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Background and Goal of Study

Narcolepsy is a neurological disorder that affects sleep regulation and is associated with increased risk of perioperative complications. The aim of this study is to systematically review the literature concerning the anesthetic management of patients with narcolepsy.

Materials and Methods

A search was conducted in the Medline database. We included all studies of patients with narcolepsy submitted to anesthesia. The parameters analyzed were: type of anesthesia, premedication, withdrawal of medication for narcolepsy, use of depth of anesthesia monitors, time for extubation and perioperative complications.

Results and Discussion

Source	Study design	Anesthesia	Surgical Procedure	Medication for narcolepsy	Maintenance of narcolepsy medication on the day of surgery	Premedication	Depth of anesthesia monitoring	Time for extubation	Complications
Spector et al, 1977 (1)	Case report	General inhalational	Exploratory laparotomy	None	N/A	Morphine, diazepam, atropine	No	Not mentioned	2 episodes of sleep paralysis in the recovery room and 1 episode of sleep paralysis 4 days after surgery
Pasteau et al, 1996 (2)	Case report	Spinal	Lumbar herniated disk surgery	Modafinil 300 mg daily	Not mentioned	Diazepam and pethidine	No	N/A	2 narcolepsy-cateplexy episodes intra-operatively
Mesa et al, 2000 (3)	Case report	General intravenous	Excision of a thigh mass	Dextroamphetamine	Yes	No	No	15 minutes after the end of surgery	None
Fischer et al, 2000 (4)	Case report	General inhalational	Emergency laparoscopy	Dextroamphetamine 10 mg, amphetamine 10 mg daily	Yes	Midazolam	No	Not mentioned	None
Dounas et al, 2002 (5)	Case report	Epidural analgesia	Labor	None (stopped modafinil during pregnancy)	N/A	No	No	N/A	None
Gómez-Garrido et al, 2002 (6)	Case report	General inhalational	Aortobifemoral bypass	Methylphenidate and fluoxetine	Yes	No	No	2 hours after admission to PACU	Hypnagogic / hypnopompic hallucinations
Vieito et al, 2002 (7)	Two case reports	General inhalational	Reduction of nasal bones fracture	Methylphenidate	Yes	No	No	Not mentioned	No
		Axillary brachial plexus block	Osteosynthesis of radius and ulnar fractures	Pemoline	No, suspended 7 days before surgery	No	No	N/A	No
Peláez et al, 2004 (8)	Case report	General intravenous	Quadruple coronary artery bypass grafting	Amphetamine 10 mg, modafinil 300 mg, clomipramine 150 mg, daily	Yes	No	No	6 hours after end of surgery in the ICU	None
Burrow et al, 2005 (9)	Case series: 10 patients submitted to 27 surgeries	General anesthesia	10 orthopedic, 6 ENT, 5 urologic, 3 abdominal, 2 gynecologic, 1 thoracic	All patients were treated with one or more of the following: methylphenidate, methamphetamine, trazodone, doxepin, amphetamine, pemoline, perphenazine-amitriptyline, desipramine	Yes	Not mentioned	No	Time from end of surgery to endotracheal tube removal: 12 ± 7 min (average and SD)	2 cases of hypersomnolence in the PACU 1 patient complained of excessive sleepiness in the 6 months after general anesthesia
Janeiro et al, 2007 (10)	Case report	General intravenous	Pyeloplasty	Clomipramine and modafinil	Continued modafinil, suspended clomipramine	No	Entropy monitor	Extubated in the PACU	None
Pérez et sl, 2007 (11)	Case report	General inhalational	Laryngeal microsurgery	Anafranil 25 mg daily	Yes	Diazepam	No	Not mentioned	None
Ozkose et al, 2007 (12)	Case report	General intravenous	Bilateral breast reduction	None	N/A	No	BIS® monitor	Not mentioned	None
Staikou et al, 2007 (13)	Case report	General inhalational	Laparoscopic cholecystectomy	None	N/A	No	BIS® monitor	Not mentioned	Postoperative narcoleptic events (similar to her usual ones)
Doyle et al, 2008 (14)	Case report	General inhalational	Hysteroscopy day surgery	Modafinil 300 mg daily	No	No	No	10 min (laryngeal mask)	None
Dahaba et al, 2009 (15)	Case report	Femoral nerve block	Lower limb surgery	None	N/A	No	Two BIS® monitors for both hemispheres	N/A	Narcolepsy-cataplexy episode (2h duration)
Montcriol et al, 2010 (16)	Case report	General intravenous	Colonoscopy	Methylphenidate 30 mg, modafinil 400 mg daily	Yes	No	BIS® monitor	N/A	None
Morimoto et al, 2010 (17)	Case report	General inhalational	Endoscopic sinus surgery	Modafinil 100 mg daily	Yes	No	BIS® monitor	10 minutes	None
Soltanifar et al, 2010 (18)	Case report	Epidural	Caesarean section	Modafinil 200 mg, fluoxetine 20 mg daily	Not mentioned	No	No	N/A	None
Honca et al, 2013 (19)	Case report	General inhalational	Emergency caesarean surgery	None	N/A	Not mentioned	BIS® monitor	Not mentioned	None
Pedrosa et al, 2015 (20)	Case report	General intravenous	Lumbar herniated disk surgery	Modafinil 200 mg daily	Yes	No	BIS® and entropy monitors	4 minutes	None

Nineteen case reports and one case series were included. We did not find clinical trials. The only review article found was written prior to the publishment of almost all case reports.

Excessive sleepiness, sleep paralysis and hypnagogic/hypnopompic hallucinations were reported in 3 narcoleptic patients after inhalational anesthesia. However, 6 reports of uneventful inhalational anesthetics were also found. Concerning intravenous anesthesia for narcoleptic patients, 6 case reports were found, showing no complications. A case series of 10 narcoleptic patients who underwent 27 general anesthetics showed that time for extubation did not differ from that observed in age and procedure match controls, during the same period.

Cataplexy episodes were reported in 2 narcoleptic patients undergoing spinal anesthesia and femoral nerve block. We found 2 case reports of epidural blocks and 1 case of an axillary brachial plexus block, with no complications.

Depth of anesthesia monitors were used in less than half of the patients. BIS® or entropy monitoring can be important to optimize anesthetic administration and to monitor a possible narcoleptic episode.

Benzodiazepines were administered preoperatively in four cases. Two of the patients had narcoleptic events intra ou post-operatively.

In the majority of cases, the patient's usual medication for narcolepsy was continued on the day of surgery, which may have contributed to a more rapid and complete recovery of consciousness.

Conclusions

Avoidance of sedative premedication, continuation of medication for narcolepsy on the day of surgery, use of short-acting anesthetic agents and depth of anesthesia monitoring may be beneficial measures in the management of narcoleptic patients.

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