Case Report

Pseudocholinesterase Deficiency Causing Delayed Recovery Following Caesarean Section in a Patient with Antithrombin lll Deficiency

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Introduction

Pseudocholinesterase deficiency can result in impairment of the metabolism of neuromuscular blocking agents like succinylcholine and mivacurium. We report the case of a 33 year old patient with known antithrombin III deficiency who underwent caesarean section under general anesthesia following which she had delayed recovery from anaesthesia, due to pseudocholinesterase deficiency.

Case report

A 33-year-old lady, with known antithrombin III deficiency, on anticoagulants at 37 weeks of gestation was planned for Caesarean section as an elective procedure. She had a previous normal delivery 5 years ago. However on 40th post partum day, she had an episode of seizures for which CT scan brain was done which revealed transverse and sigmoid sinus thrombosis with venous infarct in left posterior temporal area. Haematological investigations revealed thrombocytopenia. She was started on warfarin and phenytoin which was continued for 1 year. She was on regular follow up with the haematologist since then. She was under regular antenatal checkup during her present pregnancy with constant followup by haematologist. The values of anticardiolipin antibody, lupus anticoagulant, protein C and protein S were normal.

At 30 weeks of gestation there was mild reduction in antithrombin III 81.8% (normal value 83-128) which further reduced to 66.1%. She was started on low molecular weight heparin (Enox aparin 0.6 ml s/c OD). She was planned for elective caesarean section at 37 weeks of gestation. Routine preanesthetic assessment was done and all haematological and biochemistry lab values were normal except platelet count of 80000 /mm^3. Low molecular weight heparin was changed to unfractionated heparin 5000 Units IV qid on the previous day of surgery and stopped 6 hours before surgery. On the day of surgery platelet count - 61000/mm^3 PT - 12.6 (C), 13.5 (T), INR - 1.07, aPTT - 28 (C), 29.6 (T), Hb 11.7 g%.

In view of antithrombin III deficiency and thrombocy topenia it was decided to perform LSCS under general anaesthesia. Patient was shifted to the operating room and her baseline hemodynamic parameters like heart rate, ECG, NIBP, oxygen saturation were noted. Anesthesia was induced with Thiopentone 250 mg iv and endotracheal intubation was facilitated with 7 mm ID cuffed endotracheal tube with succinylcholine 100 mg as a neuromuscular blocking agent. Intermittent positive pressure ventilation was initiated (Tidal volume - 450 ml, rate - 12, I:E ratio - 1:2) and surgery was started. 10 minutes after Succinylcholine, iv Atracurium 15 mg was given to facilitate adequate surgical relaxation and to prevent any increase in intracranial pressure (as the patient had previous history of cerebral venous thrombosis) consequent to coughing/bucking. A live male baby was delivered (APGAR at 1 minute - 8/10, at 5 minutes - 9/10). Following delivery of the baby, fentanyl 75 mcg, was given intrave-nously and infusion of oxytocin (20 units) was started. Anesthesia was maintained with isoflurane (0.6-0.8%) in oxygen:air (50:50). One unit of platelet was transfused intraoperatively. Patient was haemodynamically stable throughout the intraoperative period.

Anesthesia was reversed with glycopyrrolate 0.5 mg and neostigmine 2.5 mg when she developed spontaneous respiratory efforts (30 minutes after atracurium). However the respiratory efforts were not adequate. Hence a repeat dose of glycopyrrolate 0.2 mg and neostigmine 1 mg were administered. Respiratory efforts were still not adequate. Patient was drowsy, opening eyes to commands. Muscle power in all four limbs was grade 0-1. Ventilation was continued with 100 % oxygen. Arterial blood gas sample revealed metabolic acidosis (pH-7.275,HCO_3- 18.6 mmol/L) po-tassium was 4.5 meq/l and ionised calcium was 0.98. 10% Calcium gluconate 10 ml given slowly over 15 minutes. Nalaxone 200 mcg was given suspecting prolonged opioid effect. Muscle power and respiratory efforts were still poor and assisted ventilation was continued. Neuromuscular monitoring was instituted which showed TOF of 10 %. Temperature was normal. Blood glucose was 108mg /dl. Pupils were equal B/l and reacting to light.

Two hours later, the muscle power improved to grade 4 and respiratory efforts were adequate. Repeat arterial blood gas sample showed pH-7.352, PO2-104, PCO2-33.8, HCO3 - 18.2. Patient was conscious, obeying commands, respiratory efforts were good, with adequate tidal volume and oxygen saturation maintained 100 % with room air, TOF value of 90% and hence trachea was extubated. Muscle power in upper limb was grade-4 and lower limb was grade-2. Patient was then shifted to ICU in a hemodynamically stable condition for postoperative monitoring. Five hours after extubation patient was fully awake, oriented with normal motor power (Grade 5) in all limbs with-out any sensory deficit. Venous doppler of lower limbs showed no evidence of venous thrombosis. Heparin was restarted at 5000 U s/c tds, 6 hours after surgery. Post operative calcium (total) was 8.3 mg/dl, and magnesium 2.0 mg/dl. Platelet was 96000 lac/mm3.

The cause of delayed recovery from anesthesia was suspected to be either due to hypothy-roidism or pseudocholine esterase deficiency which was evaluated post operatively.

Thyroid function test (free T3, free T4 and TSH) were normal. 24 hours later she was started on warfarin 2 mg which was titrated according to PT and INR values. Heparin continued for 48 hours following surgery, after which she was on warfarin alone. She had an uneventful postoperative pe-riod and was discharged on the 8th postoperative day.

