A Study on the Comparison of Post Operative Recovery Characteristics between Sevoflurane and Desflurane in Patients Undergoing Day-Care Surgical Procedures

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ABSTRACT:- Background: Day-care surgeries cover a broad spectrum of procedures, from surgical procedures under local anaesthesia (LA) to general anaesthesia (GA). Day care surgery can be considered as when the patient is planned up for a procedure on a no-resident basis.

Methods: Fifty (50) surgical patients of age group 20 – 60 years, ASA grade I and II, BMI <30 kg/m², of either gender were scheduled for the day – care surgical procedures. They were divided into two groups Group I and group II (25 patients in each group). Group I patients received sevoflurane for the anaesthesia and Group II. patients received desflurane for the anaesthesia.

Results: The time to early ambulation and the time to discharge from the PACU were significantly earlier in the desflurane group.

Conclusion: Desflurane offers a safest option regarding the recovery profile of patients post operatively.

Key words: Desflurane, Sevoflurane, Time of discharge

I. INTRODUCTION

Patient care has always been the mainstay of healthcare industry. Right from the preoperative assessment, intraoperative period and post operative stay – due caution and eternal vigilance is required to prevent patient morbidity and mortality. This led to increased post operative stay of the patients after short duration surgeries. With the passage of time and advancements in the field of anaesthetic pharmacology, there came many such innovative drugs which led to more patient safety, reduced hospital stays and decreased morbidities. Patients were awake earlier, were able to walk and pass urine with early discharge time. This led to the advent of Ambulatory surgeries or Day care surgeries or Office-based surgeries.

Day care surgery can be considered as when the patient is planned up for a procedure on a no-resident basis. (1) After the surgery, the patient is admitted in post anaesthesia care unit where the patient is monitored for various parameters such as alertness, requirement for supplemental oxygen, pain score, ability to move limbs and ambulate with no episodes of nausea and vomiting. The patient is discharged the same day with the instructions of not using any fine motor skills.

There are many advantages of ambulatory surgeries such as the foremost being early mobilisation, shorter hospital stays, relatively less postoperative pain and no nausea and vomiting with ability to pass urine. The only disadvantage with such surgeries is the need for

a responsible person to look after the patient for the next 48 hours as patients cannot use their fine motor skills like driving a car.

Day-care surgeries cover a broad spectrum of procedures, from surgical procedures under local anaesthesia (LA) to general anaesthesia (GA). The examples include major surgeries such as cholecystectomy, fundoplication, gastric banding (for obese patients), major gynaecological laparoscopic procedures including hysterectomies, breast cancer surgeries, cruciate ligament repairs, major plastic surgeries such as breast reduction, liposuction, paediatric and urologic surgeries, oocyte retrieval, dilatation and curettage (D+C) and many more. (2)

A daycare facility can be a part of the hospital or as a separate unit at a lesser distance from the main hospital. The area should be easily accessible and with sufficient parking space free from congestion and emergency area. There should be a separate registration counter, waiting area, examination and pre-anaesthetic check-up room, changing room, operation theatre, recovery and pharmacy. The staff should consist of consultants specialized in daycare surgery and anaesthesia. The supporting staff consists of anaesthetists, assisting surgeons, anaesthesia assistants, scrub nurses, ward nurses and other ancillary workers.

The inclusion criteria for the day care surgery are very selective. Every patient cannot be posted for surgery in day care. The patient should be healthy with controlled or optimised co-morbidities (American Society of Anaesthesiologists [ASA] Physical Status Class I and II). (3) .The extremes of age are at a much higher preoperative risk (paediatric patients, who are less than 1 year of age and Age >80 years). (4,5)

Under GA, there are two modalities available for ambulatory surgeries – Total intravenous anaesthesia (TIVA) and inhalational agents. TIVA offers the following advantages: it is associated with lower incidence of PONV, avoids the risk of malignant hyperthermia and provides rapid recovery without agitation. (10) Inhalational agents have further augmented the anaesthesia care with the introduction of sevoflurane and desflurane. These agents have rapid induction and recovery profiles with improved minimal or no cardiac and respiratory depression. (6).

Aim of the Study:

The aim of the study was to compare the comparison of post operative recovery characteristics between sevoflurane and desflurane in the patients undergoing day-care surgical procedures

Objectives of the study:

1. To evaluate the efficacy of sevoflurane over desflurane in the patients undergoing day-care surgical procedures.
2. To assess the post operative hemodynamic stability of the patients in both the groups.

II. MATERIALS AND METHODS:

The present study was conducted in the Department of Anaesthesiology, Shifa Medical Centre, Magarmal Bagh, Srinagar after taking approval from the ethical committee.

