Propofol-Remifentanil Induction Followed By Desflurane-Remifentanil Anaesthesia Without Muscle Relaxant In Patients With Myasthenia Gravis For Thymectomy

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Citation

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Abstract

Myasthenia gravis is a challenging situation for anaesthesiologists due to its neuromuscular involvement. The main concerns are respiratory muscle weakness and side effects due to heavy dose of anticholinesterases. This limits the use of sedatives, hypnotics and muscle relaxants. We report two cases of trans-sternal thymectomy for myasthenia gravis using non muscle relaxant, propofol-remifentanil induction followed by desflurane-remifentanil anaesthesia. This afforded excellent control of heart rate and pressor responses during surgery while allowing early return of spontaneous ventilation and extubation within five minutes of termination of anaesthesia. Advantages and disadvantages of this approach versus relaxant techniques are discussed with particular reference to preservation of neuromuscular function.

INTRODUCTION

Myasthenia gravis (MG) is an autoimmune neuromuscular disorder characterized by easy fatiguability of voluntary muscles due to presence of acetylcholine receptor antibodies. The incidence is 50-142 cases per million populations [1]. Patients with MG demonstrate resistance to succinylcholine and have an increased sensitivity to non-depolarizing muscle relaxant which is often variable and unpredictable [2]. Avoidance of muscle paralysis facilitates perioperative management, allowing early recovery of muscle function. The provision of general anaesthesia for trans-sternal thymectomy in myasthenia gravis has traditionally been complicated by a variable increased sensitivity in this group to the action of neuromuscular blocking agents [3,4]. Prolonged postoperative mechanical ventilation of the lungs may be required in myasthenic patient who have been given neuromuscular blocking drugs as part of anaesthetic technique. This can be compounded by significant reduction in neuromuscular function with the use of volatile anaesthetic agents [5]. In addition, depression of central respiratory drive from co-administered intraoperative opioids can further compromise respiratory function in the immediate postoperative period.

We report two cases of trans-sternal thymectomy under general anaesthesia without muscle relaxants with the use propofol-remifentanil induction followed by desflurane-remifentanil anaesthesia.

CASE REPORT

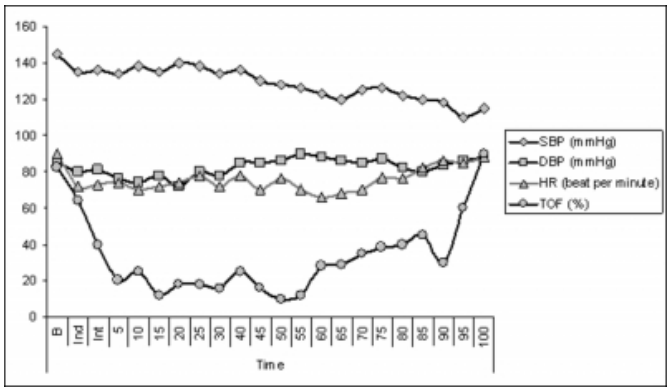
Two women, 41 and 29 year old, with myasthenia gravis were scheduled for trans-sternal tymechtomy. They had presented six months history of progressive weakness after childbirth diagnosed as generalized myasthenia gravis on the basis of electromyography and positive edrophonium test and treated with pyridostigmine 240 mg daily before surgery. Preoperatively patients classified as Osserman classification of Grade IIb myasthenia on the basis of generalized moderate weakness with fatiguability on effort and bulbar dysfunction [6]. On examination, they had bilateral ptosis, weakness on arm and leg and dysarthria. A spiral computed tomography showed an increased density of adipose tissue localized on anterior mediastinum. Their respiratory function was stable with preoperative acceptable spirometric tests.

Preoperatively cases were not premedicated and other medication was omitted. In the theatre intravenous access was established and 400 ml lactated ringer solution were given intravenously. Anaesthesia was induced with 2.5 mg/kg propofol followed by 2 µg/kg remifentanil. Sixty seconds after the remifentanil bolus, intubation was

performed without difficulty at the first attempt using an endotracheal tube of 8.0 mm and condition evaluated as " excellent" [7] (jaw relaxation complete, laryngoscopy easy, vocal cords open, no coughing, no movement). Neuromuscular monitoring was done throughout the procedure with an accelograph from the train of-four response. The train of ratio as recorded electrically was 10-90 % throughout the surgical procedure, heart rate, blood pressure and oxygen saturation did not vary from the baseline value (Figure 1). Anaesthesia was maintained with desflurane (2-8 %) and remifentanil 0.25 µg/kg/min in air/oxygen. Controlled ventilation was adjusted to maintain normocapnia. Thymectomy was done under mid-sternotomy and lasted 100 min. The intraoperative period was uneventful.

