



UNUSUAL PRESENTATION OF LEFT BUNDLE BRANCH BLOCK FOLLOWING PERIPHERAL NERVE BLOCK

Anaesthesiology

Dr Nidhi

Chitravanshi

Junior Consultant, Department of Anaesthesiology, BARC Hospital.

Dr Sheetal

Chiplonkar

Senior Consultant, Department of Anaesthesiology, BARC Hospital.

Dr Shrividya

Chellam

Senior Consultant, Department of Anaesthesiology, BARC Hospital.

Dr Pragati

Volvoikar

Senior Resident, Department of Anaesthesiology, BARC Hospital.

Dr Pratibha Toal

Consultant and Head, Department of Anaesthesiology, BARC Hospital.

ABSTRACT

Local anaesthetic systemic toxicity (LAST) is a life threatening complication that may occur after administration of local anaesthetic drugs during regional anaesthesia. Here, we present a case report of an 85-year-old female with mid shaft humerus fracture posted for open reduction internal fixation (ORIF). After giving combined ultrasound and nerve stimulator guided brachial plexus block, patient developed sudden onset Left Bundle Branch Block (LBBB) with brief episode of perioral twitching with stable haemodynamic parameters. Cardiac enzyme showed no abnormality.

KEYWORDS

Left Bundle Branch Block, local anaesthetic systemic toxicity, Arrhythmia.

INTRODUCTION:

Local anaesthetic systemic toxicity is rare but a life threatening complication known to occur with their use in regional anaesthesia. It may range from mild to severe neurological signs and symptoms and/or cardiovascular collapse. Recognition of the symptoms and prompt management is most important. The incidence of LAST currently estimated is about 0.03% or 0.27% episodes per 1000 peripheral nerve blocks.⁽¹⁾

This article reports an unusual case of left bundle branch block in a patient who developed transient arrhythmia without hemodynamic disturbance after brachial plexus block administered under combined guidance of ultrasound and nerve stimulator.

Case Report -

An 85 year-old female, weighing 55kgs, known hypertensive and diabetic on tablet Telmisartan 20mg twice daily and tablet Metformin 500mg thrice daily, with left mid shaft humerus fracture, was scheduled for open reduction internal fixation (ORIF) in right lateral position.

Patient was taken for surgery under ASA risk II with written informed valid consent for ultrasound guided brachial plexus block via Interscalene approach.

The patient received tab Alprazolam 0.5mg on the night before the surgery. In the operation theatre, monitors were attached and heart rate, non-invasive blood pressure (NIBP), 5 lead ECG and oxygen saturation (SpO₂) were continuously monitored. The patient's preoperative vitals were heart rate 74 bpm, Blood pressure 150/80 mmHg, pulse oximetry was 100% with 2 l/min oxygen via nasal prongs. Peripheral venous access was established with 20 G cannula and patient was given inj fentanyl 20ug iv, inj cefuroxime 1.5gms as per institution protocol, inj ondansetron 4mg iv and Ringers lactate infusion was started.

Ultrasound probe 6-13Hz and 5cm peripheral nerve stimulator needle (PNS) were used. Under all aseptic precautions, after correct identification of the nerve roots of brachial plexus and eliciting the deltoid + finger twitch response with 0.4mA current and 1Hz frequency, 30ml of local anaesthetic mixture (15ml of 0.5% bupivacaine+15ml of 2% lignocaine + adrenaline) was deposited in the interscalene groove and subclavian perivascular area after negative aspiration of blood. There was no change in heart rate and blood pressure immediately after the block and the onset of sensory block

was confirmed in the left upper limb after 1 minute. However, within the next few minutes ECG changes were noticed. Normal sinus rhythm got converted to left bundle block morphology on the ECG.(Fig 1,2)

