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Case Report

Involuntary Movement of the Lower Limbs Following Subarachnoid Block in a Diabetic Patient: A Case Report

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Abstract: Spinal anesthesia is commonly used for various surgeries below the umbilicus including urological surgeries. Whereas many complications occur following administration of spinal anaesthesia such as hypotension, bradycardia, high spinal, post dural puncture headache, involuntary movement of the limbs is an extremely rare complication. It presents as a sudden shock-like involuntary muscle contractions affecting a single muscle or multiple muscle groups, which often resolves untreated. The characteristic of the presentation is different from those of typical myoclonus and the etiology is unclear. Here we presented a case of a 56-year-old known diabetic patient who developed jerky uncoordinated involuntary movements of the lower limbs with flexion at the hips after administration of spinal anaesthesia. These movements lasted 2-3 minutes, occurring without any form of stimulation in the limbs despite loss of sensation to the lower limbs. He was treated with iv ondansetron 8mg, iv hydrocortisone 200mg, iv chlorpheniramine 10mg. Symptoms improved after about 3 hours after induction of spinal anaesthesia with return sensory and purposeful motor function of the lower limbs. Involuntary movements of the lower limbs can occur unexpectedly following spinal anaesthesia in a diabetic patient. Anaesthestist should be mindful of this and be ready to manage the situation when it arises.

Keywords: Spinal Anaesthesia, Lower Limbs, Involuntary Movement, Diabetes, Bupivacaine, Case Report

1. Introduction

Subarachnoid block (SAB) or Spinal anaesthesia is a form of anaesthesia used for surgeries commonly below the umbilicus – lower limbs, perineum, inguinal region or lower abdominal walls [1]. It produces intense sensory and motor blockade. The advantage of SAB is that it avoids general anesthesia, airway manipulations, has reduced blood loss compared to GA, encourages early ambulation, and has reduced incidence of deep veinous thrombosis amongst others [2].

Common complications associated with SAB include hypotension, bradycardia, high spinal, post dural puncture headache, whereas involuntary movements after induction of spinal anesthesia is an extremely rare complication.[3] Although there is no official name for this involuntary myoclonic movement, when it follows neuraxial anaesthesia, it is referred to as Spinal Myoclonus following Neuraxial Anaesthesia (SM-NA) [4].

2. Case Report

Our patient is a 56-year-old man (weight = 78kg, height = 182cm), known hypertensive and diabetic patient both of about 18 years duration, who had laser bladder neck incision on account of bladder neck stenosis as a day case surgery. The patient was placed on tabs Galvusmet (metformin/vildagliptin 50/500mg daily) and Tabs lisinopril 10mg daily by the physicians for the control of blood glucose levels and elevated blood pressure respectively. Patient had no complications of high blood pressure and / or diabetes mellitus. He also had no history of allergies. He was counselled on preoperative fasting

guidelines and asked to skip the morning dose of oral hypoglycemic drugs. Random blood glucose done a day before surgery was 7.0mmol/l, HBA1C = 8.7.

Preoperative review on the morning of surgery revealed a Pulse rate 72b/m, Blood pressure 134/70mmhg, SpO2 = 99%, and a random blood glucose (RBG) = 11.1mmol/l. Patient had American Society of Anaesthetists physical status classification II (ASA II). He was counselled on the options of anaesthesia, and he opted for SAB. No premedicants were administered. He was wheeled into the operating room and connected to a multiparameter monitor (Mindray Patient monitor iMEC10) and baseline vital signs measured. He had a baseline PR = 78b/m, BP=156/91mmhg, Spo2= 98%. Intravenous (IV) access was secured in the hand using an 18G cannula and 500mls of 0.9% saline administered. Also, preoperative antibiotic levofloxacin (Tavanic) 500mg was given.

