
Clinical Reports

Shivering following retrobulbar block

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A case of a severe but brief period of shivering following a retrobulbar block (RBB) is presented. The shivering occurred within two minutes after completion of the RBB and subsided gradually within five minutes, without specific treatment. The patient remained conscious during the episode of shivering. The shivering was so abrupt and severe as to be misjudged as a seizure, but its onset appeared to be slower than a seizure. The mechanism of shivering appeared to be the central spread of local anaesthetic solution into the brain stem, along the optic nerve. Shivering may be a warning sign of brain stem anaesthesia and demands special care to anticipate life-threatening complications.

We had an opportunity to observe a short period of severe shivering following a retrobulbar block (RBB) for cataract extraction. Although various complications of RBB have been reported,¹⁻⁹ we were unable to find a report of shivering related to the block.

Case Report

A 51-year-old male was scheduled for an extracapsular lens extraction with an intraocular lens implantation under monitored anaesthesia care (MAC) as an ambulatory patient. The past medical history was unremarkable. The patient was 185 cm tall and weighed 80 kg. Blood pressure was 110/70 mmHg and pulse rate 65 beats·min⁻¹. He had had a tonsillectomy as a child under general anaesthesia and dental extractions under local anaesthesia, both without complications. There was no known allergy. Physical examination and laboratory studies were normal.

The patient was placed on the operating table, covered

Key words

ANAESTHETIC TECHNIQUES: retrobulbar block; COMPLICATIONS: shivering, brain stem anaesthesia

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with a warm blanket and appeared to be comfortable. A total of 20 µg fentanyl and 2 mg diazepam was injected intravenously. A modified Van Lint block using 8 ml of a 1:1 mixture of two per cent lidocaine with 1:200,000 epinephrine and 0.75% bupivacaine, plus hyaluronidase, was administered to the patient's left side. Four ml of the same local anaesthetic mixture (without epinephrine) was injected into the left retrobulbar space.

Within two minutes after completion of the RBB, the patient complained of being cold and began shivering severely. Therefore, diazepam 3 mg was injected intravenously. One hundred per cent oxygen by mask was also given to the patient. The intensity of shivering gradually decreased and finally subsided within five minutes. He also experienced a 10–15 minute period of tachycardia (110 beats·min⁻¹) and hypertension (BP 200/80 mmHg). Although the patient never lost consciousness, he was somewhat drowsy and his respiration was shallow. All extremities were cold and clammy, and his response to verbal command was slow. Arterial blood gases sampled near the end of the shivering episode showed: pH 7.31, PCO₂ 47 mmHg, PO₂ 433 mmHg, HCO₂ 23 mEq·L⁻¹, BE - 1.

Within 15 minutes the patient was alert, oriented, and had begun to talk. Blood pressure and heart rate returned to normal. At no time were any rhythm disturbances noted on the electrocardiogram. A good state of anaesthesia and akinesia of the left eye was present. Neurological examination was normal, except for full dilation of both pupils, absent pupillary reactivity to light, and facial numbness on the left side (due to the block). No pupillary dilators had been given preoperatively into the right eye. Retrograde spread of local anaesthetics was suspected as the cause of these abnormalities and a decision was made to proceed with the cataract extraction. The patient tolerated the procedure well and was transferred to the Recovery Room in stable condition. Three hours after the RBB, the dilated pupil of the right eye returned to normal size and became reactive to light. The patient was discharged to his home five hours after surgery, without any complications. Ten months later, the second cataract was removed under a RBB with the same mixture of local anaesthetics and the same regimen, without any side effects.

Discussion

One of the most serious complications related to the RBB is brain stem anaesthesia, which has been well known for several years.¹⁻⁷ Brain stem anaesthesia has also been reported following trigeminal nerve blocks.¹¹⁻¹³ The central spread of local anaesthetic solution after cranial nerve blocks is thought to be the cause of brain stem anaesthesia.^{4,10} The same mechanism is considered to be the cause of bilateral amaurosis observed shortly after RBB.^{3,8}

Our patient's response was similar to previously reported cases of brain stem anaesthesia.^{1-7,11-13} Blood pressure and heart rate rose sharply, soon after the RBB. Signs of peripheral vasoconstriction were also noted, along with full dilation of both pupils. Hearing loss, loss of consciousness and apnoea were not observed. Another rare complication of RBB is the occurrence of decreased visual acuity and extraocular muscle palsies in the contralateral eye.⁸ Despite the full dilatation of the right pupil, our patient did not experience extraocular muscle palsies. We are not certain whether the right eye had decreased visual acuity, as it was not examined thoroughly.

