Qurina Scientific Journal – QSJ

ISSN: 2959- 7463

Sevoflurane Maintained Anesthesia Induced with Propfol in Young Patients: Recovery Characteristics after ENT Surgery in Al-Marj Teaching Hospital - Al-Marj City – Libya

[1] Adel Abd Ullatif Basher, [2]Dareen El shareef Jadullah
[1]Anasthesia & Intensive care Departmenr, Faculty of Medical sciences, Qurina International University, Benghazi– Libya.

[2]Microbiology, Faculty of pharmacy, Qurina International University, Benghazi– Libya.

[1] Email: adelabdullatifbasher@qiu.edu.ly.
[2] Email: dareenelshareef@qiu.edu.ly.

Abstract

Background: Anesthesia in ENT poses a wide variety of problems; the acts performed are sometimes simple and very short or long and delicate. This study was aimed to study the quality of recovery profile of patients using general anesthesia (intravenous and inhaled anesthesia) after ENT surgeries at Al-Marj Teaching Hospital - Al-Marj City – Libya. **Patients and methods:** This was prospective, randomized study, was done in Al-Marj Teaching Hospital - Al-Marj City – Libya. Ethical Approval was taken from Qurina International University- Faculty of Medical Sciences-Anesthesia & intensive care department and Al-Marj Teaching Hospital. A total of 150 patients from different gender and ages, were scheduled to enter ENT surgeries, their sociodemographic data was inquired and recorded. Perioperative vital signs were measured and recorded, maintenance and general anesthesia were given according to each operation and recorded. Operation end and recovery time, were recorded, the recovery assessment was done for each patients where measured and recorded. Statistical analysis by SPSS 22, chi square test to compare between operation and each variable of the study. **Results :** Our study shows the effect of general anesthesia on recovery of patients post ENT surgery as the use of propofol as induction agent and inhalation maintenance anesthetics (sevoflurane) as we found all the patients tend to full recover in less than half hour, move voluntary and breath smoothly, their conscious level was fully awake to majority of them with 84.7%, and significant relationship between operation and consciousness level (*P* value 0.004) as both propofol and sevoflurane meet these criteria due to their smooth and rapid onset of action with a shorter recovery period **Conclusion:** It conclude that the use of propofol as induction agent and sevoflurane as maintenance anesthetic agents can suitably and safely use in ENT surgeries, with significant statistical results and smooth and shorter recovery.

Keywords: Propofol, Sevoflurane, Isoflurane, ENT, Hospitalized, patients.

I. INTRODUCTION

Otorhinolaryngology (ENT) and maxillofacial surgery (MFS) posed a lot of challenges to anesthetists, the main anesthetic concerns include management of the upper airways due sharing of the airway by both anesthetist and the surgeon, pathology modifying the laryngotracheal structures resulting in difficulties in exposing the glottis amongst others. Prefer and thorough evaluation of airway for early detection of difficult airway must be carried out prior to the intervention and a strategy of management established, in order to prevent accidents with rapidly serious consequences [1]. Anesthesia in ENT poses a wide variety of problems; the acts performed are sometimes simple and very short or long and delicate [2].

A.1. Intraoperative monitoring technique:

Standard American Society of Anesthesiologists (ASA) monitors [3] such as Blood pressure, Electrocardiography, Pulse oximetry for O2 saturation, capnography, and temperature monitoring are usually applied during ENT surgery. Invasive blood pressure monitoring and advanced hemodynamic monitoring is usually considered in patients with significant cardiovascular disease or long procedures, and

when excessive blood loss is expected. One study suggested that the use of goal-directed fluid therapy based on cardiac output monitoring helps guide fluid therapy and avoid fluid overload in free flap transfer.[4] Processed electroencephalogram (EEG) monitoring helps assess the depth of anesthesia and guide anesthetic drug dosing to provide a stable plane of anesthesia during surgery. [4]

A.1.2. Positioning:

The majority of ENT surgeries are done in a supine position with a 15–20-degree head-up tilt to improve venous drainage. Anesthesiologists must pay meticulous attention to the patient's positioning especially since the head of the operating table is usually turned 90–180 degrees away from the anesthesia machine, limiting immediate access to the airway. Thus, long ventilator tubing and vascular access lines are required and the endotracheal tube should be secured effectively to avoid accidental extubation and disconnection.

