



Post anesthesia recovery rate evaluated by using White fast tracking scoring system

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ABSTRACT

Introduction: Postponed recuperation from anesthesia can lead to different complications such as apnoea, aspiration of gastric content with consequent development of aspiration pneumonia, laryngospasm, bradycardia, and hypoxia. Aim of this research was to determine influence of propofol, sevoflurane and isoflurane anesthesia on post anesthesia recovery rate.

Methods: This was a prospective study; it included 90 patients hospitalized in period from October 2011 to may 2012 year, all patients included in the study underwent lumbar microdiscectomy surgery. Patients were randomly allocated to one of three groups: group 1: propofol maintained anesthesia, group 2: sevoflurane and group 3: isoflurane maintained anesthesia. Assessments of recovery rate were done 1, 5 and 10 minutes post extubation using White fast tracking scoring system.

Results: Significant difference was observed only 1 minute after extubation ($p=0,025$) finding recovery rate to be superior in propofol group. Propofol group compared to inhaled anesthesia with sevoflurane group, shows significantly faster recovery from anesthesia only one minute after extubation ($p=0,046$). In comparison of propofol group and isoflurane anesthesia group, statistical significance was noticed one minute following extubation ($p=0,008$). Comparison of propofol group and inhaled anesthesia groups recovery rates were not significantly different at all times measured. When we were comparing sevoflurane and isoflurane anesthesia, recovery rates showed no significant statistical difference.

Conclusions: Recovery rate evaluated by using White fast tracking scoring system was superior and with fewer complications in propofol maintained in comparison to sevoflurane and isoflurane maintained anesthesia only one minute post extubation, while after fifth and tenth minute difference was lost.

Keywords: Post anesthesia, recovery, propofol, sevoflurane, isoflurane.

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INTRODUCTION

Delayed post anesthesia recovery is often multifactorial and it might be influenced by pharmacological and organic causes as well as metabolic abnormalities. Postponed recuperation from anesthesia can lead to different complications such as apnoea, as-



piration of gastric content with consequent development of aspiration pneumonia, laryngospasm, bradycardia, and hypoxia. Because of the fact that these complications can appear, it is very important to ensure that the patient is fully awake, adequately breathing, with completely recovered cough and swallowing reflexes (1).

Choice of anesthetic is influenced by different factors; knowledge and experience of anaesthesiologist, available equipment, patient related indications, and economic circumstances.

Propofol is most widely used intravenous anesthetic today, it is used to induce and maintain anesthesia. Main advantage of propofol in clinical practice is rapid recovery of consciousness and full awareness when bolus doses are used to induce anesthesia. No significant cumulation of propofol in the tissues occurs even after prolonged continuous infusion (1, 3). Propofol is one of the mostly suitable anesthetics for total intravenous anesthesia (4). Inhaled anesthetics are among most rapidly acting drugs today, they have high safety ratio. Isoflurane, a halogenated methyl ethyl ether, it is a clear, non-flammable liquid at room temperature and has a high degree of pungency (5). Isoflurane is relatively insoluble and has a low blood-gas partition coefficient 1, 4 that combined with a high potency, permits rapid onset and recovery from anesthesia using isoflurane alone or in combination with nitrous oxide or injected drugs, such as opioids (2, 3). Sevoflurane is relatively insoluble in blood and has a low blood-gas partition coefficient which allows rapid induction and recovery from anesthesia (2). Sevoflurane is approximately half as potent as isoflurane, has minimal odour, no pungency, and is a potent bronchodilator. These attributes make sevoflurane an excellent candidate for administration via the facemask on induction of anesthesia in both children and adults (5).

Aim of this research was to determine emergence quality after anesthesia with propofol, sevoflurane and isoflurane in order to assure safe discharge of the patient from operating room in every day practice

METHODS

This was a prospective study; conducted at University Clinical Centre Tuzla, Department of neurosur-

gery. It included 90 patients hospitalized in period from October 2011 to May 2012 year. All patients included in the study undergone lumbar microdiscectomy surgery due to herniated lumbar disc, and were assessed as ASA I (American Society of Anesthesiologists) physical status. Written consent was obtained from all the patients included in the study and they were randomly allocated to one of three groups, each group consisting of thirty patients: group 1: propofol maintained anesthesia, group 2: sevoflurane maintained anesthesia and group 3: isoflurane maintained anesthesia.

