Review Article

Complications of Shoulder Arthroscopy

Todd C. Moen, MD
Glen H. Rudolph, MD
Kyle Caswell, DO
Christopher Espinoza, MD
Wayne Z. Burkhead, Jr, MD
Sumant G. Krishnan, MD

Abstract

Over the past 20 to 30 years, arthroscopic shoulder techniques have become increasingly popular. Although these techniques have several advantages over open surgery, surgical complications are no less prevalent or devastating than those associated with open techniques. Some of the complications associated with arthroscopic shoulder surgery include recurrent instability, soft-tissue injury, and neurapraxia. These complications can be minimized with thoughtful consideration of the surgical indications, careful patient selection and positioning, and a thorough knowledge of the shoulder anatomy. Deep infection following arthroscopic shoulder surgery is rare; however, the shoulder is particularly susceptible to *Propionibacterium acnes* infection, which is mildly virulent and has a benign presentation. The surgeon must maintain a high index of suspicion for this infection. Thromboemoblic complications associated with arthroscopic shoulder techniques are also rare, and studies have shown that pharmacologic prophylaxis has minimal efficacy in preventing these complications. Because high-quality studies on the subject are lacking, minimal evidence is available to suggest strategies for prevention.

From the W.B. Carrell Memorial Clinic, Dallas, TX (Dr. Moen and Dr. Burkhead), the Department of General Orthopedics and Shoulder Surgery, Lakeview Medical Center, Marshfield Clinic, Rice Lake, WI (Dr. Rudolph), Caswell Orthopedic Clinic, New Iberia, LA (Dr. Caswell), McBride Orthopedic Hospital Outpatient Clinic, Oklahoma City, OK (Dr. Espinoza), and The Shoulder Center, Baylor University Medical Center, Dallas, TX (Dr. Krishnan).

J Am Acad Orthop Surg 2014;22: 410-419

http://dx.doi.org/10.5435/JAAOS-22-07-410

Shoulder surgery has undergone a paradigm shift over the last 20 to 30 years. The introduction, development, and refinement of arthroscopic instrumentation and surgical techniques have prompted many surgeons to abandon traditional open procedures in favor of arthroscopic techniques. As the popularity of arthroscopic surgery has increased, proponents of these techniques have cited numerous advantages over open surgery, including lower complication rates.[1] However, complications are ubiquitous in surgery of any kind; it would be more appropriate to argue that complications of arthroscopic surgery are different from those of open surgery, but they are not necessarily less prevalent or devastating. Here, we review the general complications that are most commonly encountered in arthroscopic shoulder surgery and the etiology of these events, with the hope that this knowledge will help surgeons to minimize these events in their practices.[2]

Complications are best conceptualized in reference to when they occur: preoperatively, intraoperatively, or postoperatively. Specific risks of complications are inherent in these three phases of treatment and require the surgeon's attention. Complications associated with arthroscopic shoulder surgery can be minimized with careful patient selection, thoughtful consideration of surgical indications, appropriate patient positioning, detailed knowledge of shoulder anatomy, and judicious use of anesthesia.

Preoperative Complications

Patient Selection and Surgical Indications

Some complications associated with arthroscopic shoulder surgery can be avoided through appropriate patient section before the patient ever enters the operating room. Many shoulder procedures that were traditionally performed using an open approach are now routinely performed arthroscopically. Shoulder stabilization for anterior instability is one example. Traditionally, open shoulder stabilization has been considered the standard of care for surgical management of traumatic anterior instability.[3] Refinement of arthroscopic techniques and instrumentation has allowed surgeons to achieve results similar to those of open procedures, leading some to argue that arthroscopic techniques are the new standard of care.[4] However, the true standard of care for shoulder instability surgery remains controversial and is subject to debate.

