Arthroscopic Rotator Cuff Repair: The Ambulatory Surgery Center at MGH West

Anshu Singh MD, Travis O'Brien BS, Jeffrey Wilson MD, Charles Kelly MD, Claire O'Brien RN, and Jon JP Warner MD

Massachusetts General Hospital

ABSTRACT

There is no consensus in the literature regarding the ideal perioperative management of arthroscopic rotator cuff repair. A collaborative protocol was established by the Orthopaedics and Anesthesia Departments at the inception of the MGH West Surgery Center in 2005. The purpose of this study is to systematically review relevant perioperative metrics from a single center. Patient satisfaction, perioperative complications, and two year clinical follow-up are presented. Interscalene block with laryngeal mask airway has a low complication rate, high patient satisfaction, and good clinical results.

DISCLOSURES

Each author certifies that he or she has no commercial associations that may pose a potential conflict of interest with this study.

Travis O'Brien B.A.
Medical Student
U of Rochester
travis.obrien7@gmail.com

Jon JP Warner MD
Chief, Harvard Shoulder Service
MGH
55 Fruit St YAW 3G
Boston, MA 02114
jwarner@partners.org

Jeffrey Wilson MD
Medical Director
MGH West Ambulatory Surgery Center
MGH Orthopaedic ASC
40 Second Avenue, Suite 200
Waltham, MA 02451
jwilson12@partners.org

Charles A. Kelly, MD
Assistant Medical Director
MGH West Ambulatory Surgery Center
MGH Orthopaedic ASC
40 Second Avenue, Suite 200
Waltham, MA 02451
ckelly9@partners.org

Claire O'Brien, RN, CNOR
Nurse Manager
MGH Orthopaedic ASC
40 Second Avenue, Suite 200
Waltham, MA 02451
cobrien14@partners.org

Anshu Singh MD
Shoulder and Elbow Surgeon
Kaiser Permanente, San Diego
anshu_singh@hotmail.com

INTRODUCTION

Rotator cuff repair is being performed with increasing frequency throughout the world. The progression from open to mini-open to a fully arthroscopic technique is well-documented in the literature[1]. Many recent publications have also focused on intra-operative goals and techniques. Peri-operative care, however, is not well-studied.

There is little consensus regarding the perioperative care of the patient undergoing arthroscopic rotator cuff repair. Many experienced arthroscopists around the world continue to routinely admit patients postoperatively. Even within a given center, some practitioners prefer interscalene catheters or blocks without general anesthesia, while others perform arthroscopy with full general anesthesia only.

There are many reasons for this inconsistency. Training is certainly a major factor. Interscalene blocks are an acquired skill that some anesthesiologists are more facile with than others. Surgeons worry about documented adverse events, such as pneumothorax, neuropraxia, and block failure. Others may prefer to monitor their patients postoperatively in a controlled inpatient setting. Finally, patients from different backgrounds have varied preferences and expectations regarding hospitalization. Some regard it as a convenience; others see it as a burden. Patient satisfaction and patient-centered care are emerging paradigms in medicine. We focus on patient-based metrics in the current study.

Surgeon practice patterns and volume have a direct impact on the delivery and quality of arthroscopic care[2]. A JBJS multivariate analysis by Green in 2005 revealed that surgeon factors explained variability in readmission rates and length of stay[3]. Sherman et al. found that surgeon volume, as well as patient age and comorbidities explained the variance in readmission rates.[4]

Clearly, physician practices affect expenditures. With rising healthcare costs around the world, it is critically important for all physicians to examine and eliminate wasteful practices. In the United States, annual spending on Medicare is growing faster than the GDP, quickly outstripping the ability of society to pay for medical care[5]. Given the increasing frequency and relative expense of arthroscopic procedures, this is a subject that needs to be considered.

MATERIALS AND METHODS

All patients initially presented to an orthopaedic surgeon. When surgical indications were met and informed consent was obtained, patients were booked for outpatient surgery within the MGH system. Those that were American Society of

Cancellations	Etiology	Ultimate Outcome
4 cases (0.31%)	Chest Pain after block	Negative cardiac workup, 23 hour admission
	Flank Pain after block	Negative workup, observed
	Unable to Intubate (2)	Awake intubations at Main OR

Admissions	Etiology	Ultimate Outcome
6 cases (0.46%)	Aspiration	Young male with SaO2 85% in recovery. Bilateral lung consolidations on CXR. 23 hour admission, no long-term issues.
	Chest Pain post-op	Negative cardiac workup, 23 hour admission
	Myocardial Infarction next day	Sternal chest pain the with inferior STEMI. Cath found clot at RCA. Female, on estrogen, with May-Thurner syndrome (possible higher clotting risk)
	Postoperative Pain	Admit for 23 hours from post-anesthesia recovery room
	Factitious seizure	Negative neurological workup. 23 hour admission.
	Intraoperative bradycardia (case halted)	HR48, BP 71/37. Negative cardiac workup, telemetry, and labs. 23 hour admission.

