



Comparative Study of Propofol, Propofol-Midazolam, Propofol-Fentanyl, Ketamine in Day Care Surgeries

KEYWORDS

1. Day care surgery 2. propofol 3. midazolam 4. fentanyl 5. ketamine

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ABSTRACT "Day care surgery" is the procedure on which patients who are admitted and discharged for home on the same day of the surgery; with minimal or negligible post-operative complications. In this we compare four groups Propofol; Propofol-Midazolam; Propofol-Fentanyl and Ketamine in Day Care Surgery

Aims and objectives:

To compare the following factors in four groups Propofol; Propofol – Midazolam; Propofol – Fentanyl and Ketamine in Day Care Surgery

1. Quality of induction
2. Incidence of adverse reactions during induction
3. Hemodynamic variations like blood pressure, heart rate, SpO₂
4. Incidence of post-operative side effects
5. Recovery parameters

Patients and Methods:

100 patients of ASA I & II Class of age group 14-70 years undergoing short surgical procedures, like dilatation and curettage, suction and evacuation, dilatation and curettage with cauterization, cervical biopsy, close manipulation of fracture of limbs, upper GI endoscopy and drainage of abscess etc., were selected at random from the patients pool who gave consent to an institutionally approved study at various surgical departments of ALLURI SITARAMARAJU ACADEMY OF MEDICAL SCIENCES ELURU during the period of 2013-2015 to evaluate Propofol; Propofol-midazolam; propofol-fentanyl and ketamine as inducing agents in Day Care Surgery.

Conclusion: Among different groups propofol and fentanyl group takes a new look at IV anaesthesia for day care surgery as a sole agent by providing; (a) A high quality of smooth and rapid induction. (b) Well controlled maintenance (c) Swift and clear headed recovery in short surgical procedures

Introduction

The concept of providing health care on a day care basis started with

the concern of decreasing the cost over the last two decades. It has brought about a dramatic metamorphosis in approach to health care provision.

"Day care surgery" is the procedure on which patients who are admitted and discharged for home on the same day of the surgery; with minimal or negligible post-operative complications.

(i) In most of the countries it means that "patient spends a

few hours in hospital and doesn't stay overnight."

(ii) In USA it means that "Day care surgery is termed ambulatory surgery and includes patients who may spend up to 23 hours in the hospital allowing greater range of procedures to be included".

Benefits of day care surgery are

- (i) Patient preference both children and elderly.
- (ii) Lack of dependence on availability of hospital beds.
- (iii) Greater flexibility in scheduling operations.
- (iv) Low morbidity and mortality.
- (v) Low incidence of infections (Nosocomial).
- (vi) Low incidence of Thromboembolism.
- (vii) Higher number of patients are benefited.
- (viii) Shorten surgical waiting list.
- (ix) Lower overall procedural costs.
- (x) Lesser pre-operative testing and post-operative medications.
- (xi) Minimal disruption of patient's life.

Reasons for increase in Day care surgery centers is due to

- (a) High cost of keeping patient in bed.
 - (b) Reduction in availability of these beds.
 - (c) Long surgical lists in Govt., Hospital and
 - (d) Improvements in (1) Newer anaesthetic agents
- (2) Better pain control
 - (3) Minimal invasive surgery
 - (4) Changing attitudes to recovery.

Patients selected should be healthy of ASA I and II class without any need for major fluid infusion or blood transfusion. Age and sex should not be a significant determinant in performing day care surgery. Although there have been case reports of anaesthesia related complications after general anaesthesia, the risk of side effects are independent of the surgical procedures. The most important factor in selecting cases for day care procedures is the degree or level of post-operative care the patient would require.

Observation and results

The Study Titled "A Comparative Study of Propofol; Propofol – Midazolam; Propofol – Fentanyl and Ketamine in Day care Surgery"

Was carried out on patients admitted to different departments for short surgical procedures like dilatation and curettage, suction and evacuation, dilatation and curettage with cauterization, cervical biopsy, close manipulation of fracture of limbs and drainage of abscess etc., and were included in the study.