Precise indications for arthroscopic versus open stabilization are beyond the scope of this review. However, there are certain surgical indications, such as instability in the face of glenoid or osseous deficiency of the humerus, for which an open stabilization procedure would likely be preferred over an arthroscopic technique. Performing an arthroscopic procedure when an open technique would more adequately address the underlying pathology can predispose a patient to recurrent instability. An arthroscopic procedure is not necessarily the best choice for every scenario. Surgeon experience with open and arthroscopic techniques and judicious evaluation of the patient's pathology play a role in minimizing the risk of complications. Although surgery for shoulder instability is the most salient example, these principles can be applied to management of rotator cuff disease and the myriad maladies that affect the shoulder.

Patient Positioning

Inappropriate patient positioning may be the leading cause of complications related to arthroscopic shoulder surgery.[2,5,6] Malpositioning can lead to significant and preventable soft-tissue injury and neurapraxia in both the upper and lower extremities. Regardless of the position used for shoulder arthroscopy, the surgeon must be intimately involved with patient positioning before the procedure. Surgeon participation at this stage ensures optimal orientation of the patient for the procedure, adequate padding of bony prominences, and appropriate protection of the neurovascular structures that are vulnerable to injury. Moreover, the surgeon may prefer a modification of positioning based on preoperative planning, which may not be readily apparent to other physicians or surgical assistants in the operating room. For example, an arthroscopic technique used to manage posterior instability may more easily be done in the lateral position; however, the surgeon may prefer the beach-chair position if conversion to an open procedure is likely.

Several fundamental principles should be followed when positioning patients for shoulder arthroscopy. When the beach-chair position is used, the cervical spine must be placed in a neutral position, and this position must be maintained. The head must be well seated and secured in a fixed head holder (Figure 1). Excessive pressure at the base of the skull in the region of the mastoid process must be avoided because it can result in neurapraxia of the posterior auricular nerve. In addition, there are reports in the literature of palsy of the hypoglossal and superficial nerves of the neck associated with excessive compression and rotation of the head while the patient is in the beach-chair position.[7,8] Compression on the eyes must be strictly avoided, and the endotracheal tube is best directed to the contralateral side to prevent interference with the surgical field. The hips and knees should be comfortably flexed to decrease lumbosacral pressure and tension on the sciatic nerve and to prevent caudal migration of the patient intraoperatively. The anesthesiologist should be encouraged to check the position of the head and neck often during surgery to ensure neutral positioning of the cervical spine. Excessive flexion, extension, rotation, or lateral bending of the cervical spine can lead to a brachial plexus injury.[9,10] Excessive extension of the cervical spine can predispose the patient to stroke.

When the lateral decubitus position is used, the previously described parameters for the head and neck

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Figure 1

Preoperative photograph demonstrating a patient in the beach-chair position. (Reproduced with permission from Krishnan SG, Pennington SD, Cooper DE, Burkhead WZ: General complications of arthroscopic shoulder surgery, in Gill TJ, Hawkins RJ, eds: *Complications of Shoulder Surgery: Treatment and Prevention*. Philadelphia, PA, Lippincott Williams and Wilkins, 2006, pp 125-131.)

should be respected, and the hips and knees should be flexed. (Figure 2, A). In this position, direct pressure is applied to the contralateral half of the body, which requires attention to several other areas in addition to the surgical arm.[1] Placement of an axillary roll under the contralateral upper ribs prevents pressure on the brachial plexus; however, pressure-induced brachial plexus palsy associated with the use of the lateral decubitus position has been described in patients with a cervical rib, even when appropriate axillary padding was used.[9,10] The peroneal nerve is subcutaneous at the fibular head on the contralateral leg and must be padded to prevent sequelae associated with prolonged pressure.[11]

In addition to overall positioning and padding of the body, the surgeon must carefully position the surgical arm. Intraoperatively, a longitudinal, perpendicular traction device is used to hold the arm in an abducted position (Figure 2, B). The appropriate amount of abduction (combined with varying degrees of flexion) required for visualization remains a topic of debate and ranges from zero to 90°. Klein et al[12] reported a reduced incidence of brachial plexus strain when the arm was positioned at 45° of forward flexion and both zero and 90° of abduction. An arm position of approximately 25° to 30° of abduction in the scapular plane (with approximately 30° of forward flexion) is usually adequate for visualization.