In all three groups, patients were premedicated using either diazepam 5 mg or 2.5 mg midazolam plus fentanyl 0.10 mg. Following induction with propofol 1.5 to 2.5 mg/kg, tracheal intubation was facilitated with atracurium, which was also used in maintaining muscular relaxation in a dose 0.3 - 0.6 mg. All patients were ventilated to maintain normocapnia with oxygen (O₂)/nitrous oxide (N₂O) mixture in ratio 60:40, in all three groups, and in group 1 with continuous propofol infusion 8 to 10 mg/kg/h were used to maintain anesthesia. In group 2 to N₂O: O₂ mixture, 1.0 volume percentage of sevoflurane was added for maintaining anesthesia and in group 3, 1.0 volume percentage of isoflurane. In all three groups, analgesia was provided with fentanyl boluses ranging from 0.05 to 0.10 mg per dose.

Assessments of recovery rate were done 1, 5 and 10 minutes post extubation using White fast tracking scoring system (6) (appendix 1). This scoring system is based on evaluation of pain, nausea, vomiting, awakens of the patient, physical activity and hemodynamic and respiratory stability. Maximal score is 14 points and score of 12 points is considered sufficient (as long as there are no scores less than one) in order to send the patient from operating ward (post anesthesia care unit) to hospital room.

Statistical analysis

Results are displayed in numeric-percentual form, as well as mean value with standard deviation (SD). Significance was evaluated using Chi square test and Student test, statistical analysis was performed with a confidence interval of 95%, a value of $p < 0.05$ was considered statistically significant.

TABLE 1. Recovery rate measured with White fast tracking scoring system, comparison of propofol, sevoflurane and isoflurane anesthesia

Test	time	Propofol	Sevoflurane	Isoflurane	p
White fast tracking scoring system	1 minute post extubation	12.40 ± 2.78	10.90 ± 2.92	10.67 ± 2.07	0.025
White fast tracking scoring system	5 minutes post extubation	12.93 ± 2.64	12.37 ± 2.65	12.53 ± 1.25	0.616
White fast tracking scoring system	10 minutes post extubation	12.53 ± 3.54	12.73 ± 2.60	13.27 ± 1.01	0.532

TABLE 2. Recovery rate measured with White fast tracking scoring system, comparison of propofol and sevoflurane anesthesia

Test	time	Propofol	Sevoflurane	p	p
White fast tracking scoring system	1 minute post extubation	12.40 ± 2.78	10.90 ± 2.92	0.046*	0.025
White fast tracking scoring system	5 minutes post extubation	12.93 ± 2.64	12.37 ± 2.65	0.412	0.616
White fast tracking scoring system	10 minutes post extubation	12.53 ± 3.54	12.73 ± 2.60	0.804	0.532

TABLE 3. Recovery rate measured with White fast tracking scoring system, comparison of propofol and isoflurane anesthesia

Test	time	Propofol	Isoflurane	p	p
White fast tracking scoring system	1 minute post extubation	12.40 ± 2.78	10.67 ± 2.07	0.008*	0.025
White fast tracking scoring system	5 minutes post extubation	12.93 ± 2.64	12.53 ± 1.25	0.460	0.616
White fast tracking scoring system	10 minutes post extubation	12.53 ± 3.54	13.27 ± 1.01	0.280	0.532

RESULTS

Study was conducted in University Clinical Centre Tuzla, Department of Neurosurgery; it enrolled 90 patients allocated to three groups each consisting of 30 patients. Based on White fast tracking scoring system influence of anesthetic on speed and quality of post anesthesia recovery was evaluated.

