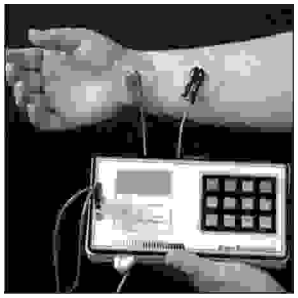
CASE REPORT PROF-970

PROLONGED NEUROMUSCULAR BLOCKADE;

AFTER EMERGENCY CESAREAN SECTION.



DR. SOHAIL ASGHAR,
Consultant Anaesthesiologist,
PAF Hospital Rafiqui,
Shorkot Cantt

DR. MOHAMMAD BOOTA
Consultant Anaesthesiologist,
PAF Hospital Rafiqui,
Shorkot Cantt

ABSTRACT... sohailz1971@yahoo.com. We are presenting a case of prolonged neuromuscular blockade after emergency cesarean section. A 34 years old, young lady with no previous history of any systemic illness including neuromuscular disorder reported in the operation t heatre for cesarean section. She was offered standard protocol for general anaesthesia using thiopentone sodium i/v for induction, suxamethonium i/v for intubation, and pancuronium bromide i/v for intra-operative relaxation. Intra-operative analgesia was obtained with nalbuphine i/v (after delivery of child). Ampicillin and gentamicin i/v were used as prophylactic antibiotics. The patient failed to regain spontaneous breathing effort after a lapse of two hours since the last dose of pancuronium bromide. Laboratory investigations including complete blood picture, urea, creatinine, electrolytes (calcium, sodium, potassium) revealed anemia and severe hypocalcemia. She was given fresh whole blood and calcium gluconate intravenously, in addition to other supportive measures like ventilatory support using SIMV mode of ventilation with 40% O2. Patient started regaining breathing effort after about 12 hours and was extubated after about 15 hours of artificial ventilation with little residual neuromuscular blocking effect. She was kept in the ICU for the next 24 hours for observation and was discharged from ICU the next day with full recovery. **Conclusion** Patient probably suffered from the interaction between gentamicin and pancuronium bromide, that was further potentiated by hypocalcemia and anaemia. She was given supportive care along with replacement of calcium, and anaemia was corrected by fresh whole blood transfusion. Patient recovered uneventfully and was discharged from ICU the next day.

Key words: Prolonged neuromuscular blockade. Pancuronium bromide. Aminoglycoside antibiotics. Hypocalcemia. Anaemia.

INTRODUCTION

Neuromuscular blockade is one of the essentials of modern day anaesthesia practice. May it be the intubation or intra-operative relaxation, not only that it is beneficial for the attending anaesthesiologist but it also facilitates the surgeon. With the advancement of anaesthesia practice, it is impossible to think about abdominal, cardiac, head and neck surgeries etc. being undertaken without proper muscle relaxation (1). Neuromuscular blocking drugs have certainly revolutionized the current anaesthesia care but this advancement is also associated with certain risks. To paralyze a patient and then to reverse it, is certainly a big ask.

Pancuronium bromide is an intermediate acting neuromuscular blocking drug that is used extensively in anaesthesia practice. Despite the arrival of variety of other drugs that offer certain benefits like short duration of action and spontaneous degradation, pancuronium bromide remains the first choice to many anaesthesiologists of the third world countries because it is time-tested, and cost effective[1].

Like any other drug, neuromuscular blocking drugs also have interactions that range from mild hypersensitivity reactions to life threatening bronchspasms (Rapacuronium, Atracurium) and prolonged paralysis (pancuronium, Vecuronium) etc[2].

We are presenting a similar case that presented in the operation theatre of Pakistan Air Force Base Hospital Rafiqui, Shorkot for emergency cesarean section.

CASE REPORT

A 34 years old, female presented to operation theatre PAF Hospital Rafiqui Shorkot for emergency cesarean section on 20th Jun 2005.

During pre-anaesthetic evaluation, she did not give history of any systemic illness including any neuromuscular disorder. She had an uneventful obstetric history. Her past, personal and family histories were also not contributory. On physical examination, she was of average build, conscious, co-operative with with-in-normal-limit vital signs. Her systemic examination did not reveal any abnormality. Her laboratory investigations showed that she was anaemic (Hb% 8.7 g/dl).