The eyes should be protected with an occlusive dressing to keep the lid closed and to prevent skin preparation solution from entering the eyes. Goggles or eye pads may be used; all pressure points must be padded, and intermittent pneumatic calf compression is applied.[4]

A.2 Choice of anesthesia techniques:

General anesthesia is the technique of choice as it provides airway protection, ensures adequate oxygenation, ventilation, immobility, and avoids distracting the surgeon. The choice of induction technique for general anesthesia (intravenous versus inhalational agents) is based on patient factors, surgical needs, and potential for compromised ventilation. Preoperative assessment and consultation with the surgeon will determine the technique of endotracheal intubation (awake or asleep), selection of an intravenous versus inhalation induction technique, and whether to use a neuromuscular blocking agent. Additionally, maintenance of anesthesia can be obtained either with total intravenous anesthesia (TIVA) or inhalation anesthetics or a combination of inhalation anesthetic with intravenous infusion of a short-acting anesthetic. Because the Propofol has ability to decrease postoperative nausea and vomiting (PONV), based-Propofol anesthesia may be a preferable technique of choice to prevent PONV. [5,6] Many centers use total intravenous anesthesia (TIVA) with target-controlled infusion (TCI) of propofol and opioids. [5,6]

Propofol:

Intravenous agents are used commonly for induction of anaesthesia followed by inhalational agents for maintenance. A problem with this technique is the transition phase from induction to maintenance. The rapid redistribution of the intravenous agent could lead to lightening of anaesthesia before an adequate depth is attained with the inhalational agent.[5] Propofol is a short acting general anaesthetic agent used widely for total intravenous anaesthesia because of its favorable recovery profile and low incidence of side effects. Propofol infusions are also becoming increasingly popular for maintenance of anaesthesia. It is particularly well-suited for anaesthesia in patients undergoing ambulatory and neurosurgery where rapid psychomotor recovery are of upmost importance.[2]

Sevoflurane:

Sevoflurane is a safe and versatile inhalational anaesthetic compared with the currently available agents. Sevoflurane is useful in adults and children for both induction and maintenance of anaesthesia in inpatient and outpatient surgery. Of all the currently used anaesthetics the physical, pharmacodynamic, and pharmacokinetic properties of Sevoflurane come closest to that of the ideal anaesthetic.

These characteristics include its inherent stability, low flammability, non-pungent odour, lack of irritation to the airway, low blood: gas solubility allowing rapid induction of and emergence from anaesthesia, minimal end-organ effects, minimal effect on cerebral blood flow, low reactivity with other drugs and a vapour pressure and boiling point that enables delivery using standard vaporization techniques. The availability of this agent makes it an alternative option for volatile Induction and Maintenance Anaesthesia (VIMA). [6]

Lack of airway irritation makes Sevoflurane almost ideal for inhaled induction, which may be especially desirable in children and needle-phobic adults.[7] Moreover, rapid increases in inspired concentration are well tolerated, facilitating control of anesthetic depth. [8]

Therefore, in our present study we compared the recovery characteristics of these two anaesthetic drugs and their usefulness in ENT anaesthesia. [9]

Monitoring recovery from anaesthesia:

I. Glasgow Coma Scale:

Originally developed to assess prognosis after head trauma and can also be used to ascertain the level of consciousness after anesthesia. Glasgow Coma Scale which is divides into three parameters: best eye response (E), best verbal response (V) and best motor response (M). The total Coma Score thus has values between 3 - 15, 3 being the worst and 15 being the highest. A score of >12 indicates return of consciousness in most patients and <8 indicates coma.[10][11][12]

II. Aldrete or modified Aldrete score:

ISSN: 2959- 7463

for assessing recovery from anesthesia, maximum total score is 10; a score of at least 9 is required for discharge from the post anesthesia care unit (PACU).[13][14]

The modified Aldrete score is measured by evaluating five criteria, including the individual's activity level, respiration, circulation, consciousness, and oxygen saturation. A score of "0", "1", or "2" is given for each category, two representing the ideal condition. The activity parameter is based on the ability to move extremities voluntarily or on command. A score of "2" is given for moving all four extremities, "1" for moving just two extremities, and "0" if the individual can't move any of their extremities.

