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*Suxamethonium-induced prolonged neuromuscular block  
in a patient undergoing caesarean section. A case report*

An unexpected prolonged neuromuscular block and respiratory distress, although infrequent, is a very serious anesthetic complication in patients undergoing general anesthesia.

Suxamethonium is a neuromuscular blocker agent of choice for a rapid effect and of short duration (3 to 5 min), which is due to its rapid degradation with plasma pseudocholinesterase (1). This agent is used for intratracheal intubation, especially when rapid intubation is necessary.

Sometimes suxamethonium may induce some side effects, such as cardiac arrhythmia or bradycardia, increase in intraocular pressure, allergy reaction and allergic shock or malignant hyperthermia. Inconvenience of its use is the lack of antagonistic agent. Although embryotoxic and teratogenic effect have not been revealed, its use in the first trimester of pregnancy is contraindicated. However, the placental transfer of this agent is not significant and does not affect the fetus in full-term pregnancy.

The purpose of this paper was to present a prolonged neuromuscular block and respiratory distress in a healthy young woman undergoing caesarean section under general anesthesia after the routine use of suxamethonium for intubation.

A CASE REPORT

A case of a 22-year-old primigravida in the 41<sup>st</sup> week of first gestation, undergoing emergency caesarean section because of incorrect engagement of the fetal head and lack of progress in labor was presented. The patient was a healthy normotensive woman with uncomplicated singleton pregnancy, without any renal, heart and vascular diseases and with normal laboratory test and electrocardiography results. Arterial blood pressure measurements were normal throughout pregnancy. The patient did not use any drugs before and during pregnancy.

A caesarean section was performed under general anesthesia. The induction was performed with 0.5 mg atropine, 5 mg kg<sup>-1</sup> thiopental and with 1 mg kg<sup>-1</sup> suxamethonium as a relaxant, followed after intubation with N<sub>2</sub>O/O<sub>2</sub> (67/33%) and after delivery with 5 µg kg<sup>-1</sup> fentanyl. There was no more injection of any relaxant agent, due to lack of reappearance of spontaneous breathing. The induction and maintenance of anesthesia were uncomplicated. The course of cesarean section was normal without any complications. At the end of the operation one short episode of the increase in blood pressure to 200/140 mmHg and the increase in the pulse rate about 170 per min was observed. After injection of 25 mg urapidil and 4 mg metoprolol, blood pressure fell down to 160/100 and

pulse rate to 120 per min. Patient received 2.5 g metamizol to exclude the influence of pain for blood pressure and pulse rate. After the completion of the operation the patient remained relaxed without spontaneous respiration and required assisted respiration.

The patient underwent the computed tomography of the head to rule out other causes for patient's condition, e.g. neurological disease or intracranial bleeding. The result of computed tomography was normal.

The patient was flaccid, with inefficient respiration and very weak defense response to pain stimulus. The most important goal at this moment was providing intensive care and assisted respiration. The patient was transferred to the intensive care unit with her trachea intubated and lungs mechanically ventilated in CMV with  $\text{FiO}_2$  0.35.

Auscultatory vesicular respiration and isocoria with light pupillary reflex were observed on physical examination. The examination of the cardiovascular system revealed temporary tachycardia up to 140 heart rate per minute and temporary increase in blood pressure up to 180/110 mmHg, especially during nursing care. The abdomen was soft to the touch. There was no bleeding from the surgical wound and lochia sanquinolenta was normal. Antalgic and sedative drugs were administered in intravenous infusion. The vital signs were closely monitored.

Spontaneous breathing returned after three hours. After the next two hours the patient fulfilled criteria for tracheal extubation because the normal level of neuromuscular tension and tone as well as normal respiratory function returned. The patient was conscious, communicative, with circulatory and respiratory efficiency and normal muscle tone and strength. She remembered the time of regaining consciousness and temporal inability to move. This anesthetic complication runs parallel to full recovery and without any adverse effects for the infant. Therefore, the patient was transferred to the obstetric ward.

This case report presents a very serious pharmacological problem, which was unexpected and may be usually diagnosed after general anesthesia. The patient remained relaxed and without spontaneous respiration for about several hours after the operation and therefore required assisted respiration.

This condition may be due to neurological disease, liver disease or other concurrent drugs or pseudocholinesterase deficiency. The neurological disease, intracranial bleeding, liver disease or drug contamination which might cause prolonged neuromuscular block and respiratory distress were ruled out. This prolonged neuromuscular block and respiratory distress after caesarean section may suggest low pseudocholinesterase activity, which is of the fundamental significance for normal suxamethonium metabolism. Serum pseudocholinesterase level in our patient was 1146 U/L (normal range between 2450 and 4950 U/L). This level confirms the clinical diagnosis of pseudocholinesterase deficiency, which is responsible for breaking down suxamethonium, administered as a muscle relaxant in general anesthesia and which resulted in prolonged neuromuscular block and respiratory distress in this patient after general anesthesia with suxamethonium during cesarean section.