Standard anaesthesia protocol was offered to the patient. Antibiotic prophylaxis was achieved with Inj. ampicillin 1 gm i/v and Inj. gentamicin 80 mg i/v. She was pre-medicated with Inj. diclofenac sodium 75 mg i/m and Inj. metoclopramide 10 mg i/v. Induction was carried out with Inj. thiopentone sodium 350 mg i/v and patient was intubated with size 7.0 ID tracheal tube by Inj. suxamethonium 100 mg i/v. Inj. pancuronium bromide 4 mg i/v was used once for intra-operative relaxation. Anaesthesia was maintained using co-axial Bain circuit with mixture of O^2, N^2O and Halothane. After delivery of the child, patient was given Inj. nalbuphine 6 mg i/v and Inj. syntocinon 20 IU i/v.

After an uneventful surgery, the patient failed to regain spontaneous respiratory effort even two hours after the last dose of muscle relaxant. She was shifted to main ICU and put on ventilatory support using SIMV mode of ventilation. She was kept sedated with Inj. midazolam infusion at the rate of 0.15 mg/kg/hr. Inj furosemide 10 mg i/v was given in effort to flush out the circulating neuromuscular blocking drugs. Laboratory investigations were urgently ordered. Complete blood count showed anaemia (Hb% 8.2 g/dl). Serum Calcium was also markedly reduced (1.5 mmol/l. Range: 2.1-2.55 mmol/l). A provisional diagnosis of possible interaction of pancuronium bromide and gentamicin (an aminoglycoside antibiotic) that was probably potentiated by anaemia and hypocalcemia was made.

Two units of whole fresh blood were arranged and transfused. Serum calcium deficit was calculated and replaced over a period of 4 hours. After about 12 hours, patient started breathing spontaneously, and after about 15 hours of surgery, after having confirmed adequate muscle tone and level of consciousness, she was extubated with suction and mask supplemental oxygen. She was monitored for another one hour for any signs of respiratory distress. Next morning, after remaining symptom free over-night, she was discharged from ICU.

DISCUSSION

Drug interactions are common in modern day anaesthesia practice. Use of multiple drugs, direct intravenous injection into the blood stream, for achieving satisfactory results further complicate the affair. Most of these interactions are attributable to neuromuscular blocking drugs like suxamethonium (a depolarizing muscle relaxant)[3], pancuronium bromide[4], vecuronium[5] etc. (non depolarizing muscle relaxants).

Pancuronium bromide is a non depolarizing muscle relaxant approved to induce skeletal muscle relaxation during anaesthesia and to facilitate the management of patients under going mechanical ventilation. The use of pancuronium bromide during surgery led to the

appreciation that it has advantages over drugs previously used for muscle relaxation. Patients in whom pancuronium bromide is of value are:

Hypoxemic patients resisting mechanical ventilation and so cardiovascularly unstable the use of sedatives is precluded.

Patients with bronchspasm unresponsive to conventional therapy. Patients with severe tetanus or poisoning where muscle spasm prohibits adequate ventilation.

Patients with status epilepticus unable to maintain their own ventilation. Shivering patients in whom metabolic demands for oxygen should be reduced.

Patients requiring tracheal intubation in whom suxamethonium administration is contraindicated. Cardiovascularly compromised patients[1].

The untoward effects of pancuronium bromide are tachyarrythmias, prolonged paralysis etc[1,2]. and have generally been attributable to its interactions with certain drugs like antibiotics (aminoglycosides)[3,5,6,7,8,9], H^2 receptor antagonists (famotidine)[10], antipsychotic drugs (lithium)[11], flunarizine[3] etc.

Prolonged paralysis is an occasional complication that is encountered with muscle relaxants, both depolarizing and non depolarizing neuromuscular blocking drugs. There are cases of prolonged apnoea following the use of suxamethonium[3,12] but it is more common with non depolarizing neuromuscular blockers. The relaxants with steroid structure (pancuronium, vecuronium, pipecuronium) seem to be particularly notorious[1,4]. Interactions with aminoglycosides are the most common. Despite major complications, namely, nephrotoxicity, ototoxicity apart from interactions with other drugs, aminoglycoside antibiotics still remain first choice for some of the life threatening situations like septicemia[6,7,8,9]. The aminoglycosides not only potentiate the neuromuscular blocking effects of non depolarizing muscle relaxants but also have some neuromuscular blocking effects of their own. It is suggested that aminoglycosides inhibit the signal-transduction pathway by interaction with the inositol polyphospholipids, thereby inhibiting the production of second messenger molecules[11,13]. The neuromuscular blocking potential tested appears to be as follows: gentamicin greater than streptomycin greater than amikacin greater than sisomicin greater than kanamycin=tobramycin greater than kenendomycin=dibekacin[14]. The neuromuscular blockade produced by these antibiotics is not reversed by neostigmine, whereas it is reversed by calcium. Calcium not only has the ability to restore the neuromuscular transmission but also exerts protective action against the neuromuscular blocking activity of aminoglycoside antibiotics[13].