Pseudocholinesterase value was 258 U/L (Normal lab reference was 2710-11510) which confirmed the cause for delayed recovery from general anaesthesia as pseudo choline esterase deficiency.

Discussion

This case report summaries the perioperative events of a gravid patient with previously undiagnosed pseudocholinesterase deficiency and administration of succinylcholine. A pseudocholinesterase enzyme deficiency was suspected after failure to recover from the neuromuscular effect of the drug and the subsequent laboratory testing confirmed a pseudocholinesterase deficiency. Following intravenous administration of succinylcholine, about 90% of the total dose is hydrolysed by pseudocholinesterase (into succinyl monocholine and choline) within 1 min and only the remaining drug reaches the nerve-muscle junctions to bind with the receptor to result in the nerve end plate depolorization[1]. Two patients with severe pseudocholinesterase deficiency may develop apnea lasting 70–120 min after receiving a depolarizing agent[3]. The deficiency or abnormal enzyme can be either inherited or acquired. Acquired factors that decrease the pseudocholinesterase levels includes pregnancy, advanced liver disease, malnutrition, myxoedema, cancers, acute systemic infection and drugs (amitriptyline, neostigmine, pyridostigmine, chlorpromazine, cyclophosphamide, pancuronium, organophosphorus insecticides)[4-6]. Viby-Mogensen proposed that apnea is only moderately prolonged with as much as a 70% depression in pseudocholinesterase activity. Thus the apnea is significantly prolonged only with extreme lower levels of pseudocholinesterase activity[7]. The deficiency or abnormal enzyme cannot be identified unless its has been tested specifically for, unless the individual experiences a prolonged effect of the drugs that are metabolised with pseudocholinesterase. The decreased enzyme activity can be due to deficient amount of normal enzyme (quantitative) or presence of abnormal enzyme (qualitative) or both. The adequacy of the pseudocholinesterase is determined qualitatively by the dibucaine number and quantitatively (pseudocholinesterase level) in units per liter[7]. Quantitative analysis of plasma levels of pseudocholinesterase is done using quantitative slab gel electrophoresis procedure. In our patient, the quantitative value of pseudocholinesterase level is 258 (Normal lab reference was 2710-11510). The amount of pseudocholinesterase activity is determined by colorimetric assay using benzylcholine substrate. Pseudocholinesterase levels less than 320 U/L are usually seen in individuals who are homozygous for atypical genes. The activity of plasma cholinesterase is measured by adding plasma to benzylcholine and observing the reaction spectrophotometrically. In persons showing succinylcholine sensitivity, the hydrolysis of the benzylcholine substrate was inhibited less by the local anaesthetic dibucaine than in persons with a normal response to succinylcholine and the dibucaine number refers to the percentage of inhibition, which is constant for a person independent of the concentration of the enzyme. The abnormal enzyme has only about 1/200 the affinity for dibucaine than the normal pseudocholinesterase. Dibucaine number is proportional to the function of pseudocholinesterase and is independent of the amount of the enzyme. It does not measure the enzyme concentration in plasma or the efficiency of the enzyme itself[8-10].

Pregnancy is associated with 25% to 30% decreased pseudocholinesterase activity from the 10th week of gestation[11]. The enzyme level returns to non pregnant levels around sixth week postpartum. This in general is clinically not significant, as it takes about 70 % depression in the enzyme activity to cause a prolonged blockade after succinylcholine. There was no case report available to support the idea that in our patient, the decrease in pseudocholineserase level was purely due to pregnancy status.

Ventilatory support remains the mainstay in managing the patient with pseudocholinesterase deficiency patients with prolonged apnea. In case of prolonged apnea following intravenous succinyl choline, administration of highly purified human serum Pseudocholiesterase decreases the duration of the induced apnea[7]. Investigating the other causes of prolonged apnea or recovery from anaesthesia helps in ruling out pseudocholinesterase deficiency. Our patient recovered completely with assisted ventilation alone, without the administration of acetylcholinesterases.

Conclusion

Deficiency of pseudocholinesterase, either inherited or acquired, can have unexpected results regarding the patient's ability to metabolize certain drugs. This case

report described a 33-year old woman who developed apnea from prolonged neuromuscular blockade because of a decreased pseudocholinesterase value of 258 U/L. Individuals who are not diagnosed of this condition earlier pose a great challenge to anaesthesiologists because of the unexpected duration of action of succinylcholine. Implementing proper monitoring techniques such as peripheral nerve stimulator helps in differentiating pseudocholinesterase deficiency from other causes of delayed neuromuscular recovery.

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Making faces at smoking mom!

The current technology allows us to view what we could not have visualised before – the reactions of an unborn to the obnoxious habits of its mom. That habit is of course smoking. In a new study carried out in Durham University, the researchers observed 4-D scans of the facial expressions of 20 foetuses of both smoking and non-smoking would-be moms. These observations were done 4 times between 24 and 36 weeks of pregnancy. The foetuses of the smoking moms showed higher rates of mouth movement and greater frequency of facial touching compared to the foetuses of non-smoking women. The authors feel that these reactions could be due to the effect of smoking on the development of foetal nervous system. However, all the babies were born healthy. The study is published in the latest issue of Acta Paediatrica.
[http://www.medicinenet.com/script/main/art.asp?articlekey=187616]

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