In the sitting position, SAB was instituted at L4/L5 interspace using a 25G quincke bevel needle after cleaning the back with 0.5% chlorhexidine solution and methylated spirit. Following free backward flow of CSF, 3mls (15mg) of 0.5% bupivacaine was injected into the subarachnoid space, following which he was placed in a supine position. The level of block was ascertained to be at the T10 level, with the quality of block being a complete block (Modified Bromage Score of 1). He was subsequently positioned in the lithotomy position.

Intraoperative monitoring included NIBP, HR, SpO2, and ECG. 40mins into the procedure, patient started to complain of itchy sensation on the left foot with intense abdominal cramps. RBG done at this point was 13mmol/l. Surgery lasted for about an hour and the estimated blood loss was minimal (~50mls).

Postoperatively, he was transferred to the recovery room. Thirty 30 mins later we were notified that the patient was vomiting and complaining of severe tingling sensations in both lower limbs with abnormal movements of the limbs. On assessing the patient, he was observed to have jerky uncoordinated involuntary movements of the lower limbs with flexion at the hips occurring at 2-3minutes intervals. These occurred without any form of stimulation despite loss of sensation to the limbs. IV ondasetron 8mg, IV hydrocortisone 200mg, IV chlorpheniramine (piriton) 10mg, and another 500mls of saline was administered following which the patient became calm while we continued to monitor him closely. About 3 hours after surgery, sensory and motor functions returned, RBG = 11mmol/l with no further complaints. He was kept overnight for further observation and was discharged home the following day with no further involuntary lower limb movement, on his oral hypoglycemic agents. He was referred to an endocrinologist for adequate glucose control.

3. Discussion

Spinal myoclonus characterized by sudden, involuntary muscle jerk or spasm as seen in our patient, is a reaction to a stimulus on a specific area of the spinal cord [5]. Shiratori and colleagues [6] reported a case of spinal myoclonus in a 33year old woman who had elective caesarean 130mins after induction of spinal anaesthesia. It became severe approximately 3 hours later with involuntary movements gradually decreasing and completely disappearing after 5hours. Of note is that they also used 0.5% bupivacaine 8.5mg combined with 20mcg of fentanyl at L3/L4.

The pathophysiology includes abnormal loss of inhibition from the suprasegmental descending pathways, loss of inhibition from local dorsal horn interneurons, hyperactivity of contiguous anterior horn neurons and aberrant local axon re-excitations [7]. The striking thing is that the patient remains conscious while experiencing these symptoms.

Despite presenting with myoclonus, making a definitive diagnosis for this patient was a bit challenging because of the varied symptoms he was presenting with. Initially, he was thought to be presenting with an anaphylactic (allergic) reaction, local anaesthesia induced neurotoxicity or some form of neuropathy as a result of the poor glucose control. Our hypothesis is that there was an irritation of the α-motor neurons with possibly loss of inhibition of suprasegmental descending pathways. This is supported by the occurrence of the involuntary movement while the spinal anaesthesia was wearing off.

Perioperative anaphylaxis is an important cause of mortality and morbidity associated with anaesthesia. [8] Typically the patient presents with rashes, hives, swellings on the eyes, face, lips, shortness of breath and hypotension. However, the only symptom suggestive of allergy in this index patient was the itch on the left leg 40mins into the procedure. This could also be seen in patients administered local anaesthetic agents combined with opioids, which was not the case here. There was no history suggestive of a prior exposure to anaesthesia or allergy to local anaesthetic agents.

SAB relies on the injection of LA to reversibly block neuronal voltage-gated sodium channels and to reversibly interrupt nerve impulse propagation. These LA could be toxic to a variety of tissues and may contribute to perioperative nerve damage. Perioperative nerve damage could also be attributed to needle injury, injection pressure, ischaemia, haematoma, positioning, use of tourniquet or a combination of all. The incidence of perioperative nerve damage from central nervous block is estimated at < 4: 10,000.[9] Shimauchi and colleagues [10] reported a case of spinal nerve neurotoxicity with ropivacaine after combined spinal and epidural anaesthesia in a pregnant woman who underwent emergency caesarean delivery and suffered left leg paralysis after surgery.

