



CASE REPORT

Deltoid Compartment Syndrome following Shoulder Arthroscopy: A Case Report

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Abstract

Acute deltoid compartment syndrome is a rare event. This is a report of a 70-year-old male who developed an acute deltoid compartment syndrome after a shoulder arthroscopy. Due to a mechanical heart valve, the patient was required to remain on anticoagulation for the procedure. A bony acromioplasty and arthroscopic biceps tenodesis were performed. On the first day after surgery increased swelling and pressure consistent with a hematoma was appreciated. The pressure caused increased deltoid compartment pressures. A diagnosis of compartment syndrome was made, and the patient was treated with an emergent decompression and delayed closure. He went on to have no deficits and excellent improvement in pain control. We recommend close observation for all patients who must remain on anticoagulation and require a bony procedure during shoulder arthroscopy.

Keywords

Compartment syndrome, Deltoid, Fasciotomy, Arthroscopy, Acromioplasty, Tenodesis

with taking anticoagulants or a bleeding disorder [3]. In shoulder arthroscopy, complications are infrequent but include soft-tissue injury, neuropraxia and infection, and a case of deltoid compartment syndrome with shoulder arthroscopy has never been reported [4].

Case Report

A 70-year-old male with a past medical history of a mechanical aortic valve, congestive heart failure with ejection fraction of 43%, hypertension, diabetes mellitus and hyperlipidemia were planned for a shoulder arthroscopy. Prior to this procedure, the patient had failed a course of nonoperative treatment include injections, physical therapy and non-steroidal anti-inflammatory medications. The patient was pre-admitted before the procedure for anticoagulation management. He had been managed on warfarin preoperatively. On the surgical date, the International Normalized Ratio (INR) value was 1.9, and our lab range of normal is 0.9-1.1.

The patient underwent a preoperative interscalene block and sedation anesthesia. A beach chair position was utilized. Using a posterior, lateral, anterior-lateral and lateral portal an arthroscopic subacromial decompression with acromioplasty, labral debridement and biceps tenodesis was performed. The tenodesis was performed arthroscopically with an interference screw. Excessive bleeding was not encountered, and meticulous hemostasis was maintained throughout the procedure. Postoperatively, the patient was restarted on warfarin, and at the request of a cardiology consult service, the patient was started on heparin.

On the morning of postoperative day number two,

Introduction

Compartment syndrome occurs when pressure within one of the body's compartments increases to the point where blood flow is impeded. After six to eight hours of elevated tissue pressure, compartment syndrome can lead to irreversible damage, and the recommended treatment is fasciotomy and decompression for tissue pressures 10-20 mmHg below diastolic pressure [1]. Fasciotomy may also be indicated for an absolute pressure measuring greater than 30 mmHg [2]. In the upper extremity sixty-nine percent of cases are associate with fracture, and in hand and forearm compartment syndrome, 10 percent were associated

the patient began having increased swelling and pain in his operative shoulder. This was 12 hours after surgery, but the pain and sensation of pressure had only been reported for one hour. Upon examination, the shoulder was firm. A deltoid compartment pressure measurement was assessed using an intra-compartmental pressure measurement (Stryker Kalamazoo, MI), and it measured 50 mmHg. The patient's diastolic blood pressure was 68 mmHg, and he was diagnosed with an acute deltoid compartment syndrome.

The patient was taken emergently to the operating room. A beach chair position was utilized without an interscalene block. A deltopectoral approach was made. Upon opening the skin, the deltoid muscle was swollen. A significant hematoma was evacuated from the subacromial space, subdeltoid space and around the biceps tenodesis site. The fascia over the deltoid was released. A large non-compressible drain was placed and the wound was left open with a vacuum assisted closure dressing. Anticoagulation was held. 72 hours later, the patient was taken back to the operating room. With removal of the vacuum dressing, the deltoid and surrounding musculature appeared healthy. The wound was able to be closed using the Allgower modification of the Donati vertical mattress suture technique [5]. The patient was restarted on anticoagulation. Upon observation, the deltoid remained soft and supple. He did not have a reoccurrence of the same pain.