Fifty (50) surgical patients of age group 20 – 60 years, ASA grade I and II, BMI <30 kg/m^2, of either gender were scheduled for the day – care surgical procedures. They were divided into two groups. Group I (n=25): patients received desflurane for the anaesthesia and Group II (n=25): patients received sevoflurane for the anaesthesia.

Details pertaining to the patient's clinical history, general, physical and systemic examination and basic routine investigations like Hb, blood sugar, blood urea, S. creatinine, bleeding time, clotting time, ECG, Chest X-ray were done. Tab. Alprazolam 0.25mg HS (at bed time) was given one day prior to surgery. Tablet Ranitidine 150 mg – one tab. was given orally with a sip of water, two hours prior to the surgery. Patients were kept nil per oral (NPO) 8 hours prior to surgery. Written informed consent was taken from all the patients.

In the operating room, routine monitoring (e.g.: non-invasive blood-pressure, pulse oximetry, ECG) was used. Appropriate Intravenous line was obtained and intravenous fluid was started. All the patients were premedicated with injection glycopyrrolate 0.2mg iv, injection fentanyl 2mcg/kg iv and injection ondansetron 0.1mg/kg iv.

Patients were preoxygenated with 100% oxygen (O2) for 3 to 5 minutes. Each patient was subjected to inhalation induction by the group specific volatile agent along with 100% O2. After the loss of eyelash reflex, airway was maintained by an appropriate size laryngeal mask airway (LMA) and respiration was

continued spontaneously. After the insertion of laryngeal mask airway, cuff was inflated with an appropriate amount of air according to the size of LMA. Proper placement of laryngeal mask airway was confirmed by auscultation of breath sounds and end-tidal CO2 graph. Analgesia was maintained with inj. Paracetamol 15 mg/kg iv.

Anaesthesia was maintained by N2O: O2: 50:50 and group specific volatile agent along with incremental doses of injection propofol 0.5mg/kg intravenously. At the end of the surgery, the volatile agent was stopped and the LMA was extubated after the return of spontaneous eye opening and head lift.

In the post operative period, patient was given 100% O2 via facemask in propped up position and baseline vitals were recorded.

Following parameters were recorded

- Demographic variables (age, weight, gender, ASA grade,).
- Hemodynamic variables (HR, SBP, DBP MAP and SPO2) were recorded every 5 min. for first 15 min followed by every half an hour for 2 hours.
- Adverse effects such as sore throat, nausea, vomiting, pain, respiratory depression and inability to follow verbal commands.
- Time of early ambulation.
- Time of discharge from post anaesthesia care unit.

The time of ambulation was checked when the patient first walked to the washroom from the bed. The time of passing urine was noted when the patient had the urge to pass the urine for the first time, after arriving in the PACU. The time of discharge from the PACU was also recorded.

III. RESULTS AND ANALYSIS

The demographic variables, age, weight, gender, ASA grade and type of surgery were comparable in both the groups. The comparison of baseline and post induction hemodynamic parameters was statistically insignificant in both the groups.

Table 1: Shows the comparison of post-operative adverse effects in both the groups

Adverse effect	Group I	Group II
Sore throat	0	5 (20%)
Nausea	0	4 (16%)
Vomiting	0	4 (16%)
Hypoventilation	0	0
Disorientation	0	10 (40%)

The comparison of post-operative adverse effects in both the groups show that in Group I, none of the patients had sore throat, nausea, vomiting and respiratory depression. All of the patients were able to follow the verbal commands in the post operative period. On the contrary, in group II, there were 5 patients (20%) who had sore throat, 4 patients (16%) had nausea and 4 patients (16%) had vomiting. 12% of the patients None of the patients had respiratory depression. There were 10 patients (40%) who were drowsy but arousable in the post operative period.

Table no 2: Shows the comparison of time to early ambulation in both the groups

Time to early ambulation	Group I	Group II	p-value
minutes	30.03 ± 0.65	91.04 ± 1.26	<0.001

The mean time of ambulation in the postoperative period was 91.04 ± 1.26 minutes, in group II, and 30.03 ± 0.65 minutes in group I. On comparing the data statistically, the p-value came out to be <0.001, which was significant.

Table 3: Shows the comparison of time of discharge from PACU in both the groups

Time of discharge from PACU	Group I	Group II	P value
minutes	118.24±3.47	166.12 ±1.12	0.001

The mean time of discharge from PACU in the postoperative period was 166.12±1.12 minutes, in group II, whereas the similar mean time of discharge was 118.24 ± 3.47 minutes in group I. On comparing the data statistically, the p-value came out to be <0.001, which was significant.