Preoperative assessment, induction characteristics, cardio-vascular changes during maintenance and quality of recovery from anaesthesia were observed and recorded.

Table - 1
SUCCESS OF INDUCTION WITH INITIAL DOSE

Group	No., of Patients	No., of Patients induced	Percentage
I	25	22	88%
II	25	23	92%
III	25	24	96%
IV	25	20	80%

Gr.I patient were induced with 2.5mg/kg body weight of 1% propofol. Gr.II patients with 2.5mg/kg body weight of 1% propofol and 0.08mg/kg body weight of midazolam, Gr.III patients with 2.5mg/kg body weight of 1% propofol and 2mg/kg body weight of Fentanyl, Gr.IV patients with 2mg/kg body weight of Ketamine to patients respectively.

In propofol group 22 of the total 25 patients were induced with a single dose (88%). In propofol and midazolam group 23 of the total 25 patients were induced with a single dose (92%). In propofol and fentanyl group 24 of the 25 patients were induced with a single dose (96%) and in ketamine group 20 of the total 25 patients were induced with a single dose (80%).

NO. OF PATIENTS REQUIRING SUPPLEMENTAL DOSES (25%) OF THE INITIAL DOSE FOR INDUCTION.

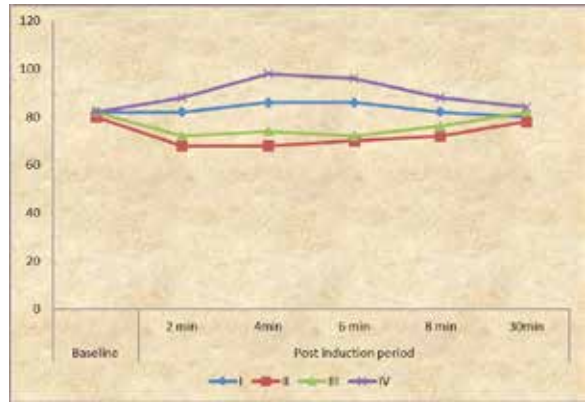
Group	Mean duration of surgery in min	1 st supplemental dose	2 nd supplemental dose
I	13±0.92	3	-
II	13.2±1	2	-
III	13±1.15	1	-
IV	13±1.36	5	-

INCIDENCE OF ADVERSE REACTIONS

Group	No of patients	Pain on injection	Apnea	Cough	Laryngeal spasm	Tremor	Hyper tonus
I	25	3	9	0	0	0	0
II	25	2	8	0	0	0	0
III	25	3	7	0	0	0	0
IV	25	0	5	0	1	1	4

CHANGES IN HEART RATE IN BPM (M±SD)

Group	Baseline	Post induction period				
		2 min	4min	6 min	8 min	30min
I	82±1.17	82 ± 1.73	86 ± 1.85	86±1.72	82±1.62	80±1.4
II	80±1	68 ± 1.45	68±1.92	70±1.7	72±1.6	78±1.01
III	82 ± 1.01	72 ± 1.01	74±1.01	72±1.01	76±1.01	82±1.01
IV	82 ± 1.01	88 ± 1.01	98±1.79	96±1.23	88±1.01	84±1.17



Discussion

A total number of 100 patients were taken for the study belonging to ASA grade I & II admitted to different departments of ALLURI SITARAMARAJU ACADEMY OF MEDICAL SCIENCES ELURU, were selected. The cases were divided into 4 groups taking into account the inducing agent namely Gr.I - propofol (n=25), Gr.II - Propofol and midazolam (n=25), Gr.III - propofol and fentanyl, Gr.IV - ketamine (n=25).