The patient was informed about the prolonged neuromuscular block and the necessity to give this information to medical personel in case of any operation.

## DISCUSSION AND CONCLUSIONS

The short duration of suxamethonium results from its rapid hydrolysis by plasma cholinesterase and is ideal for providing muscle relaxation for brief surgical procedures (2). Prolongation of the effect of this drug may be expected in patients with abnormality in this enzyme activity or decreased levels of this enzyme (2).

Pseudocholinesterase is synthesized in the liver and immediately released into plasma (3, 4). The plasma half life has been estimated to be approximately 12 days. Prolongation of succinylcholine-induced neuromuscular block may result from inherited or acquired decrease activity or deficiency of pseudocholinesterase. Physiologic decrease in this enzyme activity was observed in older patients and during pregnancy (5, 6). Decreased activity may be observed in people with liver or renal diseases, malignancy or malnutrition and burns (7).

Our patient was healthy, with normal renal and liver functions, and the results of laboratory tests were within normal limits.

A similar case was presented by Mekbib et al. (8), who reported a primigravida after a cesarean section because of cervical dystocia and a relative cephalo-pelvic disproportion. In her case succinylcholine was used in general anaesthesia as a muscle relaxant. This woman remained relaxed and without spontaneous respiration for about four hours after the operation and as a result required assisted respiration. The cause of this complication was a decreased plasma pseudocholinesterase activity too.

Lurie et al. (9) reported the case of a patient with pseudocholinesterase deficiency associated with HELLP syndrome. In this woman the pseudocholinesterase activity returned to normal with concomitant recovery from HELLP syndrome.

Hodgson et al. (10) studied the interaction between mivacurium and magnesium sulphate in a group of parturient women undergoing caesarean section under general anaesthesia. They studied hypertensive patients with and without therapy with magnesium sulphate in comparison with normotensive controls. These authors observed significantly higher magnesium concentrations and plasma cholinesterase activity in hypertensive subjects who received magnesium sulphate in comparison to hypertensive women without magnesium therapy and in comparison to normotensive controls. The duration of the effect of mivacurium was prolonged by subtherapeutic serum magnesium concentration.

Also Hino et al. (11) reported a patient with a triple pregnancy treated with magnesium sulphate who underwent emergency cesarean section in the 35<sup>th</sup> week of gestation under general anaesthesia. Although serum magnesium value was not beyond therapeutic levels, the neuromuscular block effects with vecuronium were strengthened.

This information is very important because a doctor should always remember about the biophysiological effects of magnesium or other drugs and the possibility of interaction between these drugs and anesthetic agents used in general anaesthesia.

Therefore, the neuromuscular monitoring is a good practice in all patients undergoing the operation under general anaesthesia, especially in pregnant patients treated with magnesium sulphate.

Our presented patient was in the 41<sup>st</sup> week of gestation at the time of caesarean section. She was healthy, normotensive and she did not use any drugs. Biochemical test of pseudocholinesterase activity, family history and medical history of this woman, and clinical observation confirmed the presence of constitutional deficiency of pseudocholinesterase activity. This information was of great importance for the patient and her family in the future.

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#### SUMMARY

The purpose of this study was a presentation of the young woman at delivery, who underwent a caesarean section under general anesthesia with suxamethonium as a neuromuscular relaxant. Prolonged neuromuscular block and respiratory distress requiring assisted respiration took place after the operation was completed. This condition was the result of a decreased plasma pseudocholinesterase activity. The most important goal after the delivery was providing an intensive care of patient and assisted respiration. The patient was ventilated until neuromuscular function and respiratory function returned to normal.

Indukowany suksametonium przedłużony blok nerwowo-mięśniowy po cięciu cesarskim.

#### Opis przypadku

Celem pracy było przedstawienie przypadku młodej kobiety, która urodziła cięciem cesarskim w znieczuleniu ogólnym z zastosowaniem suksametonium jako środka zwiotczającego mięśnie. Po zabiegu operacyjnym wystąpił przedłużony blok nerwowo-mięśniowy. Pacjentka wymagała zastosowania oddechu wspomaganego. Sytuacja ta była wynikiem obniżonej aktywności esterazy cholinowej. Najważniejszym zadaniem było zapewnienie pacjentce intensywnej opieki medycznej i utrzymanie oddechu wspomaganego do czasu powrotu prawidłowych funkcji życiowych.