

Dreadful Cardiopulmonary Arrest Following Simple Interscalene Block-A case report

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Abstract: We are reporting a case of cardiopulmonary arrest following Interscalene brachial plexus block in a 27-year-old short neck obese female patient who was an anticipated case of difficult intubation having fracture shaft Humerus(Left) posted for open reduction and internal fixation. Immediately after nerve locater guided Interscalene brachial plexus block, patient started desaturating and developed respiratory arrest, progressing towards cardiac arrest. It seems that it resulted from the activation of Bezold-Jarisch reflex and a related vasovagal syncope. We managed the case and patient was revived successfully.

Keywords: Complication, Nerve locater guided interscalene block, cardiopulmonary arrest.

INTRODUCTION

Interscalene approach to the brachial plexus is the most proximal approach to brachial plexus block and is utilised commonly for procedures performed on or near the shoulder joint and arm [1] like shoulder arthroscopy and various fractures. It has been shown to provide several advantages over general anaesthesia. These advantages include less postoperative nausea, vomiting, reduction in both intraoperative and postoperative doses of opiates, shorter stay in the post anaesthesia care unit, early discharge from hospital and less intraoperative blood loss, good intraoperative and postoperative analgesia [2-5] and patient satisfaction.

Although Interscalene approach to brachial plexus block is quite safe, a wide variety of complications have been reported with it. We reported a case of cardiopulmonary arrest following nerve locater guided Interscalene block which can be due to activation of Bezold-Jarisch reflex and a related vasovagal syncope [6,7].

Vasovagal syncope is loss of consciousness caused by reduced arterial pressure and blood supply to the brain, mediated mainly through neural mechanisms rather than primary cardiac dysfunction. Bradycardia and vasodilation are the characteristic changes that

cause systemic hypotension. The trigger may be central, from psychological stress or pain, or may be initiated peripherally by a reduction in venous return to the heart [8]. The Bezold-Jarisch reflex overlaps with vasovagal syncope.

D'Alessio *et al.* [3] reported that the mechanism of the Bezold-Jarisch reflex during shoulder arthroscopic surgery was thought to be due to venous blood pooling and reflex arterial vasodilation causing hypotension (due to activation of the parasympathetic nervous system) and a subsequent vagally mediated bradycardia. Bezold-Jarisch reflex has now come to include reactions triggered by cardiac mechanoreceptor activation and it has been used to describe intraoperative bradycardia with hypotension [8].

CASE REPORT

A 27-year-old short neck obese female patient, an anticipated case of difficult intubation, having fracture shaft humerus (Left) admitted in our hospital for Open Reduction and Internal Fixation surgery of shaft of humerus. She was 78 kg in weight, 166 cm in height, BMI-28, no previous history of obstructive sleep apnoea and her past medical history and family history was not significant (ASA- I). We avoided intravenous sedative drugs before block. As per the standard

institutional protocol the patient performed an overnight fasting and after written informed consent, nerve locator guided Interscalene block was planned as mode of anaesthesia for surgery. After taking patient in operation theatre standard monitors were attached like non-invasive blood pressure cuff, ECG and pulse oximeter, 20 G intravenous cannula was inserted and fluid started (ringer lactate). Her baseline blood pressure, heart rate and SpO₂ were 126/78mmHg, 100 beats/min. regular and 97% respectively.

The patient was placed in the supine position with her head turned to the right and left side of the neck was prepared and draped in a sterile manner. After the injection of a skin wheal, a 22-G, 5 cm insulated needle was inserted between the bellies of the anterior and middle scalene muscles at the level of the cricoid cartilage (C6) and advanced in the medial, dorsal and slightly caudal direction. After getting contractions of Anterior Deltoid muscle with 0.4 mA current at approximately 3 cm depth by nerve locator and after negative aspiration and a confirmed negative response to a 4-mL test dose of local anaesthetic solution, Inj. Bupivacaine 0.5%, 15 ml diluted upto 20 ml and Inj. Lignocaine 2% ,10 ml diluted upto 15ml was administered. Aspiration before, during, and after injection revealed no blood or cerebrospinal fluid.

After performing nerve locator guided Interscalene block, within 60-90 seconds of drug injection she became unresponsive, bradycardia (from 100/min. to 30/min.) carotids was not palpable, started desaturating (SpO₂—100% to 30%) and developed respiratory arrest, progressing towards cardiac arrest. No seizure activity was noted. Immediately inj. Atropine 0.6 mg given intravenously along with a rapid saline and repeated once again in the next minute. Patient was ventilated with 100% oxygen on Bain's circuit, then trachea was intubated with cuffed endotracheal tube no. 7.0 without the need of a neuromuscular blocking agent, ventilation was continued with 100% oxygen. Saturation increased to 100% within 2- 3 minutes and heart rate increased around 86/min, regular.