Three months postoperatively, he had healed well, though with some residual stiffness, though a delay in his being able to attend physical therapy might have contributed to this. His range of motion at that time was 130 degrees of forward elevation and 30 degrees of external rotation. Final follow up was at 17 months postoperatively. He demonstrated 140 degrees of forward elevation, 40 degrees of external rotation and internal rotation to approximately L3. At final follow up, had had symmetric strength in shoulder forward elevation, external rotation and internal rotation. Subjectively, the patient reported no pain in the shoulder.

Discussion

Increased postoperative tissue pressures leading to a deltoid compartment syndrome is rare. A review of the available literature demonstrated only seven cases reported. Of those seven cases, only one was associated with a surgical intervention [6]. In that case, the authors treated a humerus fracture with an antegrade humeral nail, and the patient developed a compartment syndrome within three hours of surgery. A superficial deltoid fascia release was performed, but no hematoma was encountered. Both our patient and that patient had an excellent recovery at 3 months.

Six additional reports of deltoid compartment syndrome have occurred. Knapke, et al. reported on deltoid compartment syndrome caused by a B12 injection [7].

Rohde, et al. reported a deltoid compartment syndrome that resulted from the intraoperative positioning of the patient [8]. The additional cases occurred after a soft tissue contusion [9], a drug over dose leading to long periods of compression [10] and subclavian artery angioplasty and stenting [11]. Unlike most upper extremity compartment syndromes, only the one operatively treated case was associated with a fracture.

Despite the infrequency of deltoid compartment syndrome, this complication should be kept in mind when considering bony procedures on patients who must stay on anticoagulation therapy. We recommend observation of these patients in the immediate postoperative period and the use of closed suction drainage in the subdeltoid and subacromial space. Timely diagnosis and surgical treatment are needed to prevent irreversible tissue damage.

Conflict of Interest

BOP is a consultant for Arthrex and receives royalties from Arthrex. BOP is an editor for Journal of Bone and Joint Surgery Reviews.

All other authors declare that they have no conflicts of interest to disclose.

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References

- Whitesides TE, Heckman MM (1996) Acute compartment syndrome. Update on diagnosis and treatment. *J Am Acad Orthop Surg* 4: 209-218.
- Yaun PS, Pring ME, Gaynor TP, Mubarak SJ, Newtwn PO (2004) Compartment syndrome following intramedullary fixation of pediatric forearm fracture. *J Pediatr Orthop* 24: 370-375.
- Prasarn ML, Ouelette EA (2011) Acute compartment syndrome of the upper extremity. *J Am Acad Orthop Surg* 19: 49-58.
- Moen TC, Rudolph GH, Caswell K, Espinoza C, Burkhead WZ Jr, et al. (2014) Complications of shoulder arthroscopy. *J Am Acad Orthop Surg* 22: 410-419.
- Gaffney D, Slabaugh M (2009) Deltoid compartment syndrome after antegrade humeral nailing. *J Orthop Trauma* 23: 229-231.
- Mueller ME, Allgower M, Scheider R, Willenegger H (1995) *Manual of internal fixation techniques recommended by the AO-ASIF group*. (3rd edn), Springer-Verlag, New York, USA.
- Knapke DM, Truumees E (2004) Posterior arm and deltoid compartment syndrome after vitamin B12 injection. *Orthopedics* 27: 520-521.
- Rohde RS, Goitz RJ (2006) Deltoid compartment syndrome: A result of operative positioning. *J Shoulder Elbow Surg* 15: 383-385.
- Diminick M, Shapiro G, Cornell C (1999) Acute compartment syndrome of the triceps and deltoid. *J Orthop Trauma* 13: 225-227.

10. Mubarak SJ, Owen CA, Hargens AR, Garetto LP, Akeson WH (1978) Acute compartment syndromes: Diagnosis and treatment with the aid of the wick catheter. *J Bone Joint Surg Am* 60: 1091-1095.
11. Klocker J, Chemelli A, Bodner G, Gschwendtner A, Perkmann R, et al. (2003) Hyperperfusion syndrome of the deltoid muscle after subclavian artery angioplasty and stenting. *J Endovasc Ther* 10: 833-837.