Knowledge of the anatomy and how the position of the neck and arm affect the brachial plexus is crucial to avoiding complications associated with the lateral decubitus position. The brachial plexus is fixed at two positions: at the transverse processes by the prevertebral fascia and at the axillary fascia.[13] Neck extension and bending to the contralateral side puts tension on the brachial plexus, as does external rotation and abduction of the arm.[5] While the patient is in the lateral position, the minimal amount of traction required to distract the glenohumeral joint should be applied to minimize the risk of neurapraxia. Excessive traction in either vector (longitudinally or perpendicular to the glenohumeral joint) should be avoided to prevent strain on the brachial plexus and peripheral nerves of the surgical arm. The position of neurovascular structures relative to the glenohumeral joint can change as abduction and traction are applied to the surgical arm, placing the musculocutaneous and axillary nerves at greatest risk of injury[14] and increasing the potential for iatrogenic injury if care is not taken when operating on a patient in the lateral decubitus position.

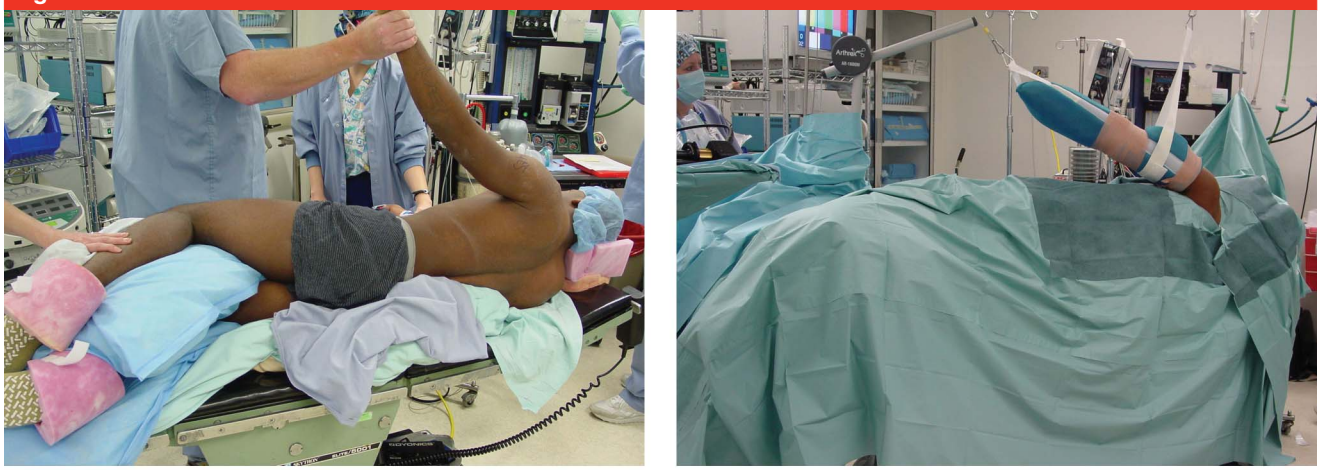
Intraoperative Complications

Neurovascular Injury

Although shoulder arthroscopy has proved to be safe, the proximity of standard portals to neurovascular structures places nerves at risk of iatrogenic injury. During shoulder arthroscopy, direct neurologic injury is a rare and potentially catastrophic event. The axillary, suprascapular, and musculocutaneous nerves are most vulnerable to direct injury. Knowledge of the specific anatomy of these nerves, their location relative to standard portal placement, and the proximity of the nerves during specific procedures is critical for the safe performance of arthroscopic shoulder procedures.