IV. DISCUSSION

Day care surgeries have been a mainstay in the western world, but the concept is still in its early stages in the developing nations. By and large, nowadays such surgeries are being opted for by the people. These surgeries are scheduled in a way that the patient is discharged from the hospital the very same day, after confirming the alertness of the patient.

Many innovations have come up in both the technology and pharmacology industry. The need for rapid induction and rapid recovery has led to the advent of certain induction agents like etomidate (besides propofol), inhalational agents such as sevoflurane and desflurane, and opioids (remifentanil). These drugs are having physiological stability besides offering early recovery in the post operative period, thereby, aiding in early time of ambulation and faster discharge rates.

Regarding the time to early ambulation in both the groups, the mean time of ambulation in the postoperative period was 91.04 ±1.26 minutes, in group II, whereas the similar mean time was 30.03±0.65 minutes in group I. On comparing the data statistically, the p-value came out to be <0.001, which was highly significant.

Korat RR, Karagathara V et al (2017) compared sevoflurane and desflurane for post operative recovery profiles in day care laparoscopic surgeries. They studied 90 patients posed for day care procedures. They found that the mean time of early ambulation in the post operative period was significantly higher in the desflurane group.

Paul S, Saikia M et al (2023) investigated the comparison of sevoflurane and desflurane in 60 patients using I-GEL in elective ambulatory surgeries. They concluded that the mean time of early ambulation in the post operative period was significantly higher in the desflurane group.

The comparison of the time of discharge from the PACU was compared in both the groups. The mean time of discharge from PACU in the postoperative period was 166.12±1.12 minutes, in group II, whereas the similar mean time of discharge was 118.24±3.47 minutes in group I. On comparing the data statistically, the p-value came out to be <0.001, which was highly significant.

Sezen and Bombacı (2018) conducted a study on Eighty patients aged between 18 and 75 years with an ASA grade I or II who were scheduled for elective lower abdominal surgery were divided into 2 groups. After the induction of anaesthesia, the maintenance of anesthesia was provided using 4% desflurane in Group I and 1.3% sevoflurane in Group II in a 50% oxygen-air mixture. They concluded that the modified Aldrete scores of Group I were significantly higher than those of Group II at 10 minutes and at later intervals (p <0.002).

Gökçek, Kaydu et al (2016) participated in a study on 50 patients aged 18-70 years who had ASA physical statuses of I-II and were scheduled for intracranial surgery. Patients were randomly divided into two groups: sevoflurane and desflurane. They finalised that the times to responses to painful stimuli, emergence, hand-squeezing, extubation, orientation and Aldrete score were significantly lower (p<0.001) with desflurane-based anaesthesia *vs*. sevoflurane-based anaesthesia.

V. CONCLUSION

The time to early ambulation and the time to discharge from the PACU were significantly lower in the desflurane, thereby, offering the best option for recovery profile.

REFERENCES

[1] Burke B and Kyker M. (2013) Speeds Criteria vs. Modified Aldrete and Fast-Track Criteria for Evaluating Recovery in Outpatients. Open Journal of Anesthesiology 3(7):309-314.

[2] Commission on the provision Surgical Services. (1992) Report of Working Party on Guidelines for Day Case Surgery. London: The Royal College of Surgeons of England

[3] Dabu-Bondoc S, Shelley KH. (2015) Management of comorbidities in ambulatory anesthesia: A review. Ambul Anesth. 2:39–51.

[4] Fleisher LA, Pasternak LR, Herbert R, Anderson GF. (2004) Inpatient hospital admission and death after outpatient surgery in elderly patients: Importance of patient and

system characteristics and location of care. Arch Surg. 139:67–72.

[5] Korat RR, Karagathara V, Patel B (2017) Comparison of recovery profile after the use of desflurane, sevoflurane and propofol in day care laparoscopic surgeries. NJMR 7(1) 9-7.

[6] Messiehs Z. (2015) An overview of anesthetic procedures, tools, and techniques in ambulatory care. Ambul Anesth. 2:21–8.

[7] Paul S, Saikia M, Nayak SK, Dutta S, Biswas C (2023) Comparative Study on Postoperative Recovery Profiles of Desflurane and Sevoflurane Using I-GEL in Elective Ambulatory Surgeries. Journal of College of Medical Sciences-Nepal 19(2);150-158.

[8] Rosero E, Joshi GP. (2015) Total intravenous anesthesia: Present and future. ASA Newsl. 79:10–57.

[9] Surendra Kumar Kala, Sushil Kumar Sharma. (2018) Int. J. Life Sci. Scienti. Res. Volume 04, Issue 05, Page 1961

[10] Whippey A, Kostandoff G, Paul J, Ma J, Thabane L, Ma HK. (2013) Predictors of unanticipated admission following ambulatory surgery: A retrospective case-control study. Can J Anaesth. 60:675–83.