



Carotid sinus hypersensitivity due to shoulder sling pressure after arthroscopic rotator cuff repair: a case report

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The beach chair position is one of the most commonly used positions in arthroscopic shoulder surgery because of its anatomical nature and easy modifiability to open surgery. Despite these advantages, thromboembolic and neurologic complications have been reported. We report a case of carotid sinus hypersensitivity due to shoulder sling pressure after arthroscopic shoulder surgery.

Key words: Arthroscopic shoulder surgery; carotid sinus hypersensitivity; shoulder sling.

Arthroscopic shoulder surgery is most commonly performed using the beach chair (BC) position. Advantages of the use of the BC position include its anatomical nature, easy convertibility to open surgery and low risk of traction neuropathy.^[1-4] Although its safety and convenience in shoulder surgery is well-delineated, thromboembolic and neurological incidents have been reported.^[1-3,5,6]

Carotid sinus hypersensitivity (CSH) is an overreaction of carotid sinus baroreceptors to stimulation. Even gentle stimulation can cause bradycardia and a decrease in blood pressure in these individuals.^[7]

As far as we know, no cases have been presented reporting CSH due to shoulder sling application. In this paper, we present a patient with CSH due to compression of a shoulder sling after arthroscopic rotator cuff repair in the BC position.

Case report

A 56-year-old female patient (weight: 75 kg; BMI: 33.4) admitted to our clinic with the chief complaints of night pain and pain and weakness in daily activities. The patient's history did not reveal any obvious cardiac or neurological disorder. Physical examination revealed decrease in ROM, primarily in elevation and external rotation. Radiological examination showed a full-thickness non-retracted anterosuperior rotator cuff tear. Arthroscopic rotator cuff repair was planned. Preoperative medical examination, including cardiologic assessment, showed no pathological conditions and the patient was scored as ASA 2 according to American Society of Anesthesiologists classification.

Arthroscopic rotator cuff repair was performed under general anesthesia with the patient in the BC position. The patient was hemodynamically stable dur-

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ing the operation. After the completion of the operative procedure, 100% oxygen was administered. A 30 degrees shoulder sling with a waist strip was applied before the patient was fully awake. After spontaneous breathing began, the patient was moved to supine position. Immediately following this position shift, the patient developed bradycardia. Pulse decreased to 45 bpm from 70 bpm and 0.5 mg atropine was administered intravenously. A second dose of 0.5 mg of atropine was administered as the patient showed no sign of improvement. Meanwhile, the patient's blood pressure decreased to non-measurable limits. Despite the intravenous application of 10 mg ephedrine and 0.5 mg adrenaline, the bradycardia worsened and the patient developed peripheral cyanosis. CPR was applied. Meanwhile, it was noticed that the patient's right upper extremity extended off the edge of the table causing extension and pressure on the carotid region. The sling was loosened considering CSH (Figs. 1 and 2). Immediately following loosening of the sling, cardiac rhythm and blood pressure returned to the normal range and peripheral pulses were palpable. Patient was extubated after acquiring spontaneous breathing and hemodynamic stabilization.

The patient was questioned postoperatively about the previous hypotension and syncope attacks in detail but no signs of previous problems were noted. The patient's carotid sinus was postoperatively stimulated in both supine and sitting positions under monitorization for classical signs of bradycardia, hypotension, and asystole to confirm diagnosis of CSH. Transthoracic ECO and bilateral Doppler for the carotid artery were normal and the patient was discharged on the 5th postoperative day.



Fig. 1. Shoulder sling application. [Color figure can be viewed in the online issue, which is available at www.aott.org.tr]

Discussion

Arthroscopic shoulder surgery is most commonly performed in the BC position. After recent studies disclosing brachial plexus and forearm nerve traction injuries in the lateral decubitus position, BC position has become more popular.^[1] Skyhar et al. suggested that the BC position is an easy, practical technique that minimizes traction nerve injuries and permits access to all kinds of arthroscopic shoulder surgery procedures.^[8] Further advantages of the BC position include the restoration of anatomy, easy accessibility to airways, practical convertibility to open surgery and prevention of brachial plexus traction injury by using only the weight of the arm itself for traction. However, rare complications including ischemic brain damage due to serious hemodynamic changes and spinal cord injuries have also been reported in the BC position.^[1,3,9,10]