The normal and variant anatomy of the axillary nerve has been well described.[15-18] The axillary nerve is at risk of injury during the placement of standard arthroscopic portals, most notably anterior and inferior portals. Posterior portals are typically safe in terms of the risk of neurovascular injury. Classic posterior portal placement, 2 cm medial and 2 cm inferior to the posterolateral corner of the acromion, is typically a minimum of 2 to 3 cm away from the axillary nerve[19,20] (Figure 3). When placed properly, an accessory portal created at the 7-o'clock position has also been described as safe because it is >39 mm from the axillary nerve.[21] Proper placement of lateral portals also can prevent injury to the axillary nerve. Burkhead et al[22] described a "safe zone" located within 3 cm of the lateral border of the acromion; lateral working portals placed within this zone avoid the axillary nerve. Placement of the Port of Wilmington (located approximately 1 cm lateral and 1 cm anterior to the posterolateral corner of the acromion) and anterosuperolateral portals is also

Figure 2



A B

A, Preoperative photograph demonstrating placement of padding for a patient in the lateral decubitus position. **B,** A traction device is used to hold the surgical arm in an abducted position. (Reproduced with permission from Krishnan SG, Pennington SD, Cooper DE, Burkhead WZ: General complications of arthroscopic shoulder surgery, in Gill TJ, Hawkins RJ, eds: *Complications of Shoulder Surgery: Treatment and Prevention.* Philadelphia, PA, Lippincott Williams and Wilkins, 2006, pp 125-131.)

safe given the distance from the portal to the adjacent neurovascular structures.[19,20]

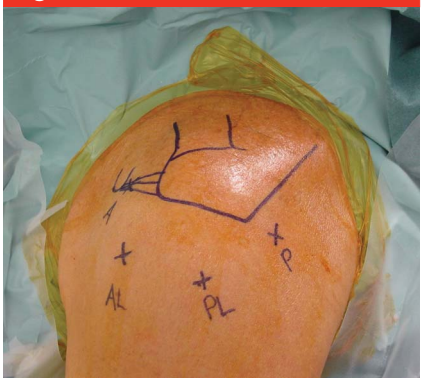
Compared with posterior portals, anterior portals, particularly anteroinferior portals, are associated with a greater risk of injury to neurovascular structures during arthroscopic surgery. In a study of cadaver specimens and clinical data, placement of a standard anterior portal lateral to the coracoid through the rotator interval has been shown to be safe.[23] However, given the proximity of the axillary nerve to the inferior glenoid and joint capsule, the margin of safety diminishes as the portal is placed in progressively inferior positions.[19,20]

Specific surgical procedures, particularly glenohumeral capsular release, thermal capsulorrhaphy, and arthroscopic stabilization, have been shown to have an increased risk of axillary nerve injury. Arthroscopic capsular release through the anteroinferior and posteroinferior axillary pouch and recesses places the nerve at risk of injury because of its proximity to the inferior capsule.[16] Capsulolabral sutures used during arthroscopic stabilization have been implicated in injury to the axillary nerve, especially when they are used in a capsular shift of the anteroinferior band of the inferior glenohumeral ligament.[1] However, sutures placed within the glenohumeral capsule no further lateral than 1 cm from the glenoid rim are at a relatively safe distance from the axillary nerve.[24] During more advanced arthroscopic techniques, such as the arthroscopic Latarjet (in which the coracoid is transferred to a deficient anteroinferior glenoid) and arthroscopic axillary nerve release, surgical instruments are in close proximity to the axillary nerve; therefore, these procedures should be performed with caution.[25-27]

The unique anatomy of the suprascapular nerve[28,29] makes it vulnerable to injury during shoulder arthroscopy, although the incidence of nerve injury is low. Historically, the suprascapular nerve was vulnerable to injury during "blind" transglenoid drilling in instability procedures.[28,29] The use of suture anchors has become more prevalent, helping to diminish the risk of injury to the nerve.[30] This injury is not unique to arthroscopic shoulder surgery; it has also been documented with overly aggressive lateral mobilization of a retracted rotator cuff tear.[29] Therefore, a safe zone of no more than 2 cm for cuff mobilization from medial to lateral to the superior glenoid rim must be respected during juxtaglenoid capsulotomy and cuff mobilization. Arthroscopic surgical decompression at the suprascapular and spinoglenoid notch also puts the nerve at risk of injury and require a thorough knowledge of suprascapular nerve anatomy.[31,32]