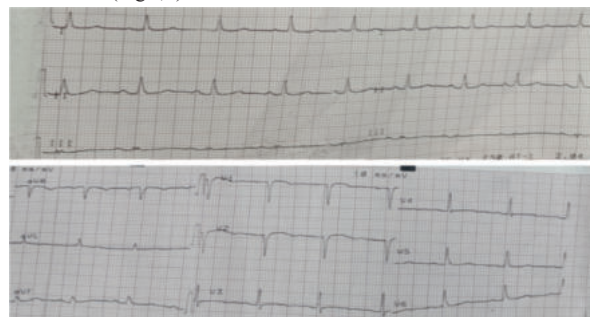


Fig 1. Pre-operative 12 Lead ECG

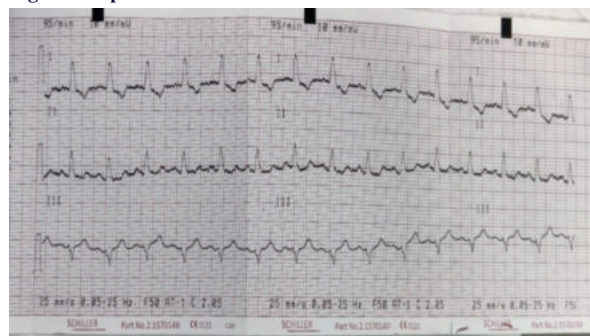


Fig 2. Post block 12 Lead ECG

However, peripheral pulses were regular and well felt. Simultaneously, patient also complained briefly of perioral twitching without any numbness or difficulty in breathing or any alteration in consciousness. Patient remained hemodynamically stable. Patient was administered 100% oxygen and inj midazolam 1mg iv after which the perioral twitches subsided. Since LBBB was not associated with hemodynamic instability or signs of altered sensorium, tinnitus, metallic taste or seizures, we kept lipid emulsion on hold and suspected acute coronary syndrome. Low dose of inj nitroglycerin was started at 0.25 microgram/kg/min and was titrated to blood pressure response. Troponin T was done which was negative. After discussing with the

surgeons, the case was deferred. After shifting the patient to post anaesthesia care unit, cardiac enzymes done and repeated after six hours which were normal. Serial ECG showed persistent LBBB. 2D echocardiography suggested - normal study, no regional wall motion abnormality, ejection fraction - 60%.

Two days later, patient was scheduled for the same surgery. Patient showed persistent LBBB pattern on the ECG with stable hemodynamics.

This time drug solution used for combined interscalene and subclavian perivascular block was 8ml of 0.5% ropivacaine + 8ml of 2% (lignocaine + adrenaline) under all aseptic precautions with combined guidance ultrasound and nerve stimulator. As there was sparing of C8 dermatome, radial nerve block via axillary approach was administered with 5ml of 2% lignocaine +adrenaline solution and the surgery was completed uneventfully. Intraoperatively, patient showed rate dependent LBBB pattern which was occurring when heart rate was above 80/min and stable hemodynamics. The patient was discharged after two days.

At one month follow up, routine ECG of the patient showed sinus rhythm with no LBBB.(Fig.3)

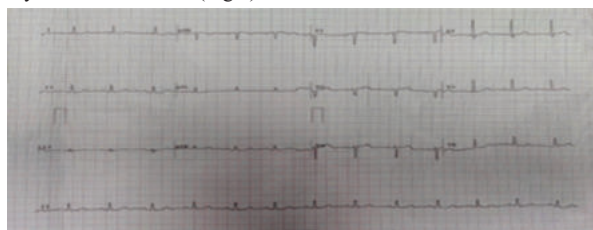


Fig 3. Follow up ECG after 1 month.

