East African Medical Journal Vol. 90 No. 10 October 2013
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ANAESTHETIC CHALLENGES IN A HIGH RISK PARTURIENT WITH MYASTHENIA GRAVIS UNDERGOING CAESAREAN SECTION UNDER SPINAL ANAESTHESIA

S. FYNEFACE-OGAN and O. T. ALAGBE-BRIGGS

SUMMARY

The prevalence of myasthenia gravis is low. The management implications of this disease in pregnant women are very challenging for anaesthetists. The objective is to highlight some of the challenges, the management and the lessons learnt during the management of this patient. This is a case report of a 31-year old parturient with diagnosed myasthenia gravis co-existing with hepatitis B infection that presented for caesarean section. Surgery was carried out under a single-shot spinal anaesthesia with bupivacaine. Intraoperative myasthenia crisis was managed with neostigmine infusion. She was managed in the Intensive Care Unit for a few days and discharged. Under spinal anaesthesia, she became very breathless and developed wide-spread musculo-skeletal weakness while having a stable haemodynamics intra-operatively. Surgery was carried out successfully. Both mother and child were discharged on the 7th day post-operative after baby was confirmed sero-negative of hepatitis B surface antigen. A better understanding of the pathophysiology and complications that accompany myasthenia gravis is needed to manage these patients under anaesthesia.

INTRODUCTION

Myasthenia gravis (MG) is an acquired, neuromuscular, autoimmune disease that presents clinically with weakness and fatigue of the skeletal muscles. The disorder is characterised by a decrease in the number of acetylcholine receptorsin the neuromuscular plates, due to an autoimmune process mediated by antibodies directed against the alpha-subunit of the nicotine receptor of the acetylcholine (1). The prevalence of the disease in Nigeria is not known but world-wide, it is twice as common in women as in men and frequently affects young women in the second and third decades of life, overlapping with the childbearing years (2, 3).

During pregnancy the course of this disease is unpredictable; but worsening of symptoms occurs more likely during the first half of pregnancy and postpartum. In one third of patients the disease exacerbates, whereas in two thirds it remains clinically unchanged (4, 5). Although myasthenia gravis constitutes a high risk, it can be well managed during pregnancy with relatively safe and effective therapies.

We report the management of a Hepatitis B seropositive patient with myasthenia gravis scheduled for Caesarean section due to prolonged rupture of membrane (PROM) and cephalopelvic disproportion (CPD).

CASE REPORT

A 31-year old Gravida 2 Para 1 registered patient presented to the labour ward of the University of Port Harcourt Teaching Hospital, Port Harcourt with a four-hour history of labour pains. She was a known patient with myasthenia gravis diagnosed about five years ago and was placed on treatment with mestinon (Pyridostigmine 30 mg) and prednisolone 2.5 mg daily. Following this medical treatment she had significant remission of the disease with occasional periods of exacerbation. Pre-natal history suggested that she had occasional episodes of cholinergic crisis. The last episode was about six months prior to the registration of this pregnancy. Her past obstetrical history included a Caesarean section due to CPD – of a 3800 g MG asymptomatic alive female child.

During the antenatal booking, her indices were;

height 167 cm, weight 119 kg (BMI 42.7), blood pressure was 120/80 mmHg. Following routine laboratory investigation during this pregnancy, she was found to be Hepatitis B surface antigen sero-positive, blood group B rhesus D positive, haemoglobin genotype AA, packed cell volume - 33%. She was however sero-negative for HIV and syphilis. Although the antenatal period was uneventful, her attendance to both Antenatal and Medical Outpatient Clinics were not regular. A repeat ultrasound examination at 36th week gestation showed a normal and well developed foetus. The amniotic fluid and foetal movements were also normal.

On presentation at the labour ward, general examination revealed that she was in painful distress and had mild pallor with mild to moderate respiratory distress as evidenced by a flaring alae nasi and heavy breathing. A vaginal examination showed that the cervical os was five centimetres dilated with 40 percent effacement. She had had a spontaneous rupture of the membrane about six hours before presentation. The cardiovascular system was essentially normal but the central nervous system examination showed mild bilateral ptosis, and generalised hypotonia with weakness of the intercostal muscles. The patient's functional status was classified according to the Osserman (6) Grade n. She could not force-open her mouth against moderate resistance. The foetal heart rate was 144 beats per minute strong and regular. On the American Society of Anaesthesiologists (ASA) physical status classification she was assessed to be Class III (Emergency). Following the mild to moderate central nervous system affectation, respiratory difficulty, premature rupture of membrane and cephalopelvic disproportion, a decision for an emergency Caesarean section was made. Consent for surgery was obtained from and mode of anaesthesia also explained to the patient.