In the study the efficacy of propofol, propofol-midazolam, propofol-fentanyl and ketamine as sole intravenous anaesthetic for induction and maintenance in short surgical procedures were evaluated and difference in induction times, quality of induction, cardio respiratory changes, adverse reactions during induction and other side effects, recovery characteristics were compared. These observation were subjected to statistical analysis, comparing the four groups and corroborating them with the findings of previous workers in similar studies.

The age of the patient varied from 14-70 years. There are 52 males and 48 females in total series with 13 males and 12 females in Gr.I, 12 males and 13 females in Gr.II, 14 males and 11 females in Gr.III, 13 males and 12 females in Gr.IV.

In group-II the induction dose of 1% propofol 2.5mg/kg and 0.08mg/kg midazolam were taken. In Group-III the induction dose of 1% propofol 2.5mg/kg and fentanyl 2µg/kg were taken.

Induction Time

In the present study the mean induction time in propofol group was 14±1.92 seconds for inability to continue counting and 18±2.16 seconds for loss of eye slash reflex. .

In propofol and midazolam group the mean induction time was 14±0.91 seconds for inability to continue counting and 18±1.32 seconds for loss of eye lash reflex.

In propofol and fentanyl group the mean induction time was 12±0.1 sec for inability to continue counting and 18±1.27 sec for loss of eye lash reflex.

The time period of stoppage of counting was 22±5.95 seconds and eye lash reflex was lost at 40±4.87 seconds in ketamine group.

In the present study success of induction in propofol group was 88%, propofol and midazolam group 92% propofol and fentanyl group 96% and ketamine group 80%.

Adverse Reactions During Induction

3 out of 25 patients 12% from propofol group, 2 out of 25 patients 8% from propofol and midazolam group, 3 out of 25 patients 12% from propofol and fentanyl group had pain on injection.

Transient Apnea

Transient Apnea was observed in 9 patients (36%) in propofol group, 8 patients (32%) in propofol and midazolam group, 7 patients (28%) in propofol & fentanyl group and 5 patients (20%) in ketamine group.

In all the four groups most of the patients resumed spontaneous respiration before 60 seconds. Incidence of apnea lasting 30 to 60 seconds was higher in propofol group 4% in – comparison to propofol and midazolam group 20%, propofol and fentanyl group 16% and ketamine group 12%.

Cough & laryngospasm

In the present study ketamine is the only group where one patient had laryngospasm; .

Tremor and Hypertonus

There adverse reactions were not observed with propofol, propofol and midazolam group, and propofol and fentanyl group.

In ketamine group 1 patient had tremor and 4 patients had hypertonus. Corssen and Domino 1966 observed hypertonus to be a common feature during ketamine anaesthesia.

Cardiovascular Changes

Heart Rate: In this study the changes in heart rate following induction with propofol was not remarkable. The maximum increase was 6.2% from baseline at 4 min post induction.

In propofol and midazolam group the heart rate decreased 13.2% from baseline in 2 minutes after induction, 10.04% from baseline in 6min after induction and gradually settled after words at 30 minutes.

In propofol and fentanyl group the heart rate decreased 12.03% from base line in 2 minutes after induction, 12.5% decrease from baseline in 6 minutes after induction and gradually settles at 30minutes after induction.

Systolic Blood Pressure

In propofol group the maximum decrease in systolic blood pressure was 14.88% below baseline at 2 min after induction.

In propofol and midazolam group it had a maximum fall of 21.8% form baseline 2 minute after induction.

In propofol and fentanyl group it had maximum fall of 8.8% from baseline 4 min after induction.

Diastolic BP

Maximum fall in DBP was 17.6% below baseline at 2 minutes after induction with propofol and gradually reached near pre-induction value at 30minutes. .

In propofol and midazolam group the maximum fall was 11.9%. Fall below the baseline at 2 min after induction and gradually settled down the pre – induction value at 8min after induction.

In propofol and fentanyl group the maximum fall was 4% below baseline 2 minutes after induction and gradually settled down the pre-induction value at 8 minutes after induction.

In ketamine group the DBP increased maximally by 20.5% above baseline at 4 min post induction but settled subsequently pre induction value at 30minutes after induction.

