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Case Report

Accidental Intrathecal Injection of Atracurium During Spinal Anesthesia: A Case Report

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ABSTRACT

This case report outlines a rare occurrence of accidental intrathecal injection of atracurium during spinal anesthesia for knee arthroscopy in a 22-year-old male patient. The solution intended to be bupivacaine mixed with fentanyl raised concerns after the ampule was discarded before verification. Fortunately, the patient showed no signs of paralysis or analgesia post-injection. The anesthesia team promptly administered high-dose methylprednisolone to reduce potential neurotoxic effects and monitored the patient closely in the Post-Anesthesia Care Unit. After six hours of stability and no neurological deficits, follow-up evaluations confirmed no lasting damage, allowing for safe discharge after 24 hours. This incident underscores the critical need for rigorous drug verification and safety protocols in anesthesia to prevent medication errors.

Introduction

Spinal anesthesia is a common and generally safe procedure used for various surgical interventions. However, the intrathecal administration of neuromuscular blocking agents (NMBAs) is a rare but potentially catastrophic event that can lead to severe complications, including neurotoxicity and permanent neurological deficits [1]. This case report describes an incident of presumed accidental intrathecal administration of atracurium instead of bupivacaine during spinal anesthesia. Fortunately, the patient was successfully managed and did not experience any adverse effects from this administration error [2].

Case Report

A 22-year-old male patient (ASA class I) was scheduled for elective knee arthroscopy due to a posterior cruciate ligament (PCL) injury. The patient was positioned sitting for spinal anesthesia, which was performed at the L3-L4 level using a 25G Quincke spinal needle. A total of 3 mL of a solution, assumed to be bupivacaine 0.5% mixed with 25 mcg of fentanyl, was injected intrathecally. The patient was then repositioned to a supine position. No analgesia or paralysis was observed post-injection. An anesthesia technician later revealed that the ampule had been discarded, raising concerns about the accidental administration of atracurium instead of bupivacaine. The anesthesia team anticipated possible neurological complications and prepared for emergency interventions. Methylprednisolone pulse therapy (1 g IV) was administered to mitigate potential inflammation or neurotoxic effects. The patient was subsequently transferred to the Post-Anesthesia Care Unit (PACU) for intensive monitoring. Continuous vital sign monitoring was performed, and a urinary catheter was placed to assess urine output. The patient remained stable in the PACU for 6 hours with no neurological symptoms. Serial neurological examinations by a neurologist revealed no deficits. The patient was then transferred to the ICU for continued monitoring, with regular evaluations by the neurology and ICU teams. After 24 hours, the patient remained neurologically intact and was discharged from

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the ICU to the ward. Following an additional 24 hours of observation, he was discharged home in good and stable condition.

Discussion

Accidental intrathecal injection of neuromuscular blocking agents (NMBAs), particularly atracurium, is extremely rare and not well documented [3]. While some NMBAs have shown neurotoxic effects in animal studies, the absence of reported neurological complications in this case is remarkable [4]. Severe neurotoxicity associated with intrathecal NMBAs has been linked to neurodegeneration, including aseptic meningitis, spinal cord damage, and paralysis [5]. Key management strategies for addressing potential respiratory depression or autonomic dysfunction include early recognition of potential drug errors, high-dose corticosteroids to reduce inflammatory responses, and close neurological monitoring for at least 24-48 hours, along with ICU admission for continued surveillance and a multidisciplinary approach involving anesthesia, neurology, and ICU teams [1,6].

Conclusion

This case highlights the critical importance of drug verification in the operating room. Despite the potential neurotoxic risks of intrathecal atracurium, prompt recognition, aggressive management, and vigilant monitoring led to a successful outcome without complications. This incident underscores the need for strict medication safety protocols to prevent similar errors in the future. It is essential to verify drug identity before administration, especially in high-risk procedures, and to be prepared for unexpected medication errors with a management plan in place. High-dose corticosteroids may play a role in preventing inflammation-related neurotoxicity, and close neurological monitoring is crucial in suspected cases of accidental intrathecal NMBA injection.

Limitations

A limitation of this case is that it restricts the ability to assess the full impact of the accidental injection, as the patient's long-term neurological outcomes were not extensively monitored.

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