ED visits	Etiology	Ultimate Outcome
3 cases (0.23%)	Nausea and Vomiting**	Emergency Department visit only
	Pain and Vomiting**	Emergency Department visit only
	Allergy to pain medication**	Emergency Department visit only

Neurological Complications (no admissions)	Etiology	Ultimate Outcome
26 cases (1.95%)	Ear Numbness: 14 cases	100% resolved within 6 months
	Finger Numbness: 8 cases	Majority resolved within 5 days, 100% resolved within 4 months
	Distal Ulnar Neuropathy	Likely due to sling. 100% resolved
	Brachial Plexitis: 3 cases	1 patient treated with Immunogammaglobulin (IgG), 100% resolved. Two patients with permanent demyelinating disease, one diagnosed with multiple sclerosis the other with transverse myelitis.

Anesthesiologists class 1 or class 2 were considered for ambulatory surgery at MGH West at Waltham.

Interscalene Block

All patients received an interscalene block followed by light general anesthesia with laryngeal mask airway only.

Each day, blocks were performed by a single dedicated anesthesiologist with no other clinical duties. This duty was rotated amongst 5 proficient staff anesthesiologists using a fixed protocol. Procedures were performed in a monitored setting. Initially, in 2005, a nerve stimulator was used to localize the plexus. Ultrasound guidance provided more reliable visualization and was used exclusively beginning in 2006. 30 to 35 mL of 0.5% bupivicaine with 1:400,000 dilution of epinephrine was utilized.

After surgery, patients were monitored in the recovery room. They were discharged home after they were alert, oriented, hemodynamically stable, ambulatory, and comfortable. Time from arrival to the recovery room to discharge was recorded.

Between August 16th, 2005 to October 31st 2008, all patients with interscalene block were called and queried the next morning by a physician. The following data were obtained: first sensation of pain (duration), satisfaction, would the patient have the block again, specific complications such as nausea, problems voiding, ear numbness, incomplete block, and neuropraxia.

Charts were also reviewed for perioperative complications such as case cancellations, readmission, and Emergency Department visits. The ultimate outcome of each adverse event was reviewed.

Surgical Follow-up

All patients who underwent ambulatory arthroscopic rotator cuff repair by the senior author (JPW) between August 16th, 2005 to October 31st 2008 were included in the analysis. All rotator cuff repairs were performed as double row procedures whenever possible. Ancillary procedures included subpectoral biceps tenodesis, biceps tenotomy, acromioclavicular joint resection, and subacromial decompression, as indicated by preoperative examination. These procedures were performed in standard fashion, with validated techniques well-documented in the literature.

Patients were systematically followed at one week, six weeks, three months, and yearly after the procedure. Pre- and Post-operative subjective shoulder value, pre- and post-operative pain level, and post-operative range of motion were recorded.

RESULTS

Perioperative Complications

1,333 patients were treated with the aforementioned protocol. 17 patients could not be contacted the next day by a series

of three telephone calls initiated by the anesthesiologist. 33 patients had incomplete data sheets, for a total next day follow-up of 1,283 patients.

A total of 39 major and minor perioperative complications occurred, a rate of 2.9%. The following table summarizes the diagnoses and ultimate outcomes of each of these complications. Only 3 patients (0.23%) had permanent sequelae, including one myocardial infarction, and two patients with brachial plexitis. The vast majority of these proved to be transient.

Interscalene Block

Of the 1333 blocks reviewed, the initial 190 were performed with nerve stimulator guidance. The remaining 1143 were performed with ultrasound. There were 5 immediate block failures (0.38%), one of which was performed with nerve stimulation. 2 patients were successfully re-blocked pre-operatively, leaving 3 interscalene blocks (0.23%) that were ultimately unsuccessful. 2 patients (0.15%) had chest or flank pain (listed previously) that necessitated aborting the procedure for further monitoring.