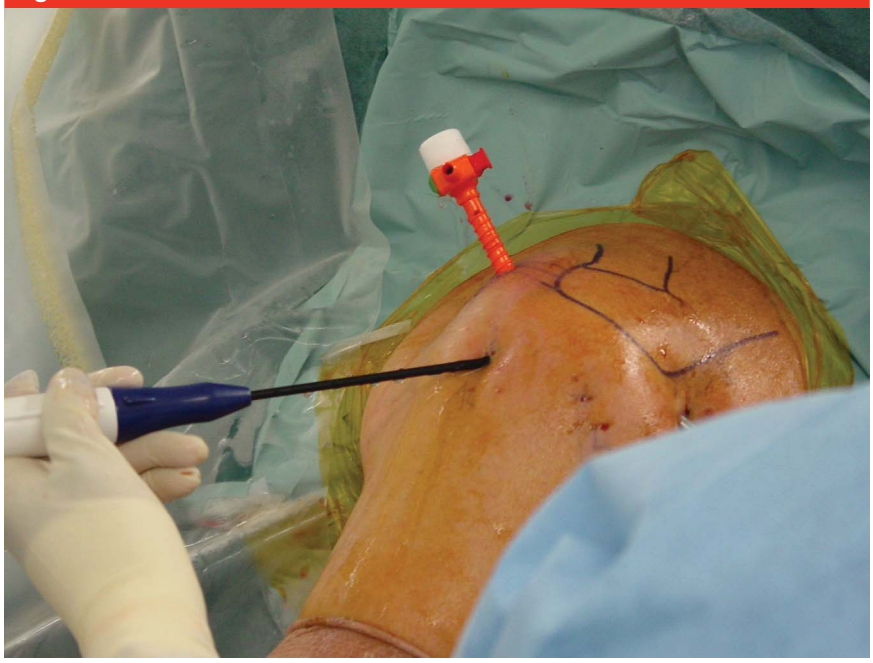
The musculocutaneous nerve is also at risk of injury during arthroscopic shoulder surgery, and studies on new, cutting-edge procedures such as arthroscopic Latarjet have focused on determining the relationship of the musculocutaneous nerve to specific portals.[26,33] Standard placement of an anterior working portal is typically midway between the coracoid and anterolateral corner of the acromion (Figure 4). Inferior or medial

Figure 3



Clinical photograph of the shoulder demonstrating markings for placement of the anterior (A), anterolateral (AL), posterolateral (PL), and posterior (P) portals for arthroscopic shoulder surgery. The posterior portal is placed 1 cm inferior and 1 cm medial to the posterolateral acromion. (Reproduced with permission from Krishnan SG, Pennington SD, Cooper DE, Burkhead WZ: General complications of arthroscopic shoulder surgery, in Gill TJ, Hawkins RJ, eds: *Complications of Shoulder Surgery: Treatment and Prevention*. Philadelphia, PA, Lippincott Williams and Wilkins, 2006, pp 125-131.)

Figure 4



Intraoperative photograph demonstrating the position of an anterior arthroscopic working portal midway between the coracoid and anterolateral acromion. (Reproduced from Krishnan SG, Pennington SD, Cooper DE, Burkhead WZ: General complications of arthroscopic shoulder surgery, in Gill TJ, Hawkins RJ, eds: *Complications of Shoulder Surgery: Treatment and Prevention*. Philadelphia, PA, Lippincott Williams and Wilkins, 2006, pp 125-131.)

placement of this portal can place the musculocutaneous nerve at risk of injury. This risk can be diminished with the insertion of a spinal needle through the rotator interval under direct visualization or by creation of an inside-out portal. Recently, many arthroscopic procedures (eg, arthroscopic Latarjet) that are performed in close proximity to the coracoid have been described, and the anatomic relationship of this bony process to the musculocutaneous nerve has received appreciable interest in the literature.[26,34]

