CASE REPORT

Successful Management of Accidental Intrathecal Tranexamic Acid Injection: A Case Report from Zambia

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ABSTRACT

Inadvertent intrathecal tranexamic acid injection remains one of the reasons for avoidable morbidity and mortality complications in African countries. A recent review in Anaesthesia highlighted 21 such cases between 1988 and 2018, 10 of which were fatal representing mortality rate above 50%. This is the first successful case report recorded in Zambia, involving a female 17 years old scheduled for an elective exploratory laparotomy due to pelvic mass, who received TXA intrathecally in place of Bupivacaine. The article is emphasizing importance of vigilance in drug administration and early management of such complications.

INTRODUCTION

One of the typical errors which can lead to severe iatrogenic consequences or even death during spinal anaesthesia is intrathecal injection of TXA instead of bupivacaine. This occurs due to similarities in appearance of the ampules of heavy bupivacaine and TXA. Currently, there is no protocol for management of inadvertent intrathecal administration of tranexamic acid and very few reported cases of successful management of this catastrophic event.

CASE PRESENTATION

There were no special considerations of the patient condition preoperatively, no past medical and surgical history, except a huge pelvic mass and anaemia, with a haemoglobin of 8.6 g/dl prior to spinal anaesthesia and the baseline Blood pressure (BP) was 144/ 96 mmHg and a Pulse rate (PR) of 72 beats per min(bpm). She never has been exposed to anaesthesia previously, but she had bloody vaginal discharge prior to operation and required BT day before surgery. She also had no complaints related to her neurological status, no history of epilepsy or allergies. Patient had a no neurological deficits on examination.

Sequence of events

Within 5 minutes after spinal injection, patient had started to complain of severe pain in the gluteal region. A quick check revealed an open ampule of TXA and not bupivacaine. Consultant Anaesthesiologist was called for help who recognized the typical presentation of accidental intrathecal injection of TXA and treatment was initiated immediately.

Keywords: Accidental injection, Tranexamic acid, Intrathecal, Medication error, Case report

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Differential diagnosis between high spinal and bupivacaine toxicity was made. In case of high spinal, rapid drop of blood pressure and shortness of breath within critical reduction of Spo2 requiring oxygen support are always observed. In our patient however had stable bp and was maintaining good saturations within 30minutes of the critical event. It is very difficult to differentiate between bupivacaine toxicity and intrathecal TXA administration in a clinical setting because both can cause convulsions. However specific pain in the gluteal region is observed with intrathecal TXA administration which was predominantly observed in this patient. No confirmatory test like CSF analysis was done in our case, arguments being highly clinical.

Intervention

In left lateral position Cerebro-spinal fluid lavage was commenced using two large bore IV cannulas inserted at level L3- L4, which was a place of accidental TXA injection and the second on the level L1- L2. In sterile conditions, 500 mls of normal saline (NS) via a giving set was connected to the upper cannula and lower cannula was left for drainage. Slow infusion of 500 ml NS was done within the next 1 ½ hours. Patient continued to complain of gluteal pain and her level of consciousness started to deteriorate. She was intubated in left lateral position with atropine, propofol, suxamethonium, maintained with halothane 1.5%, but after 15 mins she experienced her first episode of tonic-clonic convulsions. This was aborted with propofol 40 mg + diazepam 10 mg IV. Within the next 30 minutes two other episodes of generalized tonic clonic convulsions were observed, and both were aborted with propofol 40 mg IV then in next 50 mins no convulsions were observed due to anticonvulsant effect of halothane.

After Cerebrospinal fluid lavage was completed, patient was transferred to ICU, had two episodes of generalized convulsions during transportation (after inhalation of halothane was discontinued) and treated in ICU with an infusion of propofol 5ml (50mg)/hour, phenobarbitone 400 mg IV loading dose given, then 200 mg 8 hourly given only twice. Despite infusion of propofol and phenobarbitone, within next 1½ hours after admission to ICU patient convulsed more than 10 times and intermittent doses of propofol 40 mg IV did not help to abort these generalized convulsions. The mechanism of brain toxicity of TXA is not known as well as anticonvulsant effect of inhalational anaesthesia, but it is believed that the inhalational anaesthetics act on the reticular formation in the medulla oblongata. After patient was connected to an anaesthesia machine with isoflurane 1.5% for 15 min, then 0.5% only, convulsions stopped. On inhalation of isoflurane patient kept on A/C (V) mode of ventilation, she had no breathing attempts and myorelaxants were not prescribed. Administration of isoflurane for the treatment convulsions and sedation in accidental intrathecal TXA administration is supported by literature and use in many similar cases. Dexamethasone 8mg was given IV OD for next 3 days and mannitol 20%-100 mls given slowly as loading dose, then 20%- 50mls IV TDS were given also for 3 days for prevention of brain oedema.