POST-OPERATIVE SIDE EFFECTS

In this study the drugs were injected through a butterfly needle in the fore arm apposite to main infusion line; so that venous complication could be assessed properly.

1 patient from propofol group had thrombophlebitis suggesting that the incidence of venous complications were not significant.

1 patient in propofol and fentanyl and 2 patient from ketamine group had nausea and vomiting.

Recovery from Anaesthesia

In the present study the recovery time (patient fully conscious and oriented to time, place, person) in ketamine group is longer (11.2±1.41) minute, shorter in propofol group (6.2±0.52) minute, in propofol and fentanyl group it was (7.5±0.64) minute and in propofol and midazolam group it was (10.2±1.81).

Amnesic Properties

In this study 4 parameters were utilized to assess both anterograde and retro grade amnesia. The patient from propofol group, propofol & fentanyl group had neither anterograde and retrograde amnesia.

8% in propofol and midazolam group and 64% in ketamine group remembers applications of face mask. 20% in propofol and midazolam group and 80% in ketamine group remembers leaving OT.

SUMMARY AND CONCLUSION

The study of comparison of propofol group propofol and midazolam group, propofol and fentanyl group, ketamine group as an inducing agent was carried out at ALLURI SITARAMARAJU ACADEMY OF MEDICAL SCIENCES ELURU in the period 2013-2015. 100 patients of ASA I&II of both sexes aged 14-70 years were selected for the study, They were divided into 4 groups of 25 each Gr I receive 2.5mg/kg body weight of 1% propofol, Gr.II patients with 2.5 mg/kg body weight of 1% propofol and 0.08mg/kg body weight of midazolam, Gr.III patients with 2.5mg/kg body-weight of 1% propofol and 2 µg/kg body weight of Fentanyl, Gr.IV patients with 2mg/kg body weight of Ketamine were administered IV.

Patients received inj. atropine 0.6mg IV as a pre-medication 1 minute before induction. Induction characteristics, hemodynamics changes during induction and maintenance, adverse reactions during induction and other side effects were observed and recorded. The findings were compared with the observation of previous workers on similar subjects noting any deviation from their findings. The following conclusion were derived from the study.

Induction time was minimum with propofol and fentanyl group and maximum with ketamine. Highest success of induction after a single bolus dose was seen with propofol and fentanyl group. Transient apnea was seen in all the 4 groups, it was least with ketamine group and more with

propofol group. Apnea lasted for longer duration in patient administered propofol and midazolam group only.

During induction there is decrease in heart rate in propofol group, propofol and fentanyl group, propofol and midazolam group. But more in propofol and midazolam group. There is increase in heart rate in ketamine group.

There is a fall in arterial pressure in propofol group, propofol and midazolam group and less in propofol and fentanyl group during induction; where there is a rise of arterial pressure in ketamine group during induction. Though the fall of BP is not of much significance in healthy patients who were selected for the study but they are of great importance in patients with hypovolemia and shock. Though ketamine is preferred for such cases, it cannot be used for patients having hypertension, raised intracranial pressure and raised intraocular tension.

No Laryngospasm or cough was seen in patients induced with propofol group, propofol and midazolam group, propofol and fentanyl group.

Injection into a vein of fore arm caused pain in propofol group, propofol and fentanyl group, propofol and midazolam group.

Tremor and hypertonus were observed with ketamine group.

Recovery after anaesthesia is more rapid and clean headed in propofol group, next is propofol and fentanyl group but longer in propofol and midazolam group and ketamine group.

Nausea and vomiting was observed in propofol and fentanyl and ketamine group, thrombophlebitis was observed in propofol group.

Hence it is concluded that propofol and fentanyl group takes a new look at IV anaesthesia for day care surgery as a sole agent by providing;

A high quality of smooth and rapid induction.

Well controlled maintenance

Swift and clear headed recovery in short surgical procedures.

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