Thoracic Epidural Anesthesia Combined with Remifentanil-Propofol without Muscle Relaxants in A Myasthenic Patient for Abdominal Surgery

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Citation

Abstract
The present case describes the perioperative anesthetic management of a myasthenic patient undergoing thoracic epidural anesthesia using 10 mL of bupivacaine 0.5% combined with the infusions of propofol and remifentanil for abdominal surgery. This anesthetic technique provided good intra-operative relaxation followed by an uneventful recovery and eliminated the need for other postoperative analgesics. We first present a myasthenic patient undergoing the combination of epidural anesthesia and TIVA based remifentanil-propofol without neuromuscular blockade for abdominal surgery.

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INTRODUCTION
Myasthenia gravis (MG) is an autoimmune disorder characterized by easy fatiguability of voluntary muscle. It results from the production of antibodies against the acetylcholine receptors of the neuromuscular synapse. The anticholinesterase drugs are usually used in the treatment of myasthenia gravis. This therapy may pose a challenge to anesthesiologists as muscle relaxants and sedatives are best avoided in myasthenics undergoing surgery. With this case we describe the combined used of thoracic epidural anesthesia and propofol-remifentanil infusion without a muscle relaxant in induction and maintenance of anesthesia.

CASE REPORT
A 50-yr-old, 75-kg, 175-cm, male patient with myasthenia gravis (MG) (Osserman 2A) was scheduled for sigmoid colon resection due to villous adenomas. The diagnosis of MG was done by electromyography and by elevated anti-acetylcholine receptor antibodies 5 years ago. Chest computed tomographic scan revealed no timoma. He had a forced vital capacity of 2 L. Pyridostigmine, 200 mg daily was administered for 5 years and the pyridostigmine regimen was maintained until the morning of surgery. Premedication was limited to 1 mg intravenous midazolam in the operating room before anesthesia induction. Under appropriate monitoring and after determining T11-12 epidural space using loss of resistance technique, 10 mL of bupivacaine 0.5% was administrated epidurally. An epidural catheter was also inserted. General anesthesia was induced with 2 mg. kg⁻¹ propofol intravenously, to be followed by 3.0 µg. kg⁻¹ remifentanil over 30 s, and tracheal intubation. Anesthesia was maintained by titrated propofol infusion (125-250 µg · kg⁻¹ · min⁻¹) and remifentanil infusion (0.1-0.25 µg · kg⁻¹ · min⁻¹) according to the bispectral index score (BIS) between 45-60 with using BIS monitor. Neuromuscular transmission was monitored by electromyography using a Datex relaxograph (NMT-100-23-01; Datex-Ohmeda Division, Instrumentarium Corp, Helsinki, Finland), using the electromyographic response to ulnar nerve stimulation by the train-of-four. Intraoperatively, blood pressure ranged between 85/35 mmHg and 110/60 mmHg, heart rate ranged between 55 and 90 bpm, and electromyography showed normal T1/control and T4/T1 ratios. The duration of surgery was 2 h. Twenty minutes before the end of surgery, the infusions of propofol and remifentanil were gradually decreased by 20% in every 5 minutes, and on completion of surgery the infusions were discontinued. The total dose of remifentanil and propofol administered throughout surgery amounted to 1.2 mg and 1.0 g, respectively. Ten minutes after discontinuation of the infusions, the patient started to
breathe spontaneously, to respond to painful stimuli, and to
duck on the tube. The patient was extubated and transferred,
as fully awake and cooperative, to the intensive care unit (ICU)
to provide postoperative analgesia via thoracic epidural
catheter and monitor closely a further time
postoperatively. He did not report pain or awareness during
surgery. Spontaneous ventilation and coughing reflex were
adequate. Arterial blood gases were within normal limits.
The combination of bupivacaine 0.0625% and fentanyl
0.002% was used through thoracic epidural catheter at the
rate of 4 ml hourly. The patient did not complain of muscle
weakness and was able to perform respiratory physiotherapy
exercises. Pain relief was assessed every 3 hours on a visual
analog scale ranging from 0 (no pain) to 10 (unbearable
pain). The collected scores during the first 24 hours were
between 0 and 2. In the ICU, his blood pressure and heart
rate were normal limits during the first 24 hours. The patient
maintained spontaneous breathing easily with a good arterial
blood gases. The patient was discharged from the intensive
care unit on day 1, and from the hospital on day 5.