For respiration, an individual is given two points when being able to breathe deeply and cough freely; one, if there's a respiratory effort, but breathing is limited, or dyspnea is recognized, and a score of zero if they're apneic. The circulation score is based on the systemic blood pressure values compared to the pre-anesthetic level. A score of "2", "1", or "0" is given for blood pressure that is less than 20%, 20-49%, or more than 49%, from the pre-anesthetic level.

Consciousness is a score of two for fully awake individuals, one for those reusable on calling, and zero for non-responsive patients. Scores are also given for the oxygen saturation value, and the method needed to achieve it. A score of two is given if an individual can maintain oxygen saturation of more than 92% on room air; a score of one is assigned if supplemental oxygen is required to maintain more than 90%; and finally, a score of zero is given if saturation is lower than 90% even with supplemental oxygen.

Finally, the scores from each index are summed up to a total score that determines the status of the individual and contributes to the decision for discharging the patient from the PACU.[13][14][15]

A. Aim of the study:

This study was determined to study the quality of recovery profile of patients using general anesthesia (intravenous and inhaled anesthesia) after ENT surgeries at Al-Marj Teaching Hospital - Al-Marj City – Libya.

II. METHODS AND MATERIALS

A. Patients and Methods:

- This was prospective, randomized study, was done in at Al-Marj Teaching Hospital, from first May 2022 to 22 October 2022.
- Ethical Approval was taken from QurinaInternational University – anesthesia department and Al-Marj Teaching Hospital.
- A total of 150 patients from different gender, ASA physical status I & II, Their age ranged from 13 to 45 years. were scheduled for ENT surgeries, their sociodemographic data (age ,sex, body weight) was inquired and recorded.
- Preoperative vital signs (heart rate, blood pressure, oxygen saturation) was measured and recorded.
- Each patients pre-anaesthesia was prepared and anaesthesia was induced with opioid (Fentanyl) drug, induction intravenous agent (Propofol) 2.5 mg/kg for children and adult, Esmeron (Recronium) as muscle relaxant, maintenance of anaesthesia by inhalation anesthetic agents (Sevoflurane), all was given and recorded according to each operation.
- Time of operation of each case were recorded, and the recovery assessment was done for each patients by Glasgow Coma Scale and Modified Aldrete score.

B. *S*tatistical Analysis :

The categorical data was analysed and reported as tables and charts and data was expressed as frequencies and percentages by using SPSS software version 28. Chi square test used to compare between operations and every variable in the study , (p value < 0.05) was signed as statistically significant.

C. Ethical clearance :

This was prospective study was approved from anesthesia & intensive care department of Qurina international university, and Al-Marj Teaching Hospital .

III. RESULTS AND DISCUSSION

In the following table and figure (I) we notice the list of ENT operation was done in the study, as Tonsillectomy taking the lead with 62.1%, second Adenoidectomy 25.3%, following by Deviated nasal septum, Micro-laryngoscopy respectively (7.3%, 5.3%).

Table (I) : *Operation frequency and percent.*

Operation			
		Frequency	**Percent**
Valid	Adenoidectomy	38	25.3%
	Tonsillectomy	93	62.1%
	Micro-laryngoscopy	8	5.3%
	Deviated nasal septum	11	7.3%
	Total	150	100%

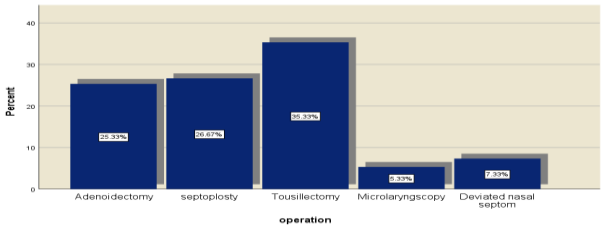

Figure (I) : *Operation percent curve.*

Table and figure (II) showing the distribution of patients between gender as male topping the study with 53.3% , while female laying second with 46.7% as tend to be the male participant more than female.

Table (II): *Gender frequency and percent.*

Gender			
		Frequency	**Percent**
Valid	**Male**	**80**	**53.3%**
	Female	**70**	**46.7%**
	Total	**150**	**100%**

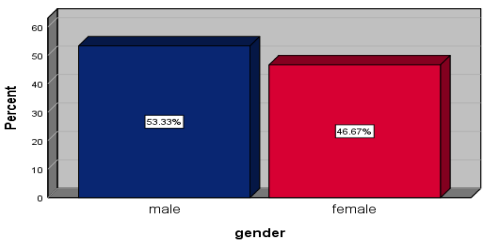

Figure (II) *Gender percent curve.*

As seen in table and figure (III) the age group of participants, which shows wide range of distribution of patients in the study, as age group 18-25 taking the lead with 29.3%, second age group between 26-35 with 27.3%, third age group 36-45 with 26%, and last age groups for age group less than 18 with 17.3%,4%.

