

Mivacurium chloride for anesthesia in day surgery

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Abstract

Anesthetic techniques for day surgery must foresee a prompt recovery of alertness, ambulation and alimentation. The aim of our study is to evaluate mivacurium chloride in outpatient general anesthesia. Twenty patients, aged 18–55 years, American Society of Anesthesiologists (ASA) class I–II, undergoing surgical procedures were studied. Mivacurium (0.2 mg/kg) was administered to provide neuromuscular relaxation and endotracheal intubation was performed. Additional doses of 0.1 mg/kg mivacurium were given to maintain neuromuscular block, monitored by Relaxograph (Datex). In all patients, mivacurium provided satisfactory conditions for tracheal intubation after a mean time of 120 ± 15 s. Spontaneous recovery after the last dose of mivacurium was obtained in a mean time of 15 min. No side-effects or significant hemodynamic changes were recorded. The incidence of histamine-related side-effects was low. Mivacurium produces spontaneous recovery of neuromuscular block in a short time and shows some ideal properties for anesthesia in day surgery. © 1997 Elsevier Science Ireland Ltd.

Keywords: Anesthesia; Day surgery; Mivacurium

1. Introduction

Anesthetic management for day surgery requires prompt postoperative presence of alertness, ambulation, alimentation and good analgesia; the challenges of outpatient general anesthesia are to provide a rapid recovery to enable the patients to go home on the same day of the surgical procedure. The ideal properties of a neuromuscular blocking agent for short surgical procedures applied to day surgery or ambulatory day-care patients are as follows:

- it should have a short onset time;
- it should be a non-depolarizing acetylcholine antagonist to avoid some side-effects of depolarizing agents as vagotonic effect and postoperative myalgia;
- it should be non-cumulative and not sequestered in tissues with spontaneous breakdown, independently of organ function and metabolism;
- the agent should not cause histamine release with adverse effect on the cardiovascular system or other organs.

Mivacurium is a new benzyloisoquinolinium choline-like diester neuromuscular blocking agent that shows some of these properties. The aim of our study was to evaluate if mivacurium could be a suitable agent for short procedures in day surgery [1,2].

2. Method

Twenty patients, all of them American Society of Anesthesiologists (ASA) physical status I or II, aged from 18 to 55 years, were studied. Eight patients were male and 12 were female.

Patients were excluded from the study if they had a history of: malignant hyperthermia; unusual sensitivity to neuromuscular blocking agents; alcohol or drug abuse; psychiatric, neuromuscular or cardiac diseases; impaired renal or liver function; asthma; exposure to aminoglycoside, antibiotics, lidocaine within 48 h of the study; exposure to antihistamines or antidepressant drugs within 1 week of the study.

All patients were scheduled for elective outpatient procedures with a duration of less than 1 h requiring tracheal intubation. Premedication included atropine

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Table 1
Modified scheme of Lund and Stovner for conditions of tracheal intubations

Grade	Characteristics
Excellent response	Good relaxation, vocal chords open, no response to IOT
Satisfactory	Good relaxation, vocal chords open, minimal coughing on IOT
Fair	Vocal chords moving, marked coughing, IOT requiring firm pressure
Poor	Poor jaw relaxation, vocal chords closed

(0.01 mg/kg) and fentanyl (1.5 mcg/kg i.v.); the induction of general anesthesia was realized with propofol (2 mg/kg) and the maintenance with additional fentanyl as clinically indicated and N₂O/O₂ (50%/50%).

Neuromuscular block for endotracheal intubation was obtained with mivacurium chloride (0.2 mg/kg) injected over 30 s. Supplementary doses of 0.1 mg/kg were administered to maintain neuromuscular block.

ECG was recorded continuously on a monitor with a four-channel recorder. Non-invasive blood pressure was monitored by Dinamap with 5-min intervals. End tidal CO₂ was monitored by infrared absorption monitor and SpO₂ by pulseoximetry.

To monitor the neuromuscular block, we used the Relaxograph Datex nerve stimulator delivering supra-maximal impulses of 0.2 ms in a train of four (TOF) pattern (2 Hz) at intervals of 20 s; the ulnar nerve was stimulated at the wrist, using surface electrodes [4,5].

The spontaneous recovery to T_{95%} and the T_{25–75%} index were recorded. The intubating conditions were graded using a modified scheme of Lund and Stovner (Table 1).

3. Results

The 20 patients studied had pseudocholinesterase activity and dibucaine number in the normal range; the mean duration of surgical procedures was 30 ± 15 min. In all cases, a bolus of mivacurium (0.2 mg/kg) was administered and endotracheal intubation was performed after a mean time of 120 ± 15 s. The intubating conditions were judged excellent in three patients and satisfactory in the other 17.

The incidence of histamine-related side-effects was low. In three patients, we observed flushing of the face, neck and upper chest which in one case was accompanied by transient hypotension (–9%), promptly corrected with crystalloid infusion.

During anesthesia, heart rate (HR) and mean arterial pressure (MAP) did not change significantly from baseline values at 1.5 and 5 min after mivacurium (0.2

Table 2
Results

Onset time	120 ± 15 s
T _{25%} –T _{75%} index	6 ± 1.2 min
T _{95%}	25 ± 3 min

mg/kg) injected over a period of 30 s. No cardiac arrhythmias were noted in any patient.

The mean 25–75% recovery index (RI) was 6 ± 1.2 min. The time for spontaneous recovery to 95% twitch height after the last dose of mivacurium occurs in 25 ± 3 min (Table 2) [3–5]. In no cases did neuromuscular block require reversal with neostigmine. All patients were able to be discharged within 6–8 h after the end of surgical procedures.

4. Discussion and conclusions

In our study, mivacurium proves to be suitable and to have the adaptable characteristics for use in day surgery. This drug has a short onset time with satisfactory conditions for tracheal intubation after about 2 min. Moreover its use in ambulatory surgery is safe with regard to its elimination by plasma cholinesterase, although the duration of action of mivacurium may be significantly prolonged in the case of plasma cholinesterase deficiency. No cumulative effects were noted [3]. Reversal is seldom necessary, avoiding the use of neostigmine that can cause nausea or vomiting. In our experience, the incidence of histamine-related side-effects was minimal, with only transient changes of cardiovascular parameters. Our data with the use of mivacurium as a bolus confirm that this non-depolarizing muscle relaxant could be safe and useful in day surgery.

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