Oh WT, Do WS, Oh JC, et al. Comparison of arthroscopy-assisted vs. Open reduction and fixation of coronoid fractures of the ulna. *J Shoulder Elbow Surg* 2021; 30: 469–478.
5. Li Y, Guo S, Li S, et al. Is there any difference in clinical outcome between open and arthroscopic treatment for tennis elbow? A systematic review and meta-analysis. *Orthop Surg* 2023; 15: 1931–1943.
6. Remily EA, Bains SS, Dubin JA, et al. Open versus arthroscopic elbow arthrolysis for primary osteoarthritis: a comparison of demographics and complications at two years. *J Orthop* 2023; 42: 30–33.
7. Ko CY, Hall BL, Hart AJ, et al. The American college of surgeons national surgical quality improvement program: achieving better and safer surgery. *Jt Comm J Qual Patient Saf* 2015; 41: 199–204.
8. Medline A, Muralidharan VJ, Codner J, et al. Organ-space surgical site infections: consequences and prediction using ACS-NSQIP. *Am Surg* 2022; 88: 1773–1782.
9. Raval M V and Pawlik TM. Practical guide to surgical data sets: national surgical quality improvement program (NSQIP) and pediatric NSQIP. *JAMA Surg* 2018; 153: 764–765.
10. Davis CL, Pierce JR, Henderson W, et al. Assessment of the reliability of data collected for the department of veterans affairs national surgical quality improvement program. *J Am Coll Surg* 2007; 204: 550–560.
11. Huffman KM, Cohen ME, Ko CY, et al. A comprehensive evaluation of statistical reliability in ACS NSQIP profiling models. *Ann Surg* 2015; 261: 1108–1113.
12. Shiloach M, Frencher SKJ, Steeger JE, et al. Toward robust information: data quality and inter-rater reliability in the American college of surgeons national surgical quality improvement program. *J Am Coll Surg* 2010; 210: 6–16.
13. Noticewala MS, Trofa DP, Vance DD, et al. Elbow arthroscopy: 30-day postoperative complication profile and associated risk factors. *Arthroscopy* 2018; 34: 414–420.
14. Nelson GN, Wu T, Galatz LM, et al. Elbow arthroscopy: early complications and associated risk factors. *J Shoulder Elbow Surg* 2014; 23: 273–278.
15. Papadonikolakis A, Jinnah A, Almasri TN, et al. Factors associated with complications of elbow arthroscopy. Analysis of 253 cases. *Arthroscopy* 2017; 33: e76–e77.
16. Camp CL, Cancienne JM, Degen RM, et al. Factors that increase the risk of infection after elbow arthroscopy: analysis of patient demographics, medical comorbidities, and steroid injections in 2,704 medicare patients. *Arthroscopy* 2017; 33: 1175–1179.
17. Intravia J, Acevedo DC, Chung WLJ, et al. Complications of elbow arthroscopy in a community-based practice. *Arthroscopy* 2020; 36: 1283–1290.
18. Pasic N, Akindolire J, Churchill L, et al. Cost and safety of inpatient versus outpatient open reduction internal fixation of isolated ankle fractures. *Can J Surg* 2022; 65: E259–E263.
19. Min CJ, Partan MJ, Koutsogiannis P, et al. Risk factors for hospital admission in patients undergoing outpatient anterior cruciate ligament reconstruction: a national database study. *J Orthop* 2020; 22: 436–441.
20. Padaki AS, Boddapati V, Mathew J, et al. The effect of age on short-term postoperative complications following arthroscopic rotator cuff repair. *JSES Open Access* 2019; 3: 194–198.
21. Boylan MR, Riesgo AM, Chu A, et al. Costs and complications of increased length of stay following adolescent idiopathic scoliosis surgery. *J Pediatr Orthop B* 2019; 28: 27–31.
22. Benito J, Stafford J, Judd H, et al. Length of stay increases 90-day readmission rates in patients undergoing primary total joint arthroplasty. *J Am Acad Orthop Surg Glob Res Rev* 2022; 6: e21.00271.
23. Schneider AM, Mucharraz C, Denyer S, et al. Prolonged hospital stay after arthroplasty for geriatric femoral neck fractures is associated with increased early mortality risk after discharge. *J Clin Orthop Trauma* 2022; 26: 101785.
24. Mundi R, Axelrod DE, Najafabadi BT, et al. Early discharge after total hip and knee arthroplasty-an observational cohort study evaluating safety in 330,000 patients. *J Arthroplasty* 2020; 35: 3482–3487.e3.
25. Moody AE, Gurnea TP, Shul CP, et al. True cost of operating room time: implications for an orthopaedic trauma service. *J Orthop Trauma* 2020; 34: 271–275.
26. Gowd AK, Liu JN, Bohl DD, et al. Operative time as an independent and modifiable risk factor for short-term complications after knee arthroscopy. *Arthroscopy* 2019; 35: 2089–2098.
27. Cregar WM, Goodloe JB, Lu Y, et al. Increased operative time impacts rates of short-term complications after unicompartmental knee arthroplasty. *J Arthroplasty* 2021; 36: 488–494.