DISCUSSION

Several factors such as ester local anesthetics, some
antibiotics, pain, and stress may aggravate the myasthenic
symptoms of these patients perioperatively. Although ester
local anesthetics may affect neuromuscular transmission in
patients receiving anticholinesterase therapy, we used
bupivacaine, an amide local anesthetic without effect on
neuromuscular transmission. Anxiety was prevented
providing sedation with midazolam before anesthesia
induction. And, more importantly, we provided an effective
analgesia in both intraoperative and postoperative period
with epidural block.

The published anesthetic experience in this disease is quite
large, especially the anesthetic management of patients
undergoing thymectomy. However, there have not
been yet published any reports on epidural anesthesia in
combination with remifentanil-propofol anesthesia for
abdominal surgery in myasthenia gravis. This currently
described anesthetic technique avoids muscle relaxants and
provides an excellent intubating and operating conditions
with effective analgesia into the postoperative period,
preserves the function of diaphragm and allows earlier
extubation.

Anesthetic management using barbiturates and propofol for
myasthenic patients without untoward effects have been
described. Propofol has the theoretic advantages of short
duration of activation without effect on neuromuscular
transmission. Although the use of remifentanil as part of
total intravenous anesthesia (TIVA) has been used in a few
cases, the combination of remifentanil-propofol limited to
only two cases for the management of myasthenics
underwent thymectomy.

Remifentanil is an ultra-short-acting opioid that is rapidly
hydrolyzed by circulating and tissue nonspecific esterases.
Discontinuation of remifentanil infusion will be followed by
a rapid recovery regardless of the duration of infusion. The
present report used the remifentanil-based technique of
anesthesia, without the use of muscle relaxants, in a
myasthenic gravis patient undergoing abdominal surgery.
This is the first case report in a myasthenic patient about the
use of combination of thoracic epidural anesthesia and
remifentanil-propofol based TIVA without any
neuromuscular blockers for abdominal surgery.

Non-relaxant techniques are a recognized method of
anesthesia in myasthenic patients. Remifentanil is ideal in this situation because of its potent
analgesic effects, the ability to provide apnea with minimal
effects on neuromuscular transmission and a rapid offset. Its
use in MG has previously been described. The
use of a short-acting intravenous anesthetic technique
virtually eliminated the risks of respiratory failure or
aspiration despite surgery lasting 2 h. In addition, the
avoidance of volatile agents reduced the risk of
postoperative nausea. Having demonstrated on the first
occasion the safety of the technique, we were able to avoid
the delays associated with the need for critical care facilities.
In this case, we report a new anesthetic management of a
myasthenic patient for abdominal surgery using a non
relaxant, propofol and remifentanil with thoracic epidural
blockade to provide analgesia in both intraoperative and
postoperative period. This afforded excellent control of heart
rate and pressor responses during surgery allowed early
return of spontaneous ventilation and extubation within ten
minutes after discontinuation of anesthesia.

Advantages and disadvantages of this approach versus
relaxant and volatile techniques are discussed with particular
reference to preservation of neuromuscular function. After
surgery these patients have an increased risk of pulmonary
complications. In general, especially in abdominal and
thoracic surgery patients in whom ventilation difficulty
expected postoperatively, we changed the perioperative
anesthesiological procedure using TIVA with
propofol/remifentanil and epidural patient-controlled analgesia with opioid and local anesthetic mixture in the first two days after surgery. This management allows a fast extubation and improves lung function postoperatively. Since the myasthenic patients having abdominal surgery tend to respiratory complications, postoperative analgesia in these is more important than in the others.

Although the potentiation of neuromuscular inhibition by local anesthetics has been reported, this situation especially related with ester type of those. In addition, in our case, we performed epidural anesthesia with reduced doses of bupivacaine to avoid high blood levels. Similarly, the safe and successful use of thoracic epidural blockade with bupivacaine for intraoperative anesthesia and postoperative analgesia for transsternal thymectomy has been reported recently. 6,7

CONCLUSIONS

In conclusion, the addition of thoracic epidural anesthesia to remifentanil-propofol based TIVA may be a suitable technique for abdominal surgery in myasthenia gravis patients. It can provide a smooth anesthesia course and a rapid recovery, with hemodynamic stability, and also having pain-free postoperatively. In addition, the use of a neuromuscular transmission and BIS monitor allows a better titration of propofol and probably a shorter recovery time.

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References
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