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Case report

Accidental intrathecal administration of dopamine in spinal anaesthesia for caesarean section: A case report

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Abstract Inadvertent intrathecal administration of a wrong drug can be a catastrophic event. We are reporting a case of 24 year old female patient who underwent elective caesarean section for oligohydramnios. During subarachnoid block resident doctor wrongly loaded 2 ml of Dopamine hydrochloride (80 mg) in the syringe assuming it to be 0.5% hyperbaric bupivacaine and injected it intrathecally. After 5 min there was no sensory-motor blockade and the senior anaesthesiologist identified the mistake that dopamine had been administered in place of bupivacaine. Immediately general anaesthesia was induced and a healthy, male baby was delivered. Cardiovascular changes in the form of hypertension, tachycardia, extrasystoles and irregular rhythm did occur but were promptly treated. No neurological complications occurred, the patient was successfully extubated and discharged on the 7th postoperative day uneventfully.

We conclude that before administration, drug labels should be carefully read to avoid medication errors from lookalike ampoules.

1. Introduction

The "wrong drug" problem is always a risk in anaesthesia. By definition "Medication error is any error in the delivery process whether it results in any adverse outcome or not" [1].

Cases have been reported in which a variety of drugs have been wrongly injected into the intrathecal space resulting in transient neurological symptoms, permanent neurological damage and death [2,3].

In present case report, we describe accidental injection of dopamine in the subarachnoid space, its consequences and outcome. Only one other case of intrathecal administration of dopamine is reported in literature [4].

It is necessary to report such events in order to create awareness, prevent further incidents and also highlight the importance of strict adherence to systematic medication safety practices.

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2. Case report

A 24 year old, 44 kg, female was taken up for elective caesarean section for oligohydramnios under spinal anaesthesia. Her preanaesthetic evaluation was unremarkable.

In the operating room routine monitoring with NIBP, electrocardiography and pulse oximetry was applied and baseline vitals B.P.-110/70 mmHg, H.R.-98/min and SpO_2-99% were recorded. She was preloaded with 500 ml of Ringer lactate.

First year anaesthesia resident (eight months experience) who was performing the block wrongly loaded the syringe with 2 ml dopamine (80 mg) [Inj. dopamine hydrochloride USP 200 mg/5 ml, United Biotech Ltd.] assuming it to be hyperbaric bupivacaine. This error occurred due to two factors. Firstly, the nursing staff had placed the dopamine pack next to the bupivacaine pack in the shelf meant for local anaesthetic and both ampoules were looking similar. Secondly, the senior anaesthetist was busy with another case, so the first year resident doctor took the dopamine ampoule in place of bupivacaine without reading its label, snapped it off and placed it over anaesthesia workstation. After getting washed she asked the non technical OT assistant to present the snapped off ampoule for loading and filled dopamine 2 ml in a 5 cc syringe in a sterile manner. After arrival of senior anaesthetist she performed lumbar puncture in L3-L4 intervertebral space under supervision and after getting free-flow of CSF, 2 ml of dopamine was injected intrathecally assuming it as hyperbaric bupivacaine.

After 5 min there was no sensory or motor block which led the senior anaesthetist to investigate the cause for the failed block. Identification of the error occurred on finding the broken ampoule of dopamine still placed on anaesthesia workstation.

Patient was conscious and oriented, she was asked about any neurological symptoms (pain, paraesthesia, motor weakness) in lower limb but she denied.

Ten more minutes had passed and BP increased to 160/94 mmHg with heart rate 160/min, irregular with multifocal ectopics which we attributed most probably to dopamine administration. Immediately 3 ml (60 mg) Lignocaine i.v (Inj. Xylocard) was given and general anaesthesia was administered to save the baby in case untoward maternal complications occur. Inj. glycopyrrolate 0.2 mg, thiopentone 250 mg, and succinylcholine 100 mg i.v. were given and she was intubated. We also administered esmolol (20 mg i.v. bolus slowly), followed by intravenous infusion of both esmolol and xylocard at 2 mg/min each. Meanwhile, a healthy male baby of 2.5 kg was delivered with APGAR score 7 at 1 min and 9 at 5 min. Blood pressure and heart rate were stabilized in 15 min, then infusion of esmolol and xylocard was gradually tapered and stopped by the end of surgery.

Further surgery was completed uneventfully in 40 min during which anaesthesia was maintained with Propofol infusion at 0.1 mg/kg/min, 100 mcg of fentanyl, and 25 mg succinyl choline. She received 1000 ml Ringer lactate, oxytocin 10 U and paracetamol infusion 1 g (100 ml) iv intraoperatively and urine output was 200 ml.

