Editorial
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Hypotensive and bradycardic episodes in the sitting position during shoulder arthroscopy using interscalene block: can those be alerted?

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The sitting position of arthroscopic shoulder surgery has gained wide acceptance among orthopedic surgeons [1,2]. Advantages include easier airway access, placing the anatomy in the standard upright position, and less bleeding in the upright position; it also facilitates checking the effect of different positions of the arm on the involved anatomy and enables use of the weight of the arm for traction. Comparing the lateral decubitus position, favored by surgeons for three reasons: there may be no need for unnatural traction on the shoulder which may compromise capsular repairs; the procedure may be converted to open surgery without repositioning; and the incidence of traction neuropathies is significantly decreased [3-5].

Interscalene block (ISB) can be selected as primary anesthetic technique for shoulder surgery with excellent intraoperative anesthesia, muscle relaxation [6], and low complication rate [7], as well as the opportunity for postoperative analgesia [8].

Bradycardia and/or hypotension (BH) episodes seen in 13–29% of patients undergoing shoulder arthroscopy in the sitting position after ISB [9-12]. BH episodes, which if anticipated, are of minor significance, but which in the extreme may lead to cardiac arrest. And also serious complications such as brain and spinal cord ischemia, transient visual loss, and ophthalmoplegia caused by hypotension have been documented in patients who have undergone shoulder surgery in the upright position [13].

Seo et al [14] performed a retrospective study to investigate contributing factors for the occurrence of BH episodes. Anesthetic records and block data sheets of 63 patients having underwent in the sitting position during shoulder arthroscopy after ISB were reviewed and they have analyzed the demographic data, intraoperative medications, the block sides of ISB, use of epinephrine in local anesthetics, degree of sensory blockade, and percent change of heart rate or systolic blood pressure (SBP) according to BH episodes. BH episodes were defined as bradycardia and/or hypotension. Bradycardia was defined as a decline in heart rate to less than 50 bpm and a requirement of atropine. Hypotension was similarly defined as a decline in systolic blood pressure (SBP) to less than 100 mmHg and a requirement of ephedrine.

This current retrospective study have observed that overall percent of BH episodes was 20.6%. The authors have founded that relatively more right side ISBs were noticed in the BH group than in the non-BH group ($P = 0.048$) and relatively higher incidence of fentanyl supplement in the BH group than in the non-BH group ($P = 0.000$). Percent change of heart rate 15 and 20 minutes after sitting positioning was significantly decreased in the BH group whereas percent change of SBP at 5 minutes after sitting position was significantly decreased as compared with non-BH group. They concluded that the side of ISB and fentanyl supplementation due to incomplete block can be possible new contributing factors for the occurrence

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of BH episodes in shoulder arthroscopic surgery.

Several studies hypothesized that the etiology of the hypotension and bradycardia was based on a combination of peripheral vasodilation from the sitting position, increased contractility of the heart secondary to absorbed epinephrine from block mixture, and vigorous contraction of an "empty" ventricle [15]. The most likely cause of the observed events in those having ISB for shoulder arthroscopy in the sitting position is a form of vasovagal syncope mediated by the Bezold-Jarisch reflex. The mechanism of the Bezold-Jarisch reflex is thought to be venous blood pooling (induced by the sitting position) and a heightened cardiac contractile state (induced by the P-adrenergic effects of epinephrine or isoproterenol) which result in reflex arterial vasodilation (mediated by activation of the parasympathetic nervous system) and a subsequent vagally mediated bradycardia [16,17]. Recently Kim's study [18] have reported that sequential compression device and elastic stockings reduce the incidence of hypotension with less hemodynamic instability in the sitting position during shoulder arthroscopy. Their study's results support that venous blood pooling induced by the upright position is associated with the hypotensive episodes.

In Seo's retrospective study, they discussed that the underlying mechanism of the newly found contributing factors such as right side of ISB and fentanyl supplement may be associated partly with sympathetic inhibition and/or parasympathetic innervation. The authors suspected that the right side of ISB involved the right side of the stellate ganglion block (SGB) which have been reported to be related with vagal reflex [19]. However, the signs induced by SGB such as Horner's sign were not described in anesthesia records and block data sheets with a limitation of this retrospective study. So a prospective and randomized study is still needed to confirm that the right side of ISB involved the right side of SGB is associated with the occurrence of BH episodes. It is not surprising to have observed in this study that fentanyl may be related with bradycardia or hypotension especially in the patient of stressful condition such as incomplete blocks which were suspected in this current study. The studies have discussed that role of endogenous opioids is related with vasovagal syncope [20] and fentanyl inhibits GABAergic transmission to cardiac vagal neurons in the nucleus ambiguus, providing one mechanism for the opioid induced bradycardia [21].

The interesting observation of this current retrospective study is to alert anesthesiologists to the possibility of potentially dangerous BH events when using right side of ISB or fentanyl supplement for shoulder arthroscopy in the sitting position; when significant decrease of heart rate at 15 and 20 minutes after sitting positioning or significant decrease of SBP at 5 minutes after sitting position are observed. Therefore progression from prodromal symptoms to cardiovascular collapse or other serious complications may be avoided if therapeutic intervention is applied as early possible and as appropriately.

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