Within 30 min, she regained consciousness, she started breathing spontaneously with good efforts, followed all verbal commands, showed good muscle tone with stable vitals, pupils bilaterally reactive normal sized. So, patient was extubated uneventfully with an adequate gag reflex. However left eye lid drooping and hoarseness of voice was present with adequate anaesthesia in the left arm. Surgery was postponed and patient was shifted to ICU for observation. After 6 hours, left arm motor power and sensation returned to normal, however analgesia remained for 9 hours.

DISCUSSION

Complications following Interscalene brachial plexus block reportedly includes haematoma formation,

subarachnoid injection, subdural injection, phrenic nerve paralysis, Intravascular L.A. injection, recurrent laryngeal nerve paralysis, L.A.S.T. (L.A. systemic toxicity), Pneumothorax [9], Respiratory arrest [10], Development of transient cardiac bruits [11], Vasovagal attack, Horner's syndrome.

Vasovagal attack—most probable diagnosis of exclusion

The triggers of vasovagal reflex are 1) painful or noxious stimuli, 2) fear of bodily injury, 3) prolonged standing, 4) exertion, 5) coughing, swallowing or straining etc. Most vasovagal episodes seem to be associated with a number of different peripheral receptors. It is thought that the afferent neural signals are derived from organ receptors, which respond to mechanical or chemical stimuli. In any event, the afferent neural signals associated with triggering vasovagal syncope ultimately converge on the nucleus tractus solitarius in the medulla as well as the hypothalamus. Generally, three responses in vasovagal syncope are observed: 1) cardioinhibitory 2) vasodepressor or 3) a mixed response with features of both cardioinhibitory and vasodepressor. Among these responses, the cardioinhibitory response results from increased parasympathetic tone and may be manifested by any or all of the following ECG findings: 1) sinus bradycardia, 2) advanced atrioventricular block and 3) PR interval prolongation [12].

Regional anaesthetic technique, in an awake patient, and any surgical procedure may result in side effect like vasovagal episodes, which if anticipated, are of minor significance, but which in the extreme cases may even lead to cardiac arrest. In all regional techniques, an incidental intravenous injection or rapid absorption can result in central nervous system toxicity.

Pharmacologically, bupivacaine has been reported to produce cardiac arrhythmias, anaphylaxis [13] and cardiac arrest if accidentally injected intravascularly. Among the arrhythmias, bradycardia is most common [14]. Intravascular injection was probably not a factor in our patient, as frequent needle aspiration was carried out during the procedure and also there was no seizure activity present. Extensive spread of local anaesthetic to the epidural, subdural, subarachnoid space may cause cardiovascular compromise but is rare [15] and probably not in our case also.

Loss of consciousness and respiratory arrest occurred very rapidly in this case, while epidural anaesthesia has a slow onset. Therefore, the possibility of epidural injection is very unlikely in our case.

In high spinal anaesthesia, sudden severe hypotension occurs, which was not seen in our case. A more reassuring finding to exclude subarachnoid block

is that there was no bilateral loss of sensory and motor functions.

The most likely cause of the observed event in our case is a form of vasovagal syncope mediated due to patient's anxiety and activation of Bezold-Jarisch reflex which is an inhibitory reflex originating in cardiac sensory receptors with vagal afferents, which are influenced by either chemical or mechanical stimuli [8]. Activation of the Bezold-Jarisch reflex initiates from an empty hypercontractile ventricle, which causes stimulation of intramyocardial mechanoreceptors (C fibers) and produces an abrupt withdrawal of sympathetic outflow, increasing vagal tone and thus causing bradycardia and hypotension.

The activation of Bezold-Jarisch reflex in such situations can be prevented by some of preoperative and intraoperative interventions like:

- Preventing the decrease in ventricular volume using adequate intravenous fluids preoperatively and intraoperatively.
- Inhibiting the afferent limb of the reflex using a vagolytic drug.

CONCLUSION

We all are aware that no procedure is absolutely safe and adequate for all patients, and Interscalene approach to brachial plexus block is no exception from this rule. However, if following precautions are observed while performing Interscalene block, then the complications associated with it can be minimised-

- The clinician performing the block first should undergo training and demonstrate competencies in the various Interscalene block techniques available [12].
- History of syncopal episodes should be taken.
- Always perform the block on patient under sedation. (Ramsay score<3).
- Avoid performing the block in an uncomfortable and non-cooperative patient.
- Always use a short bevelled needle ~25– 35 mm in size.
- Do not probe deeper than 1–1.5 inches.
- Needle should be in posteroinferior direction.
- Use of nerve stimulator or ultra-sonographic guidance.
- Each patient before undergoing Interscalene block must be evaluated for the status of recurrent laryngeal nerve and contralateral phrenic nerve function and if any problem is suspected, patient should undergo proper ENT examination.
- Constant vigilance and monitoring of respiratory and circulatory system.
- Immediate access to resuscitation equipments and emergency drugs while performing the block.

- Even after taking all precautions in patients, hazardous life threatening complications can occur, so preparedness and vigilance is the key for successful patient outcome.

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