She was extubated after regaining adequate consciousness and motor power. She had no neurological complications and was discharged on the 7th postoperative day uneventfully.

3. Discussion

In present case the error occurred because the resident identified the drug based on the appearance of the ampoule and did not verify the name on the label.

Only a single authentic case report of intrathecal dopamine administration has been published, which occurred in Korea [4] where 2 ml of dopamine was administered intrathecally in a patient undergoing femur surgery. In this case also, the nurse identified the ampoule based on appearance without cross checking the label, loaded the drug and handed over the syringe to the anaesthetist who then administered it intrathecally assuming it to contain hyperbaric bupivacaine. Five minutes later sensory block to T10 was achieved and surgery was allowed to commence. Thirty minutes into the surgery the patient started complaining of pain and at this point the nurse identified the error on finding the broken ampoule of dopamine. General anaesthesia was administered for completion of surgery. Vitals remained stable except a slight increase in blood pressure to 170/90 mmHg. The analgesic effect of intrathecal dopamine observed in this case was attributed to antinociceptive property of spinal dopaminergic and $alpha_2$ adrenergic receptors [5,6].

In our case no such analgesic effect of intrathecal dopamine was observed. However we did observe cardiovascular changes in the form of hypertension and arrhythmia which were attributed to vascular absorption of dopamine (80 mg), as she had no prior cardiovascular pathology and these changes occurred after intrathecal injection but before induction of GA.

Though there were no neurological sequelae in both cases (ours and theirs), dopamine can induce vasoconstriction in the spinal cord ($alpha_1$ effect) which might result in spinal cord ischaemia and irreversible cord injury [4].

Ali et al. [2] in an article on spinal lavage mentioned in its introductory part that there was a case of inadvertent intrathecal injection of dopamine in which paraplegia lasted over one month; however, much details of this case were not described as that event was not presented or published anywhere. Many times such errors are not documented because of medicolegal litigation and they only spread in medical fraternity through verbal communication.

Cases of inadvertent intrathecal injection involving wide range of drugs have occurred like tranexamic acid, atracurium, potassium, chlorhexidine, antibiotics and many more drugs. The outcome in these cases has varied from seizures, tetanus, muscle hypotonia, paraplegia, pulmonary oedema, unconsciousness, cramps, encephalitis, respiratory distress, cerebral oedema, rhabdomyolysis, hydrocephalus, myoclonus, ventricular arrhythmias and even death. In some cases no signs or symptoms were seen. This depends on the degree of neurological toxicity of the agent [2].

In spite of a number of reported catastrophes due to accidental intrathecal administration of the wrong drug, there are no specific clinical guidelines for the management of such incidents.

Ali et al. [2] analysed 48 case reports involving wrong intrathecal drug administration across different countries and found that if immediate CSF drainage and early irrigation was done better outcomes were reported.

For spinal lavage [2], aspiration of CSF must be done from a lower intervertebral space using a 22 G needle and then

intrathecal infusion of a crystalloid (Normal saline 0.9%, Ringer lactate and plasmalyte) must be done from a higher space. This will prevent cephalic spread of the drug. This aspiration and irrigation technique should be carried out repeatedly for better results. Volume aspirated should be equal to volume irrigated and should be at least around 150 ml. Keeping the patient in a head up position also minimizes the amount of drug reaching the brain [7].

We did not perform spinal lavage as we immediately induced general anaesthesia to salvage the life of the baby in case any untoward maternal complications occur. Veisi et al. [3] in a case report where tranexamic acid was injected intrathecally also induced immediate general anaesthesia for caesarean section to save the life of the baby. Maternal mortality occurred in this case; however, twin babies were saved.

After reviewing the available literature [8,9] and experience of present case we suggest that intrathecal drug errors can be minimised by following some recommendations:

1. In operating room, drugs intended for intrathecal use should be placed in separate designated shelves, should have visibly different colour codes from those for intravenous use, and route of administration should be mentioned on label. Where prefilled syringes are used, there should be different luer fittings for drugs for subarachnoid block and intravenous use. The person presenting the drug for loading and the anaesthetist performing the block should both read aloud the name of the drug on the label.
2. Such errors generally occur with junior doctors and nurses so emphasis should be placed on curriculum providing thorough understanding of drugs and medication errors with their potential hazards to better prepare them for clinical settings.
3. If inadvertent intrathecal administration of wrong drug occurs, spinal lavage is beneficial and it should be done as early as possible.

4. Conclusion

We conclude that before drug administration proper attention must be given for reading drug labels to avoid medication error from look-alike ampoules. If fixed protocols regarding medication practices are developed in operating room and a strict adherence to them is maintained, no matter how much busy or how much experienced we are such human errors and resulting catastrophes can be prevented.

Conflict of interest

None.

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