Table (III): *Age frequency and percent.*

Age			
		Frequency	Percent
Valid	Less than 18	26	17.3%
	18-25	44	29.3%
	26-35	41	27.3%
	36-45	39	26%
	Total	150	100%

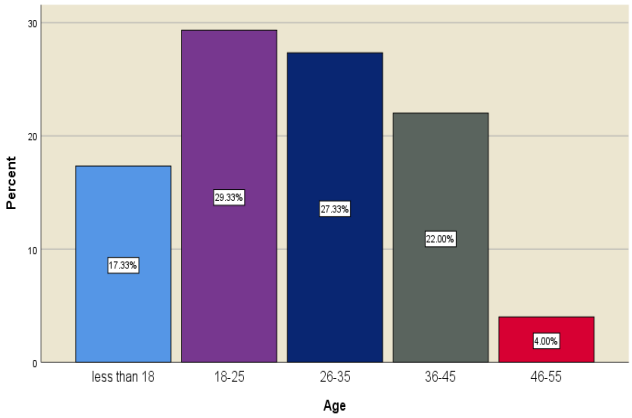

Figure (III): *Age percent curve.*

As seen table and figure (IV) describe the body weight frequency & percent between patients where largest percentage for normal weight was (63.3%), the percentage for overweight was (26%), and the lowest percentage was for underweight (16%).

Table (IV): *Body weight frequency and percent.*

Body weight			
		Frequency	Percent
Valid	Normal weight	95	63.3%
	Over weight	39	26%
	Under weight	16	10.7%
	Total	150	100%

ISSN: 2959- 7463

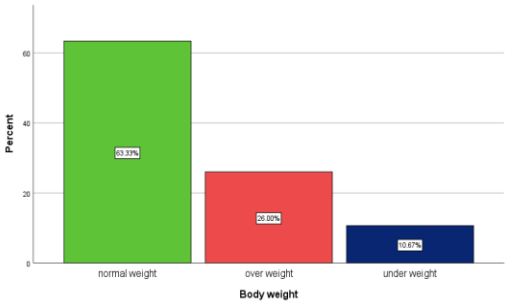

Figure (IV): *Body weight percent curve.*

As seen in table (V) Propofol & Fentanyl were the induction agents used in the study & the maintenance agent used in the study as tend to use in all operations (Sevoflurane).

Table (V): *Induction frequency and percent.*

Induction			
		Frequency	Percent
Valid	Propofol	150	100%
	Fentanyl	150	100%
	Total	150	100%

As describe in table (VI), the most of the operation end in an hour (40%) & less than an hour (36.7%).

Table (VI): *Time of the end of operation***:**

Time of the end of operation			
		Frequency	Percent
Valid	Half an hour	25	16.7%
	Less than an hour	55	36.7%
	An hour	60	40%
	Over than an hour	10	6.6%
	Total	150	100%

The recovery of the patients will have assessed and determined after operations with the GCS firstly. In table (VII) show the patients have GCS > 12 were 127 patients while patients have GCS < 12 were 23 patients.

Table (VII): *The Glasgow Coma Scale.*

The Glasgow Coma Scale		
	Frequency	**Percent**
> 12	127	84.7%
< 12	23	15.3%
Total	150	100%

Secondary will have assessed the recovery with Modified Aldrete score. Table (VIII), the most of patients will move all of their extremities voluntary with (86.7%), as seen in table (IX), in shows respiration in most of patients were found all breathes deeply and cough freely easily (91.3%). In table (X), all patients have normal blood pressure, and in table (XI), most of patients are fully awake after operation with (84.7%). As seen in table (XII), most of the patients had oxygen saturation greater than 92% on room air with (95.33%).

