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CASE REPORT

Transient Hypertension after Ultrasound-guided Interscalene Block

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ABSTRACT

The interscalene approach to brachial plexus block has been a conventional technique of regional anaesthesia for shoulder surgeries. The use of ultrasound for the procedure has improved not only pain scores perioperatively but also reduced block-related complications. To date, the most popular known complications include partial block effect, paraesthesias, pneumothorax, phrenic nerve involvement, spinal anaesthesia, and cervical cord injuries. The authors report here a lesser-known complication of transient hypertension after administration of ultrasound-guided interscalene block.

A 55-year-old woman presented with left shoulder pain after a fall and was diagnosed with a closed proximal humerus fracture. She had no significant medical history, normal vitals, and was cleared for surgery. In the operation theatre (OT), an ultrasound-guided interscalene block (ISB) was performed. Within minutes, she developed severe hypertension (up to 200/120 mmHg) with stable heart rate and normal ECG, along with hoarseness of voice. Labetalol and fentanyl were ineffective, but nitroglycerin (NTG) infusion controlled BP within 30 minutes. Surgery proceeded after stabilization, and the intra- and postoperative periods were uneventful.

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Transient hypertension after ISB is underreported. It is likely due to carotid baroreceptor blockade. Clinicians should keep this complication in mind before performing this procedure, and further studies are warranted to manage it.

Keywords: Interscalene block, ultrasound, regional anaesthesia, hypertension, brachial plexus, shoulder surgery

BACKGROUND

ISB is a widely accepted regional anaesthesia technique for anaesthetising shoulder surgeries. The current technique not only provides adequate perioperative analgesia but also significantly reduces opioid consumption, improves patient satisfaction and enables easier postoperative mobility and early discharge.[1] With the emergence of ultrasound-guided practice, there has been substantial improvement in block performance, as it allows real-time needle visualization and appreciation of target structures such as nerves and vasculature around it. The use of ultrasound has significantly minimized complications like pneumothorax, nerve injury, phrenic nerve palsy, and local anaesthetic systemic toxicity.[2]

With the practice of ultrasound-guided procedures, complications related to ISB have significantly decreased. There is still a void in the literature about transient hypertension without tachycardia after this block. The authors intend to report this dangerous complication, as it requires careful management and can be life-threatening if not recognized and treated within the stipulated time frame.

CASE PRESENTATION

A 55-year-old female presented after a fall from stairs, with left shoulder pain. There was no history of head injury, ENT bleed, loss of consciousness, or vomiting. X-ray of the left shoulder revealed a closed proximal humerus fracture.

She had no significant medical history. Vital signs were stable (pulse 72/min, BP 130/82 mmHg), and systemic examination was normal. Laboratory investigations were within normal limits. Pre-anaesthetic evaluation deemed her fit for surgery with standard anaesthetic risk, and she was scheduled for the surgery.

In the OT, standard monitors (SpO_2, non-invasive blood pressure (NIBP), ECG) were attached. Baseline vitals were recorded (PR 70/min, BP 130/80 mmHg, normal sinus rhythm). Premedication was given with 1mg midazolam and 50 µg fentanyl IV.

An ultrasound-guided ISB with nerve stimulator assistance was administered using 10 mL of 2% lignocaine and 10 mL of 0.5% bupivacaine (total 20 mL). Within 2 minutes, the patient developed numbness and warmth in the arm. Subsequently, within 15 minutes of block administration, blood pressure rose to 180/110 mmHg and peaked at 200/120 mmHg, persisting despite a stable heart rate (70–80/min) and normal ECG.

Invasive BP monitoring was established in the right radial artery, which confirmed the elevated readings shown in Figure 1. The patient developed hoarseness of voice without other symptoms within 25 minutes of block