The Caesarean delivery was performed under spinal anaesthesia. Standard monitors measuring noninvasive blood pressure (NIBP), electro-cardiogram (ECG), and peripheral oxygen saturation (SPO2) were used on this patient. We opted to initiate neuraxial anaesthesia with supportive non-invasive ventilation in the peri-operative period, although we were fully prepared for tracheal intubation and full ventilator support should her respiratory status deteriorate. For the induction of spinal anaesthesia, she was positioned sitting with the feet resting on a stool. While observing asepsis, and using the L3/4 Intervertebral space, the subarachnoid space was located after a single pass with an extralong (115 mm) 25-gauge Quincke spinal needle. Spinal anaesthesia was induced with 0.5% bupivacaine plain 10 mg. She was returned to the supine position while ensuring left lateral uterine displacement and 10 degree head-up tilt. Diclofenac suppository 200 mg was inserted before skin incision was made. A maximum T5/T6 sensory level was reached after six minutes. Supplemental oxygen at flow rate of 6 l/min was administered to her via a face mask. She had a significant relief in respiratory function following an infusion of neostigmine 5 mg in 100 ml normal saline over 10 minutes and intravenous hydrocortisone 200 mg.

Following a Pfannenstiel skin incision with low transverse uterine incision, a female infant weighing 4200 g was delivered with a placental weight of 600 g. The Apgar scores of the baby were seven and nine at one and five minutes, respectively. The intra-operative cardiovascular parameters were stable. The baby was immediately admitted into the Special Care Baby Unit (SCBU) for assessment and observation, but there were no symptoms of neonatal MG observed. Post-operative pain management in the mother was with diclofenac suppository 200 mg 12 hourly and titrable doses of pentazocine (a benzomorphan derivative) 30-45 mg four to six hourly for 48 hours. She had a satisfactory pain relief.

Although the mother was also admitted into Intensive Care Unit (ICU) of the hospital for monitoring, she was able to commence breast-feeding immediately. However, following an exacerbation of muscle weakness and fatigability in the ICU, a further neostigmine 5 mg in 100 ml normal saline every six hours and supplemental oxygen 6 l/min by nasal prongs. She also received daily intramuscular hydrocortisone 200 mg was administered until she resumed oral feeding on the second post-operative day. She was however discharged from the ICU on the third day post-operative into the postnatal unit of the hospital. The subsequent post-operative course was uneventful and, both mother and child were discharged home from the hospital on the 7th post-operative day. The postnatal period was also uneventful for the mother and child.

DISCUSSION

The course of MG in pregnancy, as well as its influence on outcome is unpredictable. This could be made worse when there is a combination of poor patient compliance to both drug treatment and clinic followup. The high-risk patient in this report was diagnosed with MG but did not have a consistent antenatal and medical follow-up. This could account for her relatively frequent periods of exacerbations.

Myasthenia gravis co-existing with pregnancy is not common in Nigeria but world-wide it occurs in 1:20, 000 - 40, 000 pregnancies (2, 3, 7). This explains why the anaesthetic management of these patients could be a challenge when they present for surgery.

The ideal anaesthetic technique for high risk patients with myasthenia gravis is not known. The main challenges faced in our patient were essentially those of muscle weakness she presented with, the

peri-operative use of anticholinestrase and the need to achieve a relaxation of the surgical field. To overcome these challenges, the technique of regional anaesthesia was used. The use of this technique of anaesthesia has also been recommended (8). The advantages of regional anaesthesia include avoidance of intravenous opioids, neuromuscular blocking drugs, and anticholinesterases. The use of neuromuscular blocking agents and the tendency of anticholinestrase overdose itself may cause considerable and excessive muscle weakness.

General anaesthesia with tracheal intubation will be more appropriate if there is bulbar involvement, or severe respiratory compromise is present. In such circumstances, the principles guiding anaesthetic management of patients with MG are the use of shortacting opioids, muscle relaxants, and inhaled anaesthetics: all being agents with rapid recovery profile. Due to acetylcholine receptor down regulation, these patients are very sensitive to non-depolarising muscle relaxants and potentially resistant to depolarising muscle relaxants. However, general anaesthesia with tracheal intubation ensures adequacy of ventilation and also confers airway protection from gastric soilage.