Table (VIII): *Activity level frequency and percent.*

Activity level	Frequency	percent
Voluntary movement of all extremities	130	86.7%
Move 2 extremities	15	10%
Cannot move extremities	5	3.3%
Total	200	100%

Table (IX): *Respiration frequency and percent.*

Respiration	Frequency	percent
Breathes deeply and cough freely	137	91.3%
Is dyspneic with shallow limited breathing	11	7.3%
Is apneic	2	1.4%
Total	200	100%

Table (X): *Blood pressure record frequency and percent***:**

Blood pressure record			
		Frequency	Percent
Valid	Normal	150	100%

Table (XI): *Conscious level frequency and percent***:**

Consciousness			
		Frequency	Percent
Valid	Fully awake	127	84.7%
	Is arousal on calling	23	15.3%
	Total	150	100%

Table (XII): *O2 saturation frequency and percent:*

O2 Saturation			
		Frequency	Percent
Valid	> 92 % on room air	143	95.33%
	> 90 % on O2 suppl.	7	4.67%
	Total	150	100%

For statistical analysis result found a relationship between operation and consciousness (*p* value 0.004), a highly statistically significant relationship, as seen in table (XIII) and figure (V).

Table (XIII): *Operation * consciousness Cross tabulation and p value***.**

Operation * consciousness Cross tabulation				
		Consciousness		Total
		fully awake	Is arousal on calling	
Operation	Adenoidectomy	27	11	38
	septoplasty	38	2	40
	Tonsillectomy	49	4	53
	Micro-laryngoscopy	6	2	8
	Deviated nasal septum	7	4	11
Total		127	23	150
P value		0.004		

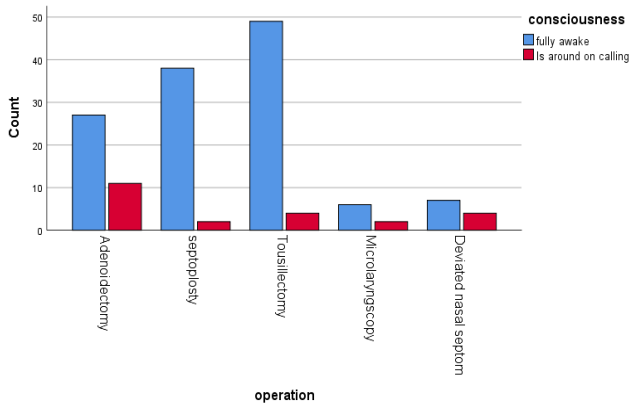

Figure (V): *Operation and consciousness relationship*.

Anesthesia in ENT poses a wide variety of problems; the acts performed are sometimes simple and very short or long and delicate. Our study shows the effect of general anesthesia on recovery of patients post ENT surgery as the use of propofol as induction agent and inhalation maintenance anesthetics (sevoflurane) as we found all the patients tend to full recover in less than half hour, move voluntary and breath smoothly, their conscious level was fully awake to majority of them with 84.7%, and significant relationship between operation and consciousness level (P value 0.004) as both propofol and sevoflurane meet these criteria due to their smooth and rapid onset of action with a shorter recovery period.[16]

In study by Xiaole Wu, Chengjing Shan *et al* .[17] where they make a comparison in recovery post tonsillectomy and adenoidectomy for children after desflurane and sevoflurane as found desflurane group have a better postoperative recovery in the short term than those in the sevoflurane group. these result was different to us as the recovery with sevoflurane not different with other anesthetic agents. Similar to ours as we use sevoflurane for maintenance of anesthesia ,a study by Parth Pandya1, Gauri M.*et a*l where propofol and sevoflurane have similar recovery profiles with BIS monitoring when used for maintenance of general anesthesia.[18]

In this study as noted respiration in patient was easily and smoothly without feeling nauseous and vomiting, in contrast similar to ours a result by Rhonda Zuckerman, Neal Sakima *et al.* as there was a significantly lower incidence of PONV in the propofol group, which may be related to its intrinsic anti-emetic properties.[19]

IV. CONCLUSION

In our study we conclude that the use of Propofol as induction agent and Sevoflurane as maintenance anesthetic agents can suitably and safely use in ENT surgeries, with significant statistical results and smooth and shorter recovery. Duo to limited resources and supplies a further more studies and methods required in assessment of recovery to understand more the effect of these general anesthesia.

REFERENCES

[1] Amélie L. Anesthesia for ENT and maxillofacial surgery. Treatise on anesthesia and resuscitation (4th edtn), USA.

[2] Jean-Louis B. Anesthesia-Resuscitation in otolaryngology and maxillofacialsurgery (1994).

