Spinal anaesthesia in a patient with reported scorpion venom induced local anaesthetic resistance for a case of wound debridement for early physiotherapy

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ABSTRACT:
A 63-year-old male was referred to the emergency department with road traffic accident injury to right lower limb. Patient had history of hypertension, chronic alcoholism, smoking, and scorpion sting twice 20 years ago. He had history of failed peribulbar block earlier. He developed necrotizing fasciitis for which he required general surgical debridement. Initial attempt with spinal anaesthesia with 2.5 ml of 0.5% hyperbaric bupivacaine was ineffective and as was an epidural top up. The case was conducted with General anaesthesia with supraglottic airway device. Since this poor response to local anaesthetics was preceded by stings of scorpion, it was decided to try a different drug regimen for intrathecal anaesthesia. A mixture of intrathecal bupivacaine 0.5% (0.6 ml), and pethidine 50 mg (1 ml), followed by intrathecal dexmedetomidine 5 mcg (0.1 ml) was administered, with a total volume of 1.7 ml. This case highlights challenges in treating scorpion envenomation due to sodium channel alterations by combining drugs with different targets

Case Report :

A 63-year-old male presented to the emergency department after a road traffic accident involving a skid and fall from a two-wheeler vehicle while under the influence of alcohol. The patient sustained an injury to the right lower limb but had no other apparent injuries. His past medical history includes a 40-year history of hypertension, for which he was not on regular medication, chronic alcoholism, and smoking. Additionally, he had two separate scorpion stings 20 years ago.

The initial clinical examination revealed a deep laceration on the right lower limb with signs of localized infection. Over the course of a few days, the patient's condition deteriorated with the rapid development of necrotizing fasciitis, necessitating urgent surgical debridement. An attempted spinal anaesthesia with 2.5 ml of 0.5 % hyperbaric bupivacaine with confirmed aspiration of CSF was very patchy and the level was below L3. An epidural catheter was also inserted at L3-L4 interspace. The surgery was proceeded with General anaesthesia with Laryngeal Mask Airway as it was a case of difficult airway with Mallampati IV and a decreased mento hyoid distance. The mouth opening was adequate. The postoperative epidural top up with local anaesthetic drug was incomplete and patchy not even giving satisfactory analgesia. A preliminary diagnosis of scorpion sting induced local anaesthetic drug resistance was proposed. On eliciting further history, the patient stated that he had got operated for cataract under local anaesthesia. But the drug did not act well and he had pain. He received one

peribulbar, one spinal, and one epidural, all of which failed to provide the necessary anaesthesia.

For the second debridement procedure, the anaesthesia team decided to attempt spinal anaesthesia with different drug combination. A mixture of intrathecal bupivacaine 0.5% (0.6 ml), and pethidine 50 mg (1 ml), followed by intrathecal dexmedetomidine 5 mcg (0.1 ml) was administered, with a total volume of 1.7 ml. The pethidine local anaesthetic combination was administered in a syringe followed by dexmedetomidine in a separate 1 ml syringe Adequate motor and sensory blockade was successfully achieved, in contrast to previous failures. The sensory level was T10. There was a complete regression of drug action and there was no neurological deficit.

Discussion:

The patient's history described about two surgeries in which spinal anaesthesia failed and therefore problems related to his response to local anaesthetic are expected especially in patients with scorpion stings. Available literature supports that patients with history of scorpion envenomation may have developed resistance to intrathecal bupivacaine by change in sodium channels caused by venom. [1] These sodium channels are involved in nerve impulse transmission; they are critical to the action of local anaesthetic agents such as bupivacaine. The neurotoxicity due to a scorpion bite results in alterations in the functional activities of the peripheral nervous system, and narrowing the duration of intrathecal local anaesthetic drug.

In this case the failed spinal anaesthesia due to other causes was sidelined in view of failure of both spinal and epidural with a history of a possible failed peribulbar block. The spinal anaesthesia was not entirely without any action but it was patchy and inadequate to suggest that the drug has entered the space. In this case, a combination of bupivacaine, pethidine, and dexmedetomidine was successful in achieving adequate anaesthesia. The use of dexmedetomidine, an alpha-2 adrenergic agonist, may have contributed to the prolongation of both motor and sensory blocks by potentiating the effects of bupivacaine.[2] The efficacy of dexmedetomidine as an adjuvant in spinal anaesthesia for lower limb surgeries has been studied, with observed superior outcomes in terms of block duration and hemodynamic stability compared to bupivacaine alone.[3]

Furthermore, the choice of intrathecal pethidine as an alternative to bupivacaine deserves consideration. Pethidine has been shown to provide adequate spinal anaesthesia in pregnant [4] as well as elderly patients, The drug has been used alone for spinal anaesthesia also. This use assumes interest in patients having local anaesthetic drug allergies. [5]

Varghese et al[6] successfully administered spinal anaesthesia in such a case with a combination of 1.5 ml of 0.5% bupivacaine heavy, 1.5 ml of 5% lignocaine heavy, 15mcg of clonidine (0.1 ml) and 7.5% sodium bicarbonate(0.2 ml) to make a total volume of 3.3 ml.

In another case controlled study, Kosam et al[7] have found significant patchy and failed blocks in patients with history of prior scorpion sting. Similar experience was reported by Issin.A where the patient had complete failure of spinal anaesthesia[8]

Conclusion:

This case underscores the potential anaesthetic challenges posed by a history of scorpion envenomation, particularly in relation to the use of intrathecal local anaesthetics like bupivacaine. The successful use of a combination of bupivacaine, pethidine, and dexmedetomidine suggests that alternative drug regimens may be beneficial in such patients especially targeting nonlocal anaesthetic receptors. We admit that we have not done any baricity studies, but our case had no major postoperative problems.

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