We had to use neuraxial anaesthesia with oxygen support by face mask in the perioperative period, although we were fully prepared for tracheal intubation and full ventilatory support in the event of deteriorating respiratory status.

Although we decided to use a single-shot spinal technique, the use of continuous spinal or epidural anaesthesia technique with catheter and combined spinal-epidural anaesthesia have been suggested (9, 10), as they allow titration of the local anaesthetic dose. Continuous spinal anaesthesia would have required dural puncture with an epidural needle, and the consequent increased risk of post-dural puncture headache (10). The advantage of spinal anaesthesia over epidural anaesthesia as previously recommended8 requires the use of a smaller dose of local anaesthetic. It has been demonstrated that large doses of local anaesthetic infused epidurally interferes with neuromuscular transmission (11). The subarachnoid dose of the bupivacaine used in our patient was adequate. There was satisfactory anaesthesia and adequate surgical relaxation without any adverse effects.

Intra-operative neostigmine 5 mg in 100 ml normal saline was administered when a 1 mg could not improve the respiratory difficulty experienced intra-operatively. Although it has been shown that an equivalent dose of intravenous pyridostigmine 4 mg can be used to replace oral doses of 120 mg, and intravenous neostigmine 1 mg replacing oral doses of 30 mg (12), our patient needed up to 5 mg of neostigmine in 100 ml normal saline administered over 10-20 minutes before the respiratory insufficiency from muscle weakness could be effectively treated. The management of MG patients in the ICU can also pose some challenges especially following thymectomy. The use of standard protocols for the management of these patients would produce better results in terms of the number of cholinergic and myasthenic crises, and duration of respiratory support. Our patient did not require full ventilator support as evidenced by her ability to care for her baby with minimal support.

Babies of mothers suffering from MG mayor may not display symptoms at birth. The baby delivered by our patient did not show any symptoms of MG. The baby was put to the breast almost immediately after birth. Unlike pyridostigmine, neostigmine is not excreted into the breast milk (14, 15). Although neostigmine is ionised at physiologic pH; the low molecular weight (about 223) is low enough for the non-ionised fraction to be excreted into milk. The effects, if any, on a nursing infant from exposure to neostigmine in milk is however unknown.

A subtle but more hazardous challenge in our patient was that she was hepatitis B surface antigen sero-positive. Mother-to-child transmission (MTCT) of hepatitis B virus (HBV) is one of the most important causes of chronic HBV infection (16,17,18). It remains one serious problem despite passive immunisation (hepatitis B immune globulin at birth) and active immunisation (hepatitis B vaccination according to the standard 3-dose schedule). MTCT may occur prenatally, during delivery, or postpartum.

Currently, a series of measures have been taken to prevent both prenatal and postpartum routes of transmission with progress being achieved to some extent. However, with regard to MTCT of HBV during delivery, disagreements still exist on the issue of whether a different mode of delivery (mainly caesarean section versus vaginal delivery) will affect the risk of mother- to-child HBV transmission (19, 20).

Of the cases of MTCT of HBV, a large proportion occurs during the intrapartum period. Underlying mechanisms may include transfusion of the mother's blood to the foetus during labour contractions, infection after the rupture of membranes, and direct contact of the foetus with infected secretions or blood from the maternal genital tract (21, 22). As elective caesarean section (ECS) is performed before the onset of labour or the rupture of membranes, it could effectively avoid the disadvantages described above. Therefore, ECS might reduce the risk of MTCT of HBV (compared with vaginal delivery, Caesarean section after onset of labour or after rupture of membranes). However this was not the case for our patient. She presented in established labour, had ruptured membranes and eventually an emergency Caesarean section was done. A serology test for hepatitis B surface antigen carried out on the baby was negative and the neonate was subsequently immunised.

In conclusion, the management of a high risk patient with myasthenia gravis can be very challenging. This is worse in the presence of bulbar involvement or respiratory insufficiency. Myasthenia gravis can be successfully managed during pregnancy with a combination of pharmaceutical agents with good maternal and foetal outcome. Our patient had a significant measure of respiratory challenge which was successfully managed and she was discharged from the hospital. The management of such patients during pregnancy should be a multidisciplinary approach involving neurologists, obstetricians, paediatricians, and obstetric anaesthesiologists during pregnancy and delivery.

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