Figure 1

Figure 1: Mean values of two patients' systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR) and train-of-four (TOF). B=baseline, Ind= after induction, Int= after intubation.



The mean period of emergence of anaesthesia was 4 minutes. The patients were able to open the eyes and protrude the tongue at train-of-four ratio of 90 %. They responded verbal command and were extubated at 5 minutes. Their orientation for time, place and person returned back at 8 minutes after stopping desflurane. The patients had no complaints of postoperative respiratory muscle weakness.

Postoperative analgesia was provided in the form of patient-controlled intravenous tramadol (5 mg/h basal rate, 20 mg bolus, 20 minute lockout, 4 hour limit 200 mg) and lornoxicam 8 mg 12 hourly. Pyridostigmine was recommended at 60 mg 6 hourly. Arterial blood gas monitoring was performed 2, 4, 8 and 16 hours after the procedure with the patient on oxygen 2 l/min via a nasal prong. After 16 hours, the patient was judged suitable for transfer to the open ward. Recovery was otherwise are unremarkable.

DISCUSSION

MG is an autoimmune disease of the neuromuscular junction resulting from production of IgG antibodies against nicotinic receptors. Patients with MG most commonly undergo surgery for thymectomy as part of the management of the disease. The main concern for the anaesthesiologist during thymectomy are respiratory muscle weakness and preoperative anticholinesterase medications as these interact with anaesthetic drugs, potentate vagal tone and produce copious bronchial secretions. Using muscle relaxants is a special problem in those patients because of autoimmune nature of the disease involving the motor and plate at the neuromuscular junction [8].

Anxiolytic, sedative and opioid premedication are rarely given to patients who may have little respiratory reserve [8]. Therefore, we gave no premedication to the patients as in the literature.

Two technique have been recommended for general anaesthesia in the myasthenic patient [2,9]. One is a non-muscle relaxant technique, which incorporate either deep inhalational anaesthesia or a narcotic-based technique for intubation and maintenance of anaesthesia, with possible adverse cardiovascular and respiratory effects. The second is balanced technique, which includes judicious use of neuromuscular blocking agents. However, prolonged postoperative ventilation may be necessary, as a result of marked sensitivity or an unpredictable response to non-depolarizing neuromuscular blocking drugs [2]. We preferred non-muscle relaxant technique for rapid recovery of spontaneous ventilation and patients had no respiratory problem in intraoperative and postoperative period.

Ideal anaesthetic agents should not be needed using a muscle relaxant. Of them, halothane, isoflurane, sevoflurane and propofol-remifentanil combination have been preferred for this purpose to date [5,10,11,12,13]. Although those previously known agents or combination, desflurane-remifentanil anaesthesia has not yet been reported in a patient with myasthenia gravis. With this combination, we need no additional muscle relaxant and achieved a stable anaesthesia throughout the procedure.

Desflurane does not act the transmission at the neuromuscular junction but it preferentially acts on the spinal cord at a segmental level, probably both on

corticospinal to - motoneurons and interneuron synapses [14]. Remifentanil appears to be a useful adjuvant to the non-muscle relaxant anaesthetic technique used in myasthenic patient [7]. It provides excellent intubating and operating conditions with haemodynamic stability and effective analgesia [13,15]. Desflurane-remifentanil combination has been recommended for major surgery because of its rapid onset and fast elimination, improved haemodynamic stability and allowing both intraoperative titration and rapid recovery [16]. In our patient, the muscle relaxation was adequate for sternotomy and sternal retraction as appreciated by the surgeon with sufficient haemodynamic stability.

Although propofol-remifentanil combination without muscle relaxant is a well established medication either in tracheal intubation or in anaesthetic maintenance, combination of desflurane-remifentanil also appears to offer an ideal companion for minimum impact at the neuromuscular junction and precise control of depth and duration of balanced anaesthesia. Considering using this combination in MG, one can speculate myasthenic patients taking oral anticholinesterase drugs have altered pharmacodynamics of remifentanil. But in our experience, we need no more dose of remifentanil during the maintenance.

CONCLUSIONS

We conclude that propofol-remifentanil induction and desflurane-remifentanil maintenance is highly suitable anaesthetic technique for thymectomy in a myasthenic patient from evidence rapid and smooth induction, rapid recovery and absence of haemodynamic instability with no residual muscle weakness during postoperative period.

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