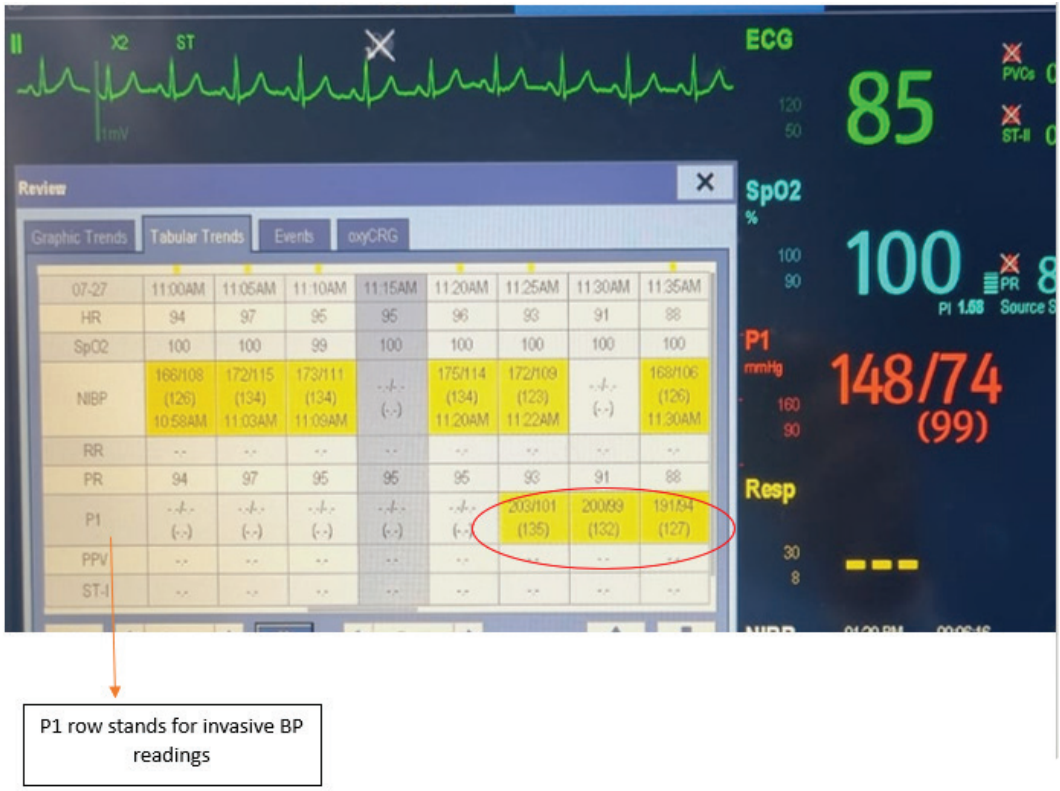


Figure 1: Shows elevated blood pressure readings after ISB.

administration. Intermittent labetalol (10 mg × 4) and additional fentanyl (25 µg × 2) were administered over 1 hour, with no significant BP reduction (remaining 180–210/100–120 mmHg). NTG infusion was then initiated, resulting in gradual BP reduction within 30 minutes to 130–150/70–90 mmHg. After blood pressure stabilised in 1.5 hours, the surgical procedure was started. The patient remained haemodynamically stable throughout the procedure, which lasted 2 hours. NTG was tapered as per haemodynamics and discontinued. The immediate postoperative period and subsequent monitoring were uneventful.

DISCUSSION

The technique of delivering local anaesthetic into the fascial sheath of the brachial plexus via the interscalene approach was described in the 1970s.[3] Thereafter, it has been widely practiced as a regional anaesthesia technique for shoulder and upper limb surgeries. This technique has proven to have lower pain scores, reduced opioid consumption, better patient satisfaction, and improved joint mobility in postoperative physiotherapy.[4,5] However, no technique comes without complications; the well-known complications of this approach are: pneumothorax, neurological deficits, phrenic nerve palsy, total spinal anaesthesia, and cervical cord injury. Ultrasound use significantly reduces these complications.[6-8] These complications result from plexus anatomy, physiological factors, technique, and performers' experience.[9]

The anatomical reasons are due to the spread of local anaesthetic to nearby structures such as the stellate ganglion, phrenic nerve, recurrent laryngeal nerve, epidural/subarachnoid space, and contralateral plexus. Clinical manifestations vary – for example, stellate

ganglion block may cause Horner's syndrome, while phrenic nerve involvement may lead to hemi-diaphragmatic paralysis.[10,11]

Current literature available has well emphasised hypotension and bradycardia following block, but hypertension is not.[12] There are only a few reports available on hypertension without tachycardia, which highlights the need to understand the mechanism and causes behind this phenomenon. Proposed causes and mechanisms include anatomical factors such as carotid receptor proximity, patient characteristics such as a history of hypertension, anterior scalene muscle thickness, anatomical laterality (right vs left side), and autonomic disturbance conditions such as diabetes mellitus.

A prospective cohort study by Mahmut Sami Tutar et al. in which ultrasound-guided ISB was given. The study found that anterior scalene muscle thickness, increased carotid intima-media thickness (CIMT), and a history of hypertension were independent predictors of hypertension after ISB. A thin anterior scalene may allow an extensive spread of local anaesthetic to the surrounding structures like the carotid sinus. It was also concluded that increased CIMT is a marker of atherosclerosis and is associated with impaired baroreceptor sensitivity, which can exacerbate hypertensive responses following ISB.[12]

Similarly, A. Hernandez et al. reported that out of 75 patients who were given ISB prior to GA, 12 patients (16%) had hypertension in normotensive patients within 5 to 10 minutes of block. Of these, 6 patients (50%) required antihypertensive treatment, indicating a significant number.[13]

The current case is comparable to the literature reported. Hypertensive responses following ISB have been linked to local anesthetic (LA) spread to carotid baroreceptors, regulating blood pressure via the glossopharyngeal nerve.[13]

A simpler explanation is that carotid sinus stimulation causes a 15% drop in blood pressure. This fact has been utilised in modern medicine as a therapy to control blood pressure in resistant hypertension.[14] Therefore, blockade of the carotid sinus has been proposed as a mechanism for temporary hypertension.[15,16]

Furthermore, Yurtlu et al. observed that right-sided ISB had significantly higher BP readings compared to left-sided blocks. This was explained by the dominance of right-sided sympathetic cardiovascular outflow and left-sided dominance of parasympathetic outflow.[12]

In the current case, persistent hypertension for about 1hour may reflect transient failure of contralateral carotid baroreceptor compensation.[17,18]

Also, conditions like diabetes mellitus can cause autonomic dysfunction and impaired vascular responses, which can further compromise cardiovascular stability, especially in patients with hypertension.[13]

CONCLUSION

Hypertension following interscalene block, although uncommon, is a clinically relevant phenomenon. Possible explanations include carotid baroreceptor involvement, anatomical factors, pre-existing hypertension, block laterality, and autonomic dysfunction.

Awareness of these factors may help clinicians anticipate and appropriately manage transient

hypertensive responses following interscalene block.

AUTHORS' CONTRIBUTIONS

Concept and design: SKM, AP, AM

Literature review: SS, SK, VN, AKY, AM

Compilation of manuscript: SS, SKM, AP

Manuscript editing & proofreading: SS, VN, SK

DECLARATION OF CONFLICTS OF INTEREST

The authors declare no competing interests.

DECLARATION OF PATIENT'S CONSENT

Informed written consent to use data regarding the patient, procedure, and its related complications for publication purposes was obtained.

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