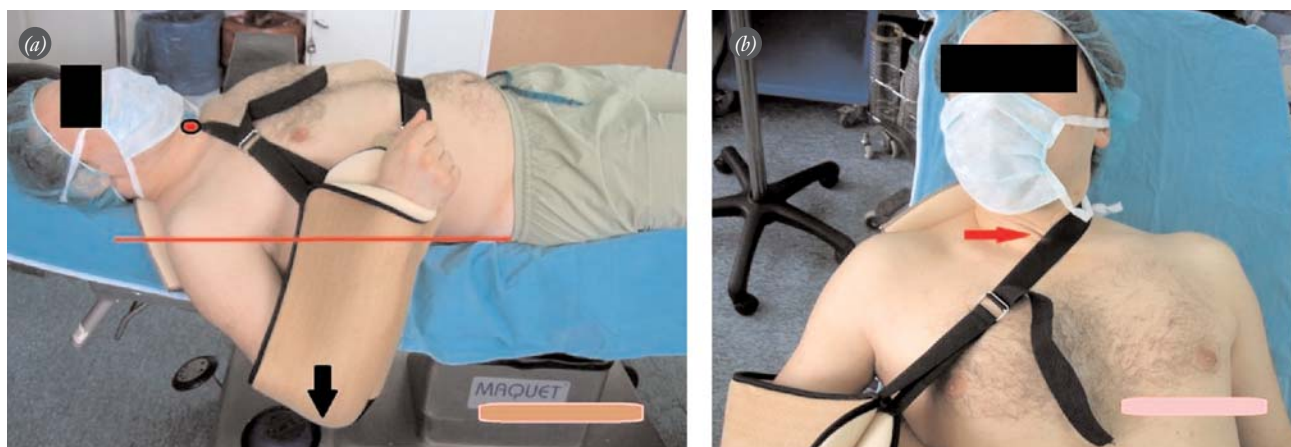


Fig. 2. (a, b) The patient's right upper extremity extended off the edge of the table causing extension and pressure on the carotid region. [Color figure can be viewed in the online issue, which is available at www.aott.org.tr]

It is well known that inappropriate head and neck positioning can provoke cutaneous neuropraxia or even midcervical quadriplegia.^[2,11] Pohl and Cullen reported four cases of ischemic brain damage and spinal cord injury, one being fatal.^[1] In addition, neuropraxia in the 9th, 10th and 12th cranial nerves,^[12] hypoglossal nerve palsy,^[2,11] midcervical quadriplegia,^[2] greater auricular neuropraxia,^[13] cutaneous branch neuropraxia in the cervical plexus,^[14] sudden loss of vision and ophthalmoplegia^[6] are among rare neurological complications possible in shoulder surgery performed in the BC position.

In their review about stroke and mortality risk discussion, Papadonikolakis et al. stressed that anesthesiologists should be alert to blood pressure levels in shoulder procedures where a relative hypotension is desired.^[10] However, Friedman et al. suggested that the BC position is not a risk factor for intraoperative cerebrovascular incident or stroke.^[15]

It is mandatory to maintain and recheck neutral head and neck positions to avoid possible complications during the surgical procedures using the BC position.^[1]

Carotid sinus hypersensitivity is an overreaction of the carotid sinus baroreceptors to stimulation. Etiological factors include female gender, advanced age (over 50 years), hypertension, coronary heart diseases, orthostatic hypotension, and vasovagal syncope attacks.^[7,16] Induced carotid sinus hypersensitivity (ICSH) is the condition of hypersensitive response to carotid sinus massage when the patient is examined for syncope attacks. In other words, the only finding is CSH with massage.^[7] ICSH is a more common condition than spontaneous carotid sinus syndrome, with typical findings of hypotension, bradycardia and asystole.^[7,17]

In our case, the sudden cessation of the hypotension, bradycardia, asystole and cyanosis after the loosening of the shoulder sling aided in the diagnosis of ICSH. The patient's age and gender also supported our diagnosis. The absence of preoperative syncope and unexplained spontaneous falls also supported the diagnosis of CSH with iatrogenic pressure caused by the shoulder sling strap. Wentink et al. suggested that ICSH is highly relevant in BC position.^[17] Kapoor stressed that a carotid sinus massage must be repeated in the BC position even when negative in the supine position.^[18] Parallel to the existing data, we believe that the operation was a contributing factor for ICSH in our patient. Meanwhile, it was clearly observed that

the overhang of the patient's upper right extremity from the edge of the operating table caused contralateral point pressure.