The severe shivering observed appears to have been directly related to the RBB rather than the patient's coincidental exposure to a cold environment. The nature of the shivering observed in the present case was quite unique. It occurred within two minutes after completion of the RBB. It was so abrupt and severe as to be misjudged as a seizure. The patient could not understand why he was shivering so severely. The onset of shivering appeared to be slower than a seizure which occurs following intravascular injection of local anaesthetics.⁹ The shivering lasted about five minutes, subsided gradually without specific treatment, and did not recur.

It is known that shivering can occur due to stimulation of certain parts of the brain ("central").¹⁴ In animal experiments, local anaesthetic solutions applied to the ventro medial reticular formation of the brain stem facilitate shivering, whereas application to the lateral pontine reticular formation inhibit shivering.^{14,15}

In the presented case, the area of the brain stem adjacent to the shivering facilitatory or inhibitory area could have been exposed to the local anaesthetic solution which spread along the sheath of the optic nerve. The anaesthetic solution could have traveled first to the shivering inhibitory area of the brain stem then gradually spread to the shivering facilitatory area. Therefore, the patient had only one episode of centrally mediated shivering which lasted a brief period and subsided gradually.

In conclusion, a brief period of severe shivering was observed shortly after the RBB. It is probable that this episode is the result of a local anaesthetic solution spreading along the optic nerve sheath, contacting an area

of the brain stem which is closely linked to the shivering mechanism. Shivering may be a warning sign of brain stem anaesthesia and demands special care to anticipate life-threatening complications.

References

- 1 Danton JV. Anesthesia for Eye, Ear, Nose and Throat. In: Miller RD (Ed) Anesthesia 2nd Ed. NY: Churchill Livingstone, 1986, pp 1837-58.
- 2 Chang JL, Gonzalez-Abola E, Larson CE, Lobes L. Brain stem anesthesia following retrobulbar block. *Anesthesiology* 1984; 61: 789-90.
- 3 Follette JW, LoCascio JA. Bilateral amaurosis following unilateral retrobulbar block. *Anesthesiology* 1985; 63: 237-8.
- 4 Hamilton RC. Brain stem anesthesia following retrobulbar blockade. *Anesthesiology* 1985; 63: 688-90.
- 5 Rosenblatt RM, May DR, Barsoumian K. Cardiopulmonary arrest after retrobulbar block. *Am J Ophthalmology* 1980; 90: 425-7.
- 6 Smith JL. Retrobulbar marcaine can cause respiratory arrest. *J Clin Neurophthalmology* 1972; 1: 171-2.
- 7 Wittpen JR, Rapoza P, Sternberg P, Kuwashima L, Saklad J, Patz A. Respiratory arrest following retrobulbar anesthesia. *Ophthalmology* 1986; 93: 867-79.
- 8 Anoszyk AN, Buckley EG. Contralateral decreased visual acuity and extraocular muscle palsies following retrobulbar anesthesia. *Ophthalmology* 1986; 93: 462-5.
- 9 Meyers EF, Ramirez RC, Bonink J. Grand mal seizures after retrobulbar block. *Arch Ophthalmol* 1978; 96: 847.
- 10 Lombardi G. Radiology in neurophthalmology. Baltimore: Williams and Wilkins 1967, pp. 6-8.
- 11 Kepes ER, Foldes FF. Transient abducens paralysis following therapeutic nerve blocks of head and neck. *Anesthesiology* 1973; 38: 393-4.
- 12 Nique TA, Bennett CR. Inadvertent brainstem anesthesia following extra oral trigeminal V₂-V₃ blocks. *Oral Surgery* 1981; 51: 468-70.
- 13 Byers B. Blindness secondary to steroid injection into the nasal turbinates. *Arch Ophthalmol* 1979; 97: 79.
- 14 Amini-Sereshki L. Brainstem control of shivering in the cat. I. Inhibition. *Am J Physiol* 1977; 232 (Regulatory Integrative Comp Physiol 1): R190-7.
- 15 Amini-Sereshki L. Brainstem control of shivering in the cat. II. Facilitation. *Am J Physiol* 1977; 232 (Regulatory Integrative Comp Physiol 1): R198-202.

Résumé

On décrit le cas d'un patient qui a présenté une brève et sévère épisode de frissons à la suite d'un block rétrobulbaire (RBB). L'épisode de frissons est survenu deux minutes après le RBB et s'est estompé graduellement après cinq minutes sans aucun traitement spécifique. Le patient est resté conscient durant cet épisode. Les frissons étaient soudains et sévères pour être confondus avec des convulsions, cependant le début de leur installation était plus lent que celui des convulsions. Le mécanisme de ce frisson apparaît comme étant l'extension centrale de la solution d'anesthésie locale le long du nerf optique. Le frisson peut être un signe avertisseur d'une anesthésie du tronc cérébral et demande des soins spéciaux afin d'éviter des complications mortelles.