



Original Research Article

Sedative effect of propofol and midazolam in surgery under spinal anaesthesia: A comparative study

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ABSTRACT

Introduction: Intravenous medications are invariably required to allay anxiety related to surgical procedures, in patients undergoing surgery under regional anesthesia. A thorough pre anaesthetic check up and details of the surgical procedure planned are necessary before administration of sedative agents to attain desirable levels of sedation and avoid unwanted adverse events.

Objective: To observe, record and analyse sedative effect of intravenous Propofol and Midazolam in lower extremities and lower abdominal surgery scheduled under regional anesthesia techniques.

Materials and Methods: A single blinded comparative study conducted in tertiary care hospital of Gujarat. Sixty patients with no organic pathology & a moderate but definite systemic disturbance categorized into two groups labeled as propofol group (n=30) and Midazolam group (n=30) of either gender and shortlisted for surgery using subarachnoid block. Observer's Assessment of Alertness/Sedation Scale (OAA/S Scale) and Ramsay sedation scale was used to assess effective sedation.

Results: Basic patients characteristics, Mean age (SD) was 31.57 + 10.57 years in category I (P group) and 35.33 + 9.98 years in category II (M group) was comparable between the groups. In category I 16(53.3%) patients reached targeted sedation level in < 60 seconds, in group M 18 (60%) patients required 90-120 seconds to achieved the same level of sedation (p<0.001).

Conclusion: Propofol gives rapid onset of sedation and faster recovery, while midazolam provides more hemodynamic stability in regional anesthesia.

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1. Introduction

Subarachnoid block is preferred over general anesthesia and local other anesthetic techniques in lower extremities and lower abdominal surgeries, though many times its use and acceptance is restricted, common reasons being patients discomfort, unwillingness to co-operate and an awake patients during procedure.¹ Risk of postoperative nausea and vomiting, aspiration and ultimately respiratory complication during surgery, blockage of trachea and lower respiratory tract, higher need for post surgery analgesia and exposure to doctors and operation theater staff is common

in general anesthesia.²

Comfortable positioning is crucial during surgery, use of sleep inducing agents like propofol and midazolam intravenously is helpful to maintain calm and relaxed patients during surgery, if level of sedation is not maintained involuntary movements, reflex response by patient initiate new complication in ongoing surgical intervention ultimately decreases client satisfaction and overall surgical indicators performances.

For smooth conduct of surgery, selection of ideal sedative agent to achieve required sedation in patients with immediate onset of action and also short lasting effects after withdrawal of drugs, other important criteria

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is to give satisfactory level of sedative condition to patient during surgery, predict depth of amnesia and avoid adverse effects. With their own pros and cons some pharmacological agents in medical practice are used routinely for sedation in subarachnoid block, common examples are dexmedetomidine, etomidate and methohexitone.³⁻⁵

1.1. Properties of midazolam and propofol

Midazolam belonging to benzodiazepine group has very short half life, soluble in water, when administered give immediate sedation and also quicker recovery process on withdrawal. It is routinely selected for first line sedative agents in regional anesthesia, for short surgery half life is seventy minutes while for longer surgery it will takes more than hundred minutes to recover fully. Midazolam easily titrated as per need and status of patients and preferred in ambulatory methods.^{6,7}

Chemical structure of propofol is C₁₂ H₁₈ O, 95-99% protein binding, given through intravenous route, elimination take place through liver metabolism, half life ranges from 1.5 -30 hours, that reduces level of consciousness and lack of memory events. Side effects reported are burning sensation at the site of injection, hypotension and bradycardia.⁸

1.1.1. Selection of patients and flow of procedure

A single blinded prospective randomized clinical study was carried out in the year 2017-18 in a tertiary care hospital attached with M P Shah Government Medical College, Jamnagar. As per protocol approval from hospital ethical committee was taken, including 60 patients of aged between 18-60 years, having a weight of 40 to 80 kgs of either gender, admitted in our hospital for planned lower limb or abdominal surgeries under spinal anesthesia were included in the study. Patients < 18 years or > 60 years, and past history of major systemic diseases, were excluded from the study.

Pre-anaesthetic assessment of the patients was done with regard to vital and hemodynamic stability and, clinical profile of patients, premedication given in the form of Glycopyrrolate (4 mcg/kg) and Ondansetron (80 mcg/kg) i.v slowly. Recording of base line values of heart rate, respiratory rate, systolic blood pressure, diastolic blood pressure and SpO₂ done. Category- I Patients (n=30) propofol given as per decided intravenously, initial bolus dose (0.5 mg/kg) followed by continuous infusion (25-75mcg/kg/min) started and category -II patients (n=30) midazolam given in the form of first bolus (0.02 mg/kg) and then put on continuous infusion (0.001mg/kg/min) which is stopped 10 minutes prior to surgery is completed. Observation of sedation made using OAA/S scale and Ramsay scale.

Under aseptic precaution skin infiltration done with 2% Lignocaine and spinal needle inserted at L3-L4 interspace in lateral decubitus position, spinal anesthesia was given using Bupivacaine 0.5% heavy, infusion rate of propofol and midazolam titrated to achieve and maintain sedation score 4 on OAA/S Scale. Information recorded before premedication, after premedication, after induction and then 1 minute, 3 minute, 5 minute, 10 minute, 15 minute, 30 minute followed by every half hourly later on for all parameters were studied for change and compared between the two groups. In addition monitoring for Electrocardiography, SpO₂ and simultaneously we also checked for side effects reported from both category patients during or after surgery.

1.2. Statistics applied and software used

MS Excel and MedCalc trial version was used for analysis. As per normal distribution, type of data like qualitative or quantitative and frequency distribution, student's t-test, chi-square test, mean and percentage calculated.

2. Results

In a category-I (propofol group) 17(56.7%) patients in age group of 18-30 years while in category-II (Midazolam group) majority 20 (66.7%) belonging in age of 31-50 years and also Mean age (SD) was 31.57 (10.57) in category - I and 35.33 (9.79) years in category-II. (Table 1).

For onset of action in propofol group, 4 (13.4%) patients had taken less than 30 seconds to reach target sedation and 29(96.7%) patients achieved desirable level of sedative effects within 90 seconds of drug administered, while in midazolam group 26(86.7%) patients required more than 90 seconds to reach at same level of sedation as per target set. The difference between two group was statistically significant (p<0.05) (Table 2). Base line values taken for hemodynamic stability and compare change during surgery, for mean heart rate, systolic blood pressure, diastolic blood pressure, mean arterial blood pressure, SpO₂ and respiratory rate. (Table 3).

