



Total Spinal Block after Thoracic Paravertebral Block

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Thoracic paravertebral block (TPVB) can be performed with or without general anaesthesia for various surgical procedures. TPVB is a popular anaesthetic technique due to its low side effect profile and high analgesic potency. We used 20 mL of 0.5% levobupivacaine for a single injection of unilateral TPVB at the T7 level with neurostimulator in a 63 year old patient with co-morbid disease who underwent cholecystectomy. Following the application patient lost consciousness, and was intubated. Haemodynamic instability was normalised with rapid volume replacement and vasopressors. Anaesthetic drugs were stopped at the end of the surgery and muscle relaxant was antagonised. Return of muscle strength was shown with neuromuscular block monitoring. Approximately three hours after TPVB, spontaneous breathing started and consciousness returned. A total spinal block is a rare and life-threatening complication. A total spinal block is a complication of spinal anaesthesia, and it can also occur after peripheral blocks. Clinical presentation is characterised by hypotension, bradycardia, apnea, and cardiac arrest. An early diagnosis and appropriate treatment is life saving. In this case report, we want to present total spinal block after TPVB.

Key Words: Regional anaesthesia, complication, paravertebral block

Introduction

Thoracic paravertebral block (TPVB) provides a major advantage for many surgical procedures because of high-quality analgesia. Comparing with thoracic epidural block, TPVB provides a more stable hemodynamic response. As it provides a safer anaesthesia and offers a lower adverse event profile, it is an alternative method for both general anaesthesia and thoracic epidural block (1).

Because of limited number of studies and case reports in the literature, the incidence of total spinal block remains unclear. In two studies investigating the important complications of central neuraxial block and regional anaesthesia, the incidence of cardiac arrest related to high level of sensory block was reported between 1/100000 and 27/100000 (2, 3). Herein, we aimed to present a case that developed total spinal block after thoracic paravertebral injection.

Case Presentation

A 63-year-old female patient with 90 kg body weight and 155 cm height was scheduled for open cholecystectomy surgery. The patient had hypertension and diabetes. Evaluation of the patient before anaesthesia revealed enlarged cardiothoracic ratio (CTR>0.5) on chest x-ray, 3/6 systolic murmur in S2 foci on auscultation and ventricular extrasystole on ECG. Pre-operative biochemistry analyses were within normal ranges except for high K⁺ level (5.3 mmol/L). After potassium level returned to the normal ranges, consultations were obtained from the relevant departments. The necessary surgical procedure was planned after obtaining informed consent of the patient.

The patient was brought into the operating room and monitored: heart rate was 60 beats min⁻¹, non-invasive arterial blood pressure was 130/65 mmHg, and arterial oxygen saturation was 95%. While oxygen was delivered by face mask at a flow of 3 L min⁻¹, intravenous midazolam at doses of 1 mg and 25 µg fentanyl were administered for sedation. Injection sites were marked while the patient was in sitting position. Local anaesthesia was performed under aseptic conditions into the skin and subcutaneous tissues using 2% lidocaine. Under ultrasound guidance, paravertebral space was accessed at 2.5

cm depth through 2.5 cm right lateral aspect of thoracic 7th vertebrae (T7) using 80 mm 18 gauge atraumatic neurostimulator (Contiplex D, B. Braun Melsungen AG, Germany) block needle by directing the needle to the caudal direction after touching transverse process at 2 cm depth. Observing the contraction of abdominal muscles at 0.5 mA with the assistance of neurostimulator, precise and intermittent (at 15 sec intervals) aspiration was performed for each 5 mL, and 20 mL of 0.5% levobupivacaine was injected.