DISCUSSION

Local anaesthetic systemic toxicity (LAST) occurs due to an excess plasma concentration of local anaesthetics because of their systemic absorption. The magnitude of this systemic absorption depends on the dose administered into the tissues, vascularity of the injection site, presence of epinephrine in the solution, and physicochemical properties of the drug. Barrington and Kruger examined a registry of 25,000 peripheral nerve blocks performed in Australia from January 2007 to May 2012 and identified 22 cases of LAST (overall incidence, 0.87 per 1000). They found that ultrasound guidance lowered the risk of LAST (odds ratio, 0.23, CI: 0.088–0.59, $p=0.002$), with roughly 16% of reported LAST occurring despite the use of ultrasound.⁽²⁾

A typical presentation of LAST usually begins with prodromal symptoms and signs, such as perioral numbness, tinnitus, agitation, dysarthria, and confusion. These may be followed by more severe central nervous system (CNS) derangements such as seizures and coma.

Cardiovascular derangements can occur as well, initially presenting with hypertension and tachycardia, then bradycardia and hypotension, with progression to more serious complications, including ventricular arrhythmias and asystole. Local anaesthetics (LA) bind to and inhibit voltage gated sodium channels, calcium channels, enzymes and receptors, including the carnitine-acylcarnitine translocase in mitochondria leading to conduction disturbances, contractile dysfunction and ventricular arrhythmias.^(3,4)

Elderly patients have reduced clearance of LA due to reduced metabolic organ perfusion, reduced skeletal muscle mass and pharmacodynamic function, thereby increasing the potential of drug accumulation with repeated boluses of LA or continuous infusions.⁽¹⁾

The main principle of LAST management is to ensure adequate ventilation and organ perfusion with sufficient oxygen-rich blood to the vital organs. In our case, we immediately started with the oxygenation of the patient. Our patient complained briefly of only perioral twitching which settled after administration of inj midazolam 1mg iv, which is known to prophylactically reduce central nervous system related toxicity like seizures and associated complications.⁽⁵⁾

Our patient also presented with LBBB changes in the ECG after administration of brachial plexus block. A similar study by Mostafa

Abohelwa in 2021, showed lignocaine induced intermittent LBBB which resolved spontaneously without any interventions.⁽⁶⁾

The LBBB pattern in our patient also showed rate dependence.(Fig.3) Our patient developed intermittent LBBB at heart rate more than 80 beats per minute and sinus rhythm when heart rate reduced between 60-80 beats per minute.

Rate dependent LBBB is the most common cause of episodic LBBB. The exact heart rate at which the BBB occurs is known as the critical heart rate.⁽⁷⁾ Episodic LBBB is known to occur during anaesthesia, probably due to blood pressure perturbations or due to tachycardia or bradycardia, posing a dilemma with regard to presence of intraoperative myocardial ischemia or infarction.⁽⁷⁾

Syed M Saad, reported a similar case of intermittent LBBB in a patient who presented with sinus rhythm alternating with bundle branch block pattern at faster heart rates with otherwise unremarkable diagnostic workup similar to our patient.⁽⁸⁾



Fig 4. Intermittent LBBB.

This suggests sensitivity to local anaesthetics rather than local anaesthetic systemic toxicity.

Nitroglycerin (NTG) was started prophylactically in our patient for cardioprotection in view of anticipated coronary event. However, the possible rate dependent LBBB in this case compelled us to stop the NTG infusion in the post anaesthesia care unit.

Ropivacaine is less lipophilic than bupivacaine and that together with its stereoselective properties, contributes to ropivacaine having a significantly higher threshold for cardiotoxicity and CNS toxicity than bupivacaine.

Considering the safer cardiac and CNS profile, we used ropivacaine for induction of the patient during subsequent block, with lower volume and concentration. Optimum LA volume to achieve a successful block is necessary in order to prevent patchy action requiring supplemental anaesthesia. A balance between adequate drug volume and safety limits needs to be maintained.

CONCLUSION

Incidences of adverse effects on cardiac conduction after standard doses of local anaesthetics have been reported. Supportive management, continued vigilance are the mainstay of treatment. Dual (ultrasound and PNS) guidance for regional anaesthesia and maintaining the dosage of local anaesthetic to optimum will reduce the incidence. Signs of cardiac conduction abnormalities suggesting sensitivity to local anaesthetic have to be carefully distinguished from local anaesthetic systemic toxicity.

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