Neurologic Events

Neurologic complications associated with shoulder arthroscopy are rare; when they do occur, they can be devastating. Adverse events such as neurapraxia of the great auricular nerve or cranial nerve,[35] injury to the cervical plexus,[7] opthalmoplegia,[36] and fatal venous air embolism[37] have been reported. However, the most severe and well-studied complications are ischemic events caused by hypoperfusion. Stroke,[38,39] central nervous system infarct,[40] and vision loss[36] associated with shoulder surgery have been reported, and these events occurred almost exclusively during arthroscopy performed with the patient in the beach-chair position. While the patient is awake, the autonomic nervous system regulates systemic blood pressure to maintain cerebral perfusion, particularly when moving from a supine to an upright position.[41,42] General anesthesia impairs the autonomic nervous system's ability to maintain blood pressure, particularly with changes in position. Thus, cerebral circulation is at risk of hypoperfusion during arthroscopic shoulder surgery performed using the beach-chair position, placing the patient at risk for an ischemic event.

The easiest way to minimize the risk of a catastrophic neurologic event is to perform the arthroscopy using the lateral decubitus position; this position has been associated with substantially fewer cerebral hypoperfusion events than has the beach-chair position.[43-45] However, if arthroscopy must be performed using the beach-chair position, the surgeon and anesthesiologist can take measures (eg, positioning the blood pressure cuff at the level of the patient's heart, inserting an arterial line) to maintain an accurate assessment of the patient's blood pressure. They also can vigilantly monitor and maintain intraoperative and perioperative blood pressure to avoid severe decreases in perfusion pressures of the central nervous system.[46] Additionally, recent research has shown that shoulder arthroscopy performed

with regional anesthetic and intravenous sedation has a substantially lower rate of cerebral desaturation events.[47]

Postoperative Complications

Infection

Deep infection following arthroscopic shoulder surgery is a rare complication; however, the rate of infection increases substantially when an arthroscopic procedure is converted to an open procedure. Typical risk factors for perioperative infection following arthroscopic shoulder surgery are similar to those for orthopaedic surgery in other joints and include obesity, diabetes, smoking, peripheral vascular disease, immunocompromise, history of prior surgery, and prior joint aspiration or injection. However, the shoulder is vulnerable to a specific subset of bacteria (*Propionibacterium acnes*) as well as systems-based risks of infection associated with the surgical instrumentation used in arthroscopic surgery. When recognized, deep shoulder infection can be effectively managed with surgical débridement and appropriate antibiotic therapy. In addition, specific steps can be taken to minimize infection during surgical site preparation and in the setting of conversion from an arthroscopic to an open procedure.

The incidence of deep infection after arthroscopic shoulder surgery ranges from zero to 3.4%.[1,48,49] Although deep infection can be successfully managed with surgical débridement and appropriate antibiotic therapy, the results of procedures complicated by infection are inferior to those without infection. In two studies, a total of 108 arthroscopic subacromial decompressions were performed, and two bacterial infections that required revision surgery were reported.[50,51] In a study of 263 patients treated with arthroscopic rotator cuff repair and antibiotic prophylaxis, Brislin et al[52] reported one deep infection (0.4%). The infection was diagnosed 2 weeks postoperatively after the development of cellulitis at the anterior portal. Despite the use of oral antibiotic therapy, drainage began 1 week later. The patient underwent arthroscopic irrigation and débridement. All implants and sutures were removed, and re-repair was performed with margin convergence suturing alone. The infection was successfully eradicated following a 6-week course of systemic antibiotics as directed by an infectious disease specialist. Marrero et al[48] reported on the long-term results of 33 all-arthroscopic rotator cuff repairs. One infection developed 2 months after the index surgery. Open débridement was performed twice and systemic antibiotic therapy was prescribed. At an average follow-up of 151 months, the authors reported a mean University of California, Los Angeles shoulder score of 31.8 and a score of 18 in the shoulder complicated by infection.