In order to test quality and rate of recovery from anesthesia we used White fast tracking scoring system. Based on this test in first group one minute after extubation score was 12.4 (SD±2.78), in second group 10.90 (SD ± 2.92) and in third group 10.67 (SD ± 2.07) (Table 1.) Comparing results between the groups, significant difference was established (p=0.025) finding recovery rate to be superior in propofol group 1 minute post extubation. Estimate carried out five minutes post extubation showed following results; in group 1 score were 12.93 (SD ± 2.64), in group 2 score was 12.37 (SD ± 2.65) and in group 3 score 12.53 (SD ± 1.25), without statistical significance (p=0.61). Ten minutes after extubation assessment using fast tracking scoring system was repeated again and next results were obtained; in group 1 score 12.53 (SD ± 3.54), in group 2 score 12.73 (SD ± 2.60) and in group 3 score 13.27 (SD ± 1.01). Comparison of these results showed

no significant difference (p=0.61). Depending on anesthetic used to maintain anesthesia important difference in recovery rate, was observed only one minute after extubation, while five and ten minutes post extubation significance was lost (Table 1).

As seen in table 2, propofol group compared to inhaled anesthesia with sevoflurane, group 1 shows

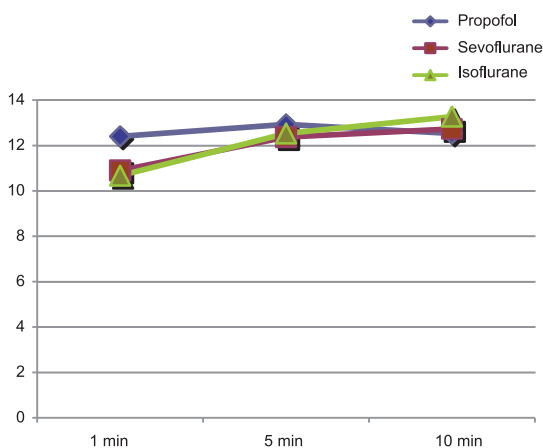
**FIGURE 1.** White fast tracking scoring system, assessment performed 1, 5 and 10 minutes post extubation

TABLE 4. Recovery rate measured with White fast tracking scoring system, comparison of sevoflurane and isoflurane anesthesia

Test	time	Sevoflurane	Isoflurane	p	p
White fast tracking scoring system	1 minute post extubation	10.90 ± 2.92	10.67 ± 2.07	0.722	0.025
White fast tracking scoring system	5 minutes post extubation	12.37 ± 2.65	12.53 ± 1.25	0.756	0.616
White fast tracking scoring system	10 minutes post extubation	12.73 ± 2.60	13.27 ± 1.01	0.299	0.532

TABLE 5. White fast tracking scoring system, measurements preformed ten minutes post extubation

Parameters (10 minutes post extubation)	Propofol	Sevoflurane	Isoflurane	p
Awakens level	1.93 ± 0.37	2.00 ± 0.00	1.97 ± 0.19	0.551
Physical activity	1.87 ± 0.44	1.87 ± 0.35	1.90 ± 0.30	0.920
Hemodynamic stability	1.70 ± 0.53	1.53 ± 0.51	1.63 ± 0.49	0.449
Respiratory stability	1.87 ± 0.43	1.97 ± 0.18	2.00 ± 0.00	0.148
Oxygen saturation	1.87 ± 0.43	2.00 ± 0.00	1.93 ± 2.54	0.211
Postoperative pain level	1.83 ± 0.46	1.87 ± 0.35	1.83 ± 0.46	0.941
Vomiting	1.93 ± 0.36	1.92 ± 0.25	2.00 ± 0.00	0.512

significantly faster recovery from anesthesia only one minute after extubation ($p=0.046$), while at second and third measurements difference was not established ($p=0.4$ after 5 minutes and $p=0.8$ ten minutes post extubation).

In comparison of propofol group and isoflurane anesthesia group, statistical significance was noticed one minute following extubation ($p=0.008$), while after fifth and tenth minute no considerable difference was found ($p=0.46$ after 5 minutes and $p=0.28$ after 10) (Table 3).

As seen from table 4, when we were comparing sevoflurane and isoflurane anesthesia, recovery rates showed no significant statistical difference at all times measured ($p=0.72$ after 1 minute; $p=0.756$ after 5 minutes; $p=0.299$ after 10 minutes).