[3] [20] ASA: American Society of Anesthesiologist. Standards for Basic Anesthetic Monitoring | American Society of Anesthesiologists (ASA) 2015 - 2020 Aug 24]. for-basic-anesthetic-monitoring.

[4] [21] Dort J C, Farwell DG, Findlay M, Huber GF, Kerr P, Shea-Budgell MA, *et al.* Optimal perioperative care in major head and neck cancer surgery with free flap reconstruction: A consensus review and recommendations from the enhanced recovery after surgery society . Vol. 143, JAMA Otolaryngology - Head and Neck Surgery. American Medical Association; 2017.

[5] [19] Coyle MJ, Main B, Hughes C,Craven R, Alexander R, Porter G,*et al.* Enhanced recovery after surgery (ERAS) for head and neck oncology patients. Clin Otolaryngol 2016 Apr 1 [cited 2020 Sep24];41(2):118-26.

[6] Coyle MJ, Main B, Hughes C,Craven R, Alexander R, Porter G,*et al.* Enhanced recovery after surgery (ERAS) for head and neck oncology patients. Clin Otolaryngol 2016 Apr 1 [cited 2020 Sep24];41(2):118-26.

[7] [20] ASA: American Society of Anesthesiologist. Standards for Basic Anesthetic Monitoring | American Society of Anesthesiologists (ASA) 2015 - 2020 Aug 24]. for-basic-anesthetic-monitoring.

[8] [21] Dort JC, Farwell DG, Findlay M, Huber GF, Kerr P, Shea-Budgell MA, *et al.* Optimal perioperative care in major head and neck cancer surgery with free flap reconstruction: A consensus review and recommendations from the enhanced recovery after surgery society . Vol. 143, JAMA Otolaryngology - Head and Neck Surgery. American Medical Association; 2017.

[9] [22] Eberhart LHJ, Eberspaecher M, Wulf H, Geldner G. Fast-track eligibility, costs and quality of recovery after intravenous anaesthesia with propofol-remifentanil versus balanced 23 Principles of Anesthesia and Airway Management in Head and Neck Surgery. anaesthesia with isoflurane-alfentanil. *Eur J Anaesthesiol* 2004 Feb [cited 2020 Sep 24];21(2):107- 14.

[10] Frost EA. Differential diagnosis of delayed awakening from general anesthesia: A review. *Middle East J Anaesthesiol.* 2014;22:537–48.

[11] Sinclair R, Faleiro RJ. Delayed recovery of consciousness after anaesthesia. Contin Educ Anaesth Crit Care Pain. 2006;6:124–8.

[12] Fischer J, Mathieson C. The history of the Glasgow Coma Scale: Implications for practice. Crit Care Nurs Q. 2001;23:52–8.

[13] Aldrete JA, Kroulik D. A postanesthetic recovery score. Anesth Analg. 1970;49:924–34.

[14] Aldrete JA. The post-anesthetic recovery score revisited. *J Clin Anesth.* 1995;7:89–91.

[15] Miller RD, editor. Miller's Anesthesia. 7th ed. United States of America: Elsevier, Churchill; 2010. pp. 2722–3.

[16] Ibraheim O, Alshaer A, Mazen K, El-Dawlaty A, Turkistani A, Alkathery K, Al-Zahrani T, Al-Dohayan A, Bukha153 ri A. Effect of bispectral index (BIS) monitoring on postoperative recovery and sevoflurane consumption among morbidly obese patients undergoing laparoscopic gastric banding. *Middle East J Anaesthsiol*. 2008; 19:819–30.

[17] Xiaole wu, chengjing shan *et al* .Comparison of desflurane and sevoflurane on postoperative recovery quality after tonsillectomy and adenoidectomy in children. experimental and therapeutic medicine 17: 4561-4567, 2019.

[18] Parth Pandya1, Gauri M.*et al* .comparison of recovery profiles of propofol and sevoflurane anesthesia with bispectral index monitoring in general anesthesia. doi: 10.5937/sjait2108147p.

[19] Rhonda Zuckerman, Neal Sakima, Anil Gupta, Stephen D. Parker. Comparison of recovery profile after ambulatory Anaesthesia with propofol, isoflurane, sevoflurane and desflurane. A systemic review. Anaesth Analg 2004; 98:632–41.