After the patient was placed in supine position, she developed unconsciousness within 1-2 minutes following local anaesthetic injection and thus, 100% O₂ was delivered. ECG monitoring revealed bigeminy and supraventricular extrasystoles. Non-invasive arterial blood pressure was 103/60 mmHg and arterial oxygen saturation was 98%. Since arterial blood gas analysis was within normal ranges, anaesthesia induction was performed (IV 100 mg propofol, IV 50 mg rocuronium) and surgical procedure was started. Ten minutes after induction, non-invasive arterial blood pressure was measured to be 60/40 mmHg despite the presence of sinus rhythm on ECG. Five milligram ephedrine was administered intravenously, arterial catheterization was performed and intravenous dopamine infusion was started at a rate of 6 mcg kg⁻¹ min⁻¹. Dopamine infusion was discontinued since the vital signs remained stable within the normal limits. Following the completion of surgery after 85 minutes, all anaesthetic agents were discontinued, and the patient's recovery from anaesthesia and spontaneous breathing was waited. Based on the absence of spontaneous breathing, intravenous sugammadex titrated to 3 mg kg⁻¹ was administered and muscle strength was verified by neuromuscular monitoring. Approximately 95 minutes after the completion of surgery, spontaneous breathing and consciousness returned. As her vital signs remained stable within the normal ranges, she was extubated. Cranial tomography, which was requested to exclude intracranial pathology based on neurology consultation, revealed no pathological findings and the patient was brought to the intensive care unit approximately 120 minutes after surgery for further analysis and treatment. The patient was conscious with spontaneous breathing, her vital signs remained stable and she had no postoperative pain, therefore she was transferred to the surgery clinic after 24 hours with recommendations to continue monitoring and treatment. Observing that the vital signs of the patient were normal and she had no nausea, vomiting or pain during her follow-up in the surgery clinic, she was discharged from the hospital at postoperative 3 days.

Discussion

Total spinal block is a rare but life-threatening complication of spinal anaesthesia. Total spinal block occurs during peripheral block either directly due to intraneural injection of high-volume local anaesthetic by mistake or indirectly by cephalic spread of the anaesthetic along the spinal cord via

the nerve roots below the pia mater. Whilst total spinal block may rapidly occur by direct intraneural administration of local anaesthetics during peripheral nerve blocks, it occurs relatively later and slower due to indirect cephalic spread (4). Clinical picture include hypotension, nausea and/or irritability particularly with position changes, bradycardia, respiratory distress, apnoea, dysesthesia or paraesthesia in the hands and arms, difficulty in speech, areflexia, cranial nerve involvement, and cardiac arrest (5).

Gay and Evans (6) reported total spinal anaesthesia after lumbar paravertebral sympathetic block in two patients. Although the needle prick sites (approximately 2.5-3 cm lateral of the spinous processes) were similar in both blocks, the needle requires to be directed deeper and towards the anterolateral aspect of the vertebra corpus to reach the lumbar sympathetic chain. It has been reported that dural sheath puncture, spread of the local anaesthetic, or subarachnoid diffusion leading to total spinal anaesthesia may occur even the needle is positioned correctly (6).

Lekhak et al. (7) administered 10 mL of 0.25% bupivacaine through thoracic paravertebral catheter for postoperative analgesia in a 62-year-old patient who underwent thoracotomy. They stated that post procedure hypotension, apnoea and unconsciousness might have occurred due to unintended subarachnoid injection. They noted that breathing and consciousness returned 2 hours after symptomatic treatment but extremity weakness continued for several hours. Nevertheless, the patient was discharged without any neurological sequelae.

Symptom-oriented supportive therapy forms the basis of treatment in total spinal block. The patients can be treated without sequelae with early recognition of symptoms. Hypotension can be treated with vasopressor agents and fluid replacement, bradycardia can be treated with vagolytic and sympathomimetic agents, and respiratory distress can be treated with oxygen delivery and intubation. In the present case, the symptoms began as the patient was placed in supine position after TPVB, progressed slowly and continued with intraoperative hypotension under general anaesthesia. Prompt fluid replacement and vasopressor treatment were important for good result by means of preventing a probable cardiac arrest and sudden death. We think that the patient's being under general anaesthesia with ventilatory support also contributed to the good result.

Total spinal block following peripheral block can be prevented by taking measures such as using local anaesthetics at the required minimum dose for block, performing block with great attention under ultrasound guidance using a peripheral stimulator, directing the tip of the catheter towards the caudal, performing slow and intermittent injections after aspiration, and not placing the patient in supine position rapidly (1). Not aspirating blood or CSF is not always reliable and probability of subarachnoid injection always exists even though all known measures are taken.

Conclusion

This case has suggested us that total spinal block is likely to occur as an important complication of paravertebral block, which is a current and safe approach in the recent years. In conclusion, it should be kept in mind that total spinal block following peripheral block is a serious and life-threatening complication, can be prevented by simple measures, and improves without sequelae by early recognition and appropriate cardiac and respiratory support.

Informed Consent: Written informed consent was obtained from patients who participated in this case.

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