According to Rains et al., cases with hypotension, bradycardia and cardiac arrest are commonly undiagnosed or unreported.^[2] As far as we know, our case with CSH and cardiac arrest after shoulder arthroscopy in the BC position is the first one reported.

In conclusion, we recommend cautious use of a shoulder sling or similar fixation materials in the upper extremity for cases with high risk of ICSH. The shoulder sling must be applied appropriately so that the elbow joint is not extended from the midaxillary line and direct pressure that may cause CSH must be avoided.

Conflicts of Interest: No conflicts declared.

References

1. Pohl A, Cullen DJ. Cerebral ischemia during shoulder surgery in the upright position: a case series. *J Clin Anesth* 2005;17:463-9.
2. Rains DD, Rooke GA, Wahl CJ. Pathomechanisms and complications related to patient positioning and anesthesia during shoulder arthroscopy. *Arthroscopy* 2011;27:532-41.
3. McCulloch TJ, Liyanagama K, Petchell J. Relative hypotension in the beach-chair position: effects on middle cerebral artery blood velocity. *Anaesth Intensive Care* 2010;38:486-91.
4. Peruto CM, Ciccotti MG, Cohen SB. Shoulder arthroscopy positioning: lateral decubitus versus beach chair. *Arthroscopy* 2009;25:891-6.
5. Kwak HJ, Lee JS, Lee DC, Kim HS, Kim JY. The effect of a sequential compression device on hemodynamics in arthroscopic shoulder surgery using beach-chair position. *Arthroscopy* 2010;26:729-33.
6. Bhatti MT, Enneking FK. Visual loss and ophthalmoplegia after shoulder surgery. *Anesth Analg* 2003;96:899-902.
7. Tan MP, Newton JL, Chadwick TJ, Parry SW. The relationship between carotid sinus hypersensitivity, orthostatic hypotension, and vasovagal syncope: a case-control study. *Europace* 2008;10:1400-5.
8. Skyhar MJ, Altchek DW, Warren RF, Wickiewicz TL, O'Brien SJ. Shoulder arthroscopy with the patient in the beach-chair position. *Arthroscopy* 1988;4:256-9.
9. Dippmann C, Winge S, Nielsen HB. Severe cerebral desaturation during shoulder arthroscopy in the beach-chair position. *Arthroscopy* 2010;26:148-50.
10. Papadonikolakis A, Wiesler ER, Olympio MA, Poehling GG. Avoiding catastrophic complications of stroke and death related to shoulder surgery in the sitting position. *Arthroscopy* 2008;24:481-2.
11. Rhee YG, Cho NS. Isolated unilateral hypoglossal nerve palsy after shoulder surgery in beach-chair position. *J Shoulder Elbow Surg* 2008;17:e28-30.

12. Cogan A, Boyer P, Soubeyrand M, Hamida FB, Vannier JL, Massin P. Cranial nerves neuropraxia after shoulder arthroscopy in beach chair position. *Orthop Traumatol Surg Res* 2011;97:345-8.
13. Ng AK, Page RS. Greater auricular nerve neuropraxia with beach chair positioning during shoulder surgery. *Int J Shoulder Surg* 2010;4:48-50.
14. Park TS, Kim YS. Neuropraxia of the cutaneous nerve of the cervical plexus after shoulder arthroscopy. *Arthroscopy* 2005; 21:631.
15. Friedman DJ, Parnes NZ, Zimmer Z, Higgins LD, Warner JJ. Prevalence of cerebrovascular events during shoulder surgery and association with patient position. *Orthopedics* 2009;32(4).
16. Kerr SR, Pearce MS, Brayne C, Davis RJ, Kenny RA. Carotid sinus hypersensitivity in asymptomatic older persons: implications for diagnosis of syncope and falls. *Arch Intern Med* 2006;166:515-20.
17. Wentink JRM, Jansen RWMM, Hoefnagels WH. The influence of age on the response of heart rate and blood pressure to carotid sinus massage in healthy volunteers. *Cardiol Elderly* 1993;1:453-9.
18. Kapoor JR. Carotid sinus hypersensitivity: a diagnostic pearl. *J Am Coll Cardiol* 2009;54:1633.