The average duration of the block was 15 hours with 1:400,000 dilution of epinephrine. This duration could be extended by using a 1:200,000 dilution, but this theoretically increases the rate of neurological complications and is therefore not used at our center.

Patient Satisfaction 24 hours after Interscalene block		
Very Satisfied	1,171(91.27%)	99.07% satisfied
Satisfied	100 (7.8%)	
Unsatisfied	12 (0.93%)	0.93% unsatisfied

Patients were queried about their satisfaction with the block. 1,171 (91.27%) were "very satisfied," 100 (7.8%) were "satisfied" and 12 (0.93%) answered "unsatisfied." The twelve unsatisfied patients were asked why they were unsatisfied. 4 responded that the block wore off too soon, 3 felt uncomfortable with the numbness, 2 reported pain at the subpectoral biceps tenodesis site, and 3 had no stated reason.

Patients left the recovery room an average of 94 minutes after arrival.

Surgical Results

Average follow-up was 18 months. 31% of cases were revision rotator cuff repairs versus 69% primary repair. Visual-analog pain scores improved from 5.0 to 1.0. Average subjective shoulder value improved 36.5 to 82. Postoperative flexion was 134.5 degrees and external rotation was 37.5 degrees. Over 95% of patients would have the procedure again given their current experience.

DISCUSSION

Interscalene Block

The anesthesia team aims to provide analgesia, amnesia, as well as paralysis for amulatory rotator cuff repair. Interscalene block provides excellent analgesia, significantly decreasing the amount of opiods needed to control pain. It also serves as a paralytic. At our institution, a light general inhaled anesthetic is utilized adjunctively.

It is imperative that anesthesia be reproducibly safe. Although the anesthesiology literature has demonstrated lower cardiac risks, many surgeons remain apprehensive regarding possible neurological sequelae from interscalene blocks. In one of the larger series in the literature, Bishop and colleagues retrospectively reviewed 295 cases in a tertiary academic center and found no permanent neurological sequelae[6]. Our study, which includes a cohort that is four times greater than the referenced study, reveals only two patients (less than 0.02%) had neurological symptoms over 6 months. Both of them were later diagnosed with conditions (multiple sclerosis and transverse myelitis) that provided explanations for their symptoms.

A randomized control trial by Hazdic of 50 patients (25 in each arm) demonstrates the superiority of interscalene block over general anesthesia with pain, time to ambulation, and time to discharge as endpoints[7]. This study also underscores that, in the ambulatory setting, it is essential that the side effect profile be low enough that patients are discharged expeditiously without the need to go to the emergency room for nausea or pain. Our patients were discharged home about 90 minutes after being admitted to the recovery room from surgery. The incidence of arm pain, chest pain, pulmonary issues, or nausea requiring admission was less than 1% (10 in 1,333) in our study.

99% of patients were satisfied or very satisfied with their interscalene block.

Surgical

This study seeks to determine the efficacy of a set perioperative protocol for outpatient rotator cuff repair, but it is important to establish the equivalency of surgical outcomes. Almost one in three of our patients underwent revision rotator cuff repair, an independent risk factor for stiffness and failure. Our cohort of patients had improvement in subjective shoulder value and decrease in pain scores equivalent to findings in the literature. Patient satisfaction was greater than 90%.

Cost

A 2007 study at Columbia University found rotator cuff repair comparable with other common orthopaedic surgical procedures in terms of cost per quality-adjusted life year[8]. The study group was entirely inpatient cases, where patients were admitted an average of two days. An efficient outpatient protocol eliminates the need for inpatient admission. Assuming other costs are similar, savings may amount to thousands of dollars in associated expenses per case.

Cordasco and colleagues performed a cost analysis of inpatient and outpatient rotator cuff repair in a 2000 study[9]. They concluded that outpatient surgery provided 43% reduction in cost. Similar reduction in cost has been demonstrated for outpatient ACL surgery[10]. Clearly well-managed outpatient surgery provides significant cost savings to society. Assuming similar clinical outcomes and quality-adjusted life years, outpatient surgery likely is more cost efficient given its lower cost.

CONCLUSIONS

For patients with minimal comorbidities (ASA 1 or 2) undergoing arthroscopic rotator cuff repair, a perioperative protocol of interscalene block with laryngeal mask anesthesia results in high patient satisfaction, low perioperative complication rate, and a significant reduction in expenditure versus the equivalent inpatient procedure.

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