Blood pressures and pulse were changing significantly during this event. At first, immediately after TXA injection patient had a raised BP of 162/ 114 mmHg, and a PR of 65 bpm, then BP reduced to 150/85 mmHg on inhalation of halothane. Pulse remained raised at 156 bpm due to TXA brain stem toxicity. At the end of the CSF lavage pulse reduced to 80 bpm, which was considered a successful measure of the lavage.

However, in ICU BP on admission was 157/ 86 mmHg, Pulse of 169 bpm, regular sinus rhythm on ECG, no arrhythmias, then BP decreased to 104/47 mmHg, PS 150 per min, still sinus rhythm. Tachycardia is one of the commonest signs of TXA toxicity. No adrenomimetics on any point of treatment were used. Patient received 1.5mls /kg/hour IVF's usual fluid requirement. On day 2 patient has shown some signs of recovery, isoflurane was switched off, 15 min later patient was fully awake, breathing spontaneously was extubated.

No convulsions or neurological deficit were observed, except general body weakness. Patient also had frequent episodes of bradycardia on day 2, which were managed by injection of atropine 0.5 mg IV only. No other drugs, except antibiotics were prescribed. Unfortunately, our laboratory technically not able to confirm presence of TXA in CSF.

On day 4 patient was discharged from ICU, and on day 5 she was discharged from the hospital remaining stable on subsequent reviews with no cardiovascular or neurological deficits.

DISCUSSION

This is the first case of a successful management of accidental TXA injection reported in Zambia, despite attempts of spinal lavage were done for similar cases by other clinicians. Our case underscores the importance early CSF lavage in the management of such cases, as well as vigilance in airway management. Inhalational an aesthetics, such halothane and isoflurane play a very critical and cardinal role as potent anticonvulsants. Literature review suggests that infusion of Magnesium sulphate in doses used for management of eclampsia has been recommended by Hatch DM et al, as it can also improve patient outcome, and can be considered for development of standard of treatment protocols in the future despite only used in one occasion but tremendous improvement of the patient's condition.

Recommendations

1. Clear and Distinct Medication Labelling.

Proper labelling of medications is essential to avoid confusion, particularly in environments with multiple medications and high-risk procedures. It is recommended that TXA be distinctly labelled to clearly differentiate it from spinal anaesthetics or other drugs used for intrathecal administration. Consider using bold, color-coded labels or markings that are easily distinguishable immediately.

2. Confirmation of the Route of Administration.

One of the most effective ways to prevent errors is through thorough verification of the medication and its intended route. Prior to administering TXA, clinicians should double-check the patient's medical records and consult with the surgical or anaesthesia team to confirm the correct route—whether intravenous, oral, or otherwise. This confirmation should be a standard practice in all clinical settings.

3. Ongoing Education and Training for Healthcare Providers

Frequent errors related to medication administration can often be traced to gaps in knowledge or training. Regular education sessions should be conducted for all healthcare professionals, including anaesthesiologists, surgeons, and nurses, to ensure they understand the risks of intrathecal medication administration. Training should emphasize the importance of correct medication verification, appropriate labelling, and the potential consequences of errors.

4. Implementation of a Two-person Check System.

A critical step in preventing medication errors is the implementation of a multi-step verification process. The "two-person check" system, where two healthcare professionals independently verify the medication and its intended route of administration, should be a routine practice. This method has been shown to significantly reduce the likelihood of mistakes during high-risk procedures.

5. Post-Administration Monitoring.

After TXA administration, it is critical to closely monitor the patient for any signs of adverse reactions. In the case of an accidental intrathecal injection, symptoms such as neurological changes (e.g., numbness, weakness, or seizures) may manifest rapidly. Early recognition of these symptoms can help initiate prompt intervention and minimize long-term damage.

6. Designated Storage.

TXA should not be kept on the anaesthesia trolley but should instead be stored in a lockable locker, accessible only by the senior nursing officer.

CONCLUSION

Accidental intrathecal administration of TXA is a preventable error that can lead to significant patient harm and death. By adhering to clear labeling protocols, verifying routes of administration, educating staff, using dedicated equipment, and implementing a two-person check system, healthcare providers can significantly reduce the likelihood of such incidents. It is also imperative to note that early CSF lavage should be considered as a lifesaving procedure during such incidences.

No any conflicts of interest declared by co-authors.

Patient has been scheduled for elective laparotomy under General Anaesthesia.

Particulars of the incident and treatment were explained to the patient and informed consent from the patient for publication in an article or any medical journal has been obtained.

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