White fast tracking scoring system evaluated recovery quality and rate ten minutes post extubation, test examined level of awakens, physical activity, hemodynamic stability, respiratory stability, percentage of oxygen saturation, pain intensity in post-operative period and presence of nausea and vomiting. Assessment of these parameters ten minutes after extubation showed no significant difference in relation to anesthetic used (Table 5).

Analysis of the results established that although some difference in recovery speed was noticed one-minute post extubation it was not significant and it was not observed after five and ten minutes.

DISCUSSION

White and Song in their study examined 216 women who underwent laparoscopic hysterectomy and fallopian tube ligation in Medical Centre Dallas Texas University. From the study are excluded all patients that are not evaluated using modified Aldrete's score for discharge, as well as the patients that declined preventive preoperative analgesia and anti-emetic pre-treatment. Demographic characteristics of patients in all three groups were similar, average age was 33 years in desflurane group, 34 years in sevoflurane and 31 year in propofol group. Their study investigated recovery speed, following anesthesia with propofol, sevoflurane and desflurane; they measured time to extubation, awaking time and determined how well the patient is orientated in early postoperative period. They concluded that recovery time is significantly shorter in desflurane and sevoflurane group in comparison to propofol group. Estimate is performed using modified Aldrete's score, and authors proved that recovery is faster after propofol anesthesia in comparison to desflurane and sevoflurane ($p<0.05$) (7). While in our study, propofol was superior to inhaled anesthesia concerning speed and quality of recovery measured in early postoperative period.

Larsen et al. also examined quality of recovery from anesthesia in early postoperative period in patients who underwent elective surgical procedures using propofol, desflurane and isoflurane, all patients

are assessed as ASA I and II physical status. Exclusion criteria in this study matched these criteria in our study, and examines showed no significance regarding demographic characteristics. Propofol maintained anesthesia proved superior in terms of recovery speed, compared to desflurane and sevoflurane anesthesia. Significance is found in early post extubation period, they also concluded that there is no significance concerning hemodynamic parameters, side effects, pain level, and nausea and vomiting among compared groups (4). In our study, we compared characteristics of post anesthesia recovery depending on anesthetic used to maintain anesthesia (propofol, sevoflurane, isoflurane) one, five and ten minutes post extubation. Our inspection was based on test that is modification of Aldrete's score same as it is done in study conducted by Larsen and associates (4).

Fredman et al. compared sevoflurane to propofol in outpatient anesthesia, forty six ASA I and II physical status undergoing either gynaecological or otolaryngology procedures participated in there study. Emergence times from discontinuation of the primary maintenance anesthetics to spontaneous eye opening, response to verbal commands, extubation, and to correctly stating name, age, and date of birth were similar in all treatment groups (8). Bharti et al. conducted study to compare hemodynamic changes and emergence characteristics of sevoflurane versus propofol anesthesia for microlaryngeal surgery. They find that emergence time, extubation times and recovery time were similar in both groups (9). In our study comparison of recovery rate after propofol vs. sevoflurane anesthesia one minute post extubation proved propofol anesthesia superior to sevoflurane, five and ten minutes post extubation recovery was similar in both groups.

In there systematic review Gupta et al. focused on postoperative recovery and complications using four different anesthetic techniques. They searched database MEDLINE via PubMed (1966 to June 2002) using the search words "anesthesia" and with ambulatory surgical procedures limited to randomized controlled trials in adults (>19 yr), in the English language, and in humans. A second search strategy was used combining two of the words "propofol," "isoflurane," "sevoflurane," or "desflurane". No difference was found between propofol and isoflurane

in early recovery of cognitive function, incidence of side effects, specifically postoperative nausea and vomiting, was less frequent with propofol (10). In our study recovery rate one minute post extubation in comparison propofol versus isoflurane anesthesia proved that faster recovery after propofol maintained anesthesia when measured one minute post extubation, while after fifth and tenth minute superiority of propofol to isoflurane was lost. We found no significant difference in inhaled anesthesia groups (sevoflurane versus isoflurane) at all times measured.