These interactions can further be aggravated by the general condition of the patient. Poor physical state, anaemia, electrolyte abnormalities, renal dysfunction leading to delayed excretion also play a major role in drug metabolism and thus its duration of action[15].

CONCLUSION

We should avoid large doses of neuromuscular blocking agents. The interaction between non depolarizing neuromuscular blocking agent and aminoglycoside antibiotics is well documented and should be avoided. If the aminoglycoside antibiotics cannot be avoided than small doses of short acting neuromuscular blocking drug with spontaneous degradation properties is recommended.

An effort should be made that the patient under going surgery is in the best optimum physical condition and does not have any electrolyte disturbances.

REFERENCES

1. Roizen MF, Feeley TW. **Pancuronium bromide.** Ann Intern Med. 1978 Jan; 88(1):64-8.

2. Morgan GE, Mikhail MS, Murray MJ. **Non depolarizing neuromuscular blocking drugs.** In: Clinical Anaesthesiology. 3rd edn. The Mac Graw-Hill Companies, Inc. 2002; 84-9.

3. del Pozo E, Baeyens JM. **Neuromuscular blockade induced by flunarizine alone and in combination with pancuronium, suxamethonium or neomycin: studies in isolated rat phrenic-hemidiaphragm preparations.**

Acta Anaesthesiol Scand. 1989 Oct;33(7):582-7.

4. Olivieri L, Plourde G. **Prolonged (more than ten hours) neuromuscular blockade after cardiac surgery: report of two cases.** Can J Anaesth. 2005 Jan;52(1): 88-93.

5. Vanacker BF, Van de Walle J. **The neuromuscular blocking action of vecuronium in normal patients and in patients with no renal function and interaction vecuronium-tobramycin in renal transplant patients.** Acta Anaesthsiol Belg. 1986; 37(3):95-9.

6. Trillo L, Arilla MC, Unzueta MC, Casas JI, Villar Landeira JM. **Prolonged neuromuscular blockade due to interaction between pancuronium bromide and gentamicin.** Rev Esp Anaesthesiol Reanim. 1990 Sep-Oct;37(5):311.

7. Kronenfeld MA, Thomas SJ, Turndorf H. **Recurrance of neuromuscular blockade after reversal of vecuronium in a patient receiving polymyxin/amikacin sternal irrigation.** Anaesthesiology. 1986 Jul; 65(1):93-4.

8. Nagano K. **Influence of streptomycin on muscle relaxation produced by pancuronium.** Masui. 1986 Jun;35(6):929-35.

9. Regan AG, Perumbetti PP. **Pancuronium and gentamicin interaction in patients with renal failure.** Anaesth Analg. 1980 May;59(5):393.

10. Bossa R, Chiericozzi M, Efstathiu G, Galatulas I, Ninci MA. **The effect of famotidine on neuromuscular transmission.** In Vivo. 1991 Jan-Feb;5(1):53-5.

11. Dehpour AR, Samadian T, Roushazamir F. **Interaction of aminoglycoside antibiotics and lithium at the neuromuscular junctions. Drugs Exp Clin Res.** 1992;18(9):383-7.

12. Eliot JM, Bion JF. **The use of neuromuscular blocking drugs in intensive care practice.** Acta Anaesthsiol Scand Suppl. 1995; 106:70-82.

13. Paradelis AG, Triantphyllidis C, Giala MM. **Neuromuscular blocking activity of aminoglycoside antibiotics.** Methods Find Exp Clin Pharmacol. 1980 Feb;2(1):45-51.

14. Rutten JM, Booij LH, Rutten CL, Crul JF. **The comparative neuromuscular blocking effects of some aminoglycoside antibiotics.** Acta Anaesthesiol Belg. 1980; 31(4):293-306.

15. Geha DG, Blitt CD, Moon BJ. **Prolonged neuromuscular blockade with pancuronium in the presence of acute renal failure.** Anesth Analg.1976 May-Jun;55(3):343-5.