Pre-existing neuropathies and other risk factors can compromise the functional integrity of peripheral nerves and make them more susceptible to injury. Neuropathies such as demyelinating diseases, peripheral vascular disease, vasculitis, hypertension and diabetic peripheral neuropathy further puts the patient at the risk of nerve injury. Long-acting local anaesthetics such as Bupivacaine hydrochloride or sustained release formulations of bupivacaine such as liposome bupivacaine, have been found to be neurotoxic when applied in the setting of diabetic neuropathy. [11] Our index patient although a diabetic, could have had subclinical neuropathy which may have been exacerbated following induction of

spinal anaesthesia using bupivacaine.

Patients with underlying chronic neural compromise secondary to ischaemia (peripheral vascular disease or microangiopathy), toxic (chemotherapy), or metabolic (diabetes mellitus) abnormalities may be at an increased risk of further neurologic injury because of a physiological double-crush. The double-crush phenomenon suggests that patients with pre-existing neural compromise may be more susceptible to injury when exposed to a secondary insult at another site. Secondary insults may include a variety of mechanical (needle – or catheter-induced trauma), ischaemia (Epinephrine-induced vasoconstriction), or toxic (local anaesthetic neurotoxicity) risk factors often associated with regional anaesthetic techniques. [12]

Several reports have reported opioid-induced neuro excitation by mechanisms that are not known. [13, 15] However in our case, no opioid was used. Also, while some people have reported symptoms lasting more than 72hours [14], ours was short lived. In About 3 hours the patient had fully recovered and showed no other symptom up to 24 hours after surgery.

It is important to note that involuntary movement following spinal anaesthesia is self-limiting [5, 16], and many reports have indicated a favourable response with the use of midazolam [5, 7, 14].

4. Conclusion

Acute spinal myoclonus following regional anaesthesia is extremely rare. Anaesthetist should watch out for this complication especially in patients with poorly controlled blood glucose levels. The role of neuraxial blockade is not very clear as a direct cause of the involuntary movements noticed, however it may be a contributing factor to an already vulnerable nerve damaged by neuropathy due to uncontrolled blood glucose.

Laboratory Investigations

Table 1. *Laboratory Investigations.*

ITEM	RESULT	REF RANGE
	FULL BLOOD COUNT	
Haemoglobin concentration	12.0g/dl	11.0 – 16.0
Total platelet count	180 x 10^9/L	100 - 400
Pack cell volume	35%	34 - 55
White blood cell count	10.5/L	3.5 - 10
Red blood cell count	4.25	3.5 – 5.5
Lymphocyte	28.5%	40 -75%
Granulocyte	56.5 %	40 -75%
Mean corpuscular volume	83.0 FL	75 - 100
Mean cell Haemoglobin	34.1 g/dL	31 – 38
	Serum Electrolytes, Urea and Creatinine	
Sodium	131 mmol/L	134 – 155
Chloride	97mmol/L	95 - 108
Potassium	4.3 mmol/L	3.5 -5.5
Bicarbonate	32 mmol/L	20 - 31
Ph	7.35	
Urea	3.9 mmol/L	2.0 – 8.3
Creatinine	100µmol/L	50 – 123
	OTHERS	
C – reactive protein	165.5	0 – 6
HbA1C	8.7%	< 6
Random Blood Glucose	11.1 mmol/l	4.2 – 10.0 mmol/L

Author's Contributions

Agwu Nnanna Uchechuku, conceptualized, reviewed the literature and wrote the manuscript.

Asudo Felicia, reviewed and supervised the manuscript.

Adeyemi William Osebequin, reviewed the manuscript.

All authors reviewed and approved the final manuscript for publication.

Ethics Approval and Consent to Participate

Not applicable.

Conflicts of Interest

The authors declare that they have no competing interests.

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