CONCLUSIONS

Evaluation of emergence quality after anesthesia regarding different types of anesthetics is important in order to assure safe discharge of the patient from operating room in every day practice. Recovery rate evaluated by using White fast tracking scoring system was superior and with fewer complications in propofol maintained in comparison to sevoflurane and isoflurane maintained anesthesia only one minute post extubation, while after fifth and tenth minute difference was lost.

COMPETING INTERESTS

None to declare.

REFERENCES

1. Ronald D Miller, Lars I Eriksson, Lee A Fleisher, Jeanine P Wiener-Kronish, William L Young. *Miller's Anesthesia*: 7 Ed. Churchill Livingstone; 2008.567p-789p.
2. T N Calvey, N E Williams. *Principles and Practice of Pharmacology for Anaesthetists*: Fifth Edition. Blackwell Publishing; 2008. 118p-157p.
3. Stoelting Robert K, Hillier, Simon C. *Handbook of Pharmacology and Physiology in Anesthetic Practice*: 2nd Edition. Lippincott Williams & Wilkins; 2006.46p-177p.
4. Larsen B, Seitz A, Larsen R. Recovery of cognitive function after remifentanyl-propofol anesthesia: a comparison with desflurane and sevoflurane anesthesia. *Anesth Analg*.2000;90:168-174.
5. Paul G Barash, Bruce F Collen, Robert K Stoelting. *Clinical Anesthesia*: 5th Ed. Lippincott Williams &Wilkins Publishers;2006:281p-311p.
6. White PF, Song D. New criteria for fast tracking after outpatient anesthesia: a comparison with the modified Aldrete's scoring system. *Anesth Analg*. 1999;88: 1062-1072.
7. Song D, Joshi GP, White PF. Fast-track eligibility after ambulatory anesthesia: A comparison of Desflurane, Sevoflurane and Propofol. *Anesth Analg*. 1998;86: 267-273.
8. Brian Fredman, Michael H Nathanson, Ian Smith, Junke Wang, Kevin Klein, Paul F White. Sevoflurane for outpatient anesthesia: a comparison with propofol. *Anesth Analg*. 1995;81:823-8.

9. N Bharti, P Chari, P Kumar. Effect of sevoflurane versus propofol based anesthesia on the hemodynamic response and recovery characteristics in patients undergoing microlaryngeal surgery. *Saudi Journal of Anaesthesia*.2012; 6:380-384.
10. A Gupta, T Stierer, R Zuckerman, N Sakima, S D Parker, LA Fleisher. Comparison of Recovery Profile after Ambulatory Anesthesia with Propofol, Isoflurane, Sevoflurane and Desflurane: A Systematic Review. *Anesth Analg*. 2004;98:632–41

APPENDIX 1

White fast tracking scoring system (17)			
Score	1 minute	5 minutes	10 minutes
Awake and oriented	2	2	2
Arousable with minimal stimulation	1	1	1
Responsive only to tactile stimulation	0	0	0
Physical activity			
Able to move all extremities on command	2	2	2
Some weakness in movement of extremities	1	1	1
Unable to voluntarily move extremities	0	0	0
Homodynamic stability			
Blood pressure 15% of baselines MAP value	2	2	2
Blood pressure 15%–30% of baseline MAP value	1	1	1
Blood pressure 30% below baseline MAP value	0	0	0
Respiratory stability			
Able to breathe deeply	2	2	2
Tachypnea with good coughs	1	1	1
Dyspneic with weak cough	0	0	0
Oxygen saturation status			
Maintains value 90% on room air	2	2	2
Requires supplemental oxygen (nasal prongs) 1	1	1	1
Saturation, 90% with supplemental oxygen	0	0	0
Postoperative pain assessment			
None or mild discomfort	2	2	2
Moderate to severe pain controlled with IV analgesics	1	1	1
Persistent severe pain	0	0	0
Postoperative emetic symptoms			
None or mild nausea with no active vomiting	2	2	2
Transient vomiting or retching	1	1	1
Persistent moderate to severe nausea and vomiting	0	0	0
Total score 14			
MAP mean arterial pressure.			