The shoulder is particularly susceptible to infection by *P acnes*, a gram-positive, microaerophilic, non–spore-forming bacillus.[53] It is mildly virulent and has a benign initial presentation, with minimal systemic symptoms, minimal to no local reaction, and nearly normal laboratory values. However, *P acnes* has been implicated in infection at multiple sites throughout the body and has a predilection for affecting the shoulder.[53-58] Recently, *P acnes* has been recognized as the main causative agent of infection in several series on shoulder arthroplasty[55,57,59] and rotator cuff repair.[54,58] Given its benign clinical presentation and the fact that *P acnes* often takes up to 2 weeks to grow in culture, the orthopaedic surgeon must maintain a high index of suspicion along with clinical vigilance and patience to correctly identify this type of infection.[53]

In addition to the unique bacterial flora of the shoulder, the surgical instruments used in arthroscopic shoulder procedures increase the risk of perioperative infection if they are not adequately sterilized. Armstrong and Bolding[60] investigated seven infections in a series of 352 arthroscopic procedures performed over a 9-month period at a single surgical center (2% infection rate). The authors found that inadequate use of a disinfectant solution, glutaraldehyde, likely attributed to the outbreak. Correction of the deficiencies in instrument sterilization decreased the number of infections to one in 579 arthroscopic procedures performed the following year. In a series of 67 arthroscopic procedures performed over a 2-week period at a single hospital, Tosh et al[61] reviewed seven *Pseudomonas aeruginosa* surgical site infections. The authors found retained tissue in the lumen of both inflow/outflow cannulae and arthroscopic shaver hand pieces, prompting the US FDA to release a safety alert regarding retained tissue in arthroscopic shavers despite sterilization performed in accordance with the manufacturer's guidelines.

It has been suggested that specific surgical site preparations can diminish bacterial loads, minimizing the risk of perioperative infection. In a prospective study of 150 patients undergoing shoulder surgery, Saltzman et al[62] randomly used one of three different preparation solutions: ChloraPrep (Cardinal Health), DuraPrep (3M), and povidone-iodine scrub and paint. They found that coagulase-negative *Staphylococcus* and *P acnes* were the most commonly isolated organisms before skin preparation. Following preparation, the overall rate of positive cultures was 7% for ChloraPrep, 19% for DuraPrep, and 31% for povidone-iodine. These differences

were statistically significant. The authors concluded that ChloraPrep, which contains chlorhexidine and alcohol, is more effective than DuraPrep and povidone-iodine for eliminating bacteria from the skin before shoulder surgery.

In addition to proper preoperative skin preparation, antibiotic prophylaxis has been shown to substantially reduce the rate of infection following arthroscopic shoulder surgery. In a series of 4,000 arthroscopic procedures performed without antibiotic prophylaxis, D'Angelo and Ogilvie-Harris[63] noted 9 cases (0.23%) of septic arthritis confirmed with cultures of joint aspirate. Arthroscopic lavage, systemic antibiotic therapy, and an additional 187 hospital days were required to treat these patients. The authors noted that patients had symptomatic sequelae and suggested antibiotic prophylaxis as a possible way to reduce hospital costs and patient morbidity. Randelli et al[49] reported on a series of 9,385 shoulder arthroscopies performed over a 1-year period, noting an infection rate of 0.16% (15 infections). Infection was diagnosed an average of 15 days after surgery (range, 3 to 40 days). Ten infections were successfully managed with antibiotic therapy alone and five were managed with antibiotics and lavage. The authors noted a significant difference in the infection rate of patients who received antibiotic prophylaxis and those who did not (0.095% versus 0.58%; $P = 0.01$).

The risk of infection increases if an arthroscopic procedure is converted to an open one; however, this risk can be diminished if the surgical site is prepared before the open portion of the procedure. In a series of 360 patients treated with mini-open rotator cuff repair following arthroscopic subacromial decompression, Herrera et al[54] reported an infection rate of 1.9%. On the basis of this initial experience, the authors modified their protocol to include a second betadine paint preparation after the arthroscopy, glove change by all surgical staff, and application of a new extremity drape before making the incision for mini-open repair. They reported no postoperative infections in the subsequent 200 mini-open rotator cuff repairs.

Thromboembolic Events

Thromboembolic complications are rare following arthroscopic shoulder surgery.[49,52,64-69] Because the reported incidence of these complications is low, minimal (if any) high-quality evidence exists in the literature to develop strategies for prevention. The incidence of thromboembolic events associated with the use of beach-chair and lateral decubitus positions is equal.[49,52] The most comprehensive studies have shown that pharmacologic prophylaxis has minimal efficacy in preventing these complications, even in patients with factors that predispose them to these complications.[49,64-71] Thus, the optimal strategy for minimizing thromboembolic events following shoulder arthroscopy remains unknown.

When thromboembolic complications occur, they typically affect patients with some form of thrombophilia. The risk factors for deep vein thrombosis (DVT) and/or pulmonary embolism (PE) following shoulder arthroscopy mirror those for DVT and PE in general: increased age, diabetes mellitus, obesity, heritable forms of thrombophilia, and malignancy.[36,64,67-70] Burkhart[70] reported on an upper extremity DVT that led to the discovery of asymptomatic Hodgkin lymphoma. He advocated for the evaluation of systemic or local anatomic abnormalities in the setting of thromboembolism following shoulder arthroscopy. In a small case series of three patients with DVT after shoulder arthroscopy, Bongiovanni et al[64] reported that all three tested positive for heritable thrombophilia.

Pharmacologic prophylaxis may not affect the incidence of thromboembolic events following shoulder arthroscopy. In the largest study to date of DVT and PE after shoulder surgery, Jameson et al[67] retrospectively reviewed English National Health System data from January 2005 to June 2008. For 65,302 arthroscopic shoulder procedures, the incidence of PE was 0.01%. The authors compared the incidence before and after the implementation of national thromboprophylaxis guidelines regarding the use of chemical agents in shoulder surgery. They found no significant difference between event rates before and after the initiation of these guidelines. In a study of the incidence of infection and thromboembolic events following arthroscopic shoulder procedures, Randelli et al[49] reported 6 events (5 DVT and 1 PE) in a series of 9,385 shoulder arthroscopies. These data were from an online survey of 59 surgeons, 20 (34%) of whom reported the use of antithrombotic prophylaxis for arthroscopic shoulder surgery. The authors noted that the risk of DVT was not significantly decreased in the patients who received antithrombotic prophylaxis.

A DVT or PE discovered after shoulder arthroscopy should be treated in the same manner as a DVT or PE found after any orthopaedic procedure. Management of symptomatic thromboembolism following shoulder arthroscopy should include medical consultation with an internist or vascular surgeon for recommendations regarding the type and duration of anticoagulation therapy. Emergent medical stabilization with monitoring in the intensive care unit and systemic or local thrombolysis may be necessary in the setting of hemodynamic instability. Finally, patients should be counseled that thromboembolic events may affect surgical outcomes.

In a case study by Burkhart,[70] the patient reported no residual shoulder pain and had full range of motion and a negative apprehension test following labral débridement complicated by ipsilateral upper extremity DVT. In a case report of DVT and PE following repair of superior labral anterior-posterior tear, Creighton and Cole[65] reported that the patient had no residual pain. However, in a retrospective review of 1,908 shoulder arthroscopies in which six patients had a thromboembolic event, Kuremsky et al[71] noted the development of adhesive capsulitis, delayed recovery, and incomplete recovery secondary to pain in two of six patients.

Summary

Complications associated with arthroscopic surgery are not necessarily less prevalent or less devastating than those associated with open procedures; the complications are different. Thoughtful consideration of the surgical indications for arthroscopic shoulder surgery, careful patient selection and positioning, detailed knowledge of the shoulder anatomy, and judicious use of anesthesia can minimize the risk of many complications associated with arthroscopic shoulder surgery.

References

Evidence-based Medicine: Levels of evidence are described in the table of contents. In this article, reference 62 is a level I study. Reference 54 is a level III study. References 1, 3-13, 37, 52, 53, 58, 59, 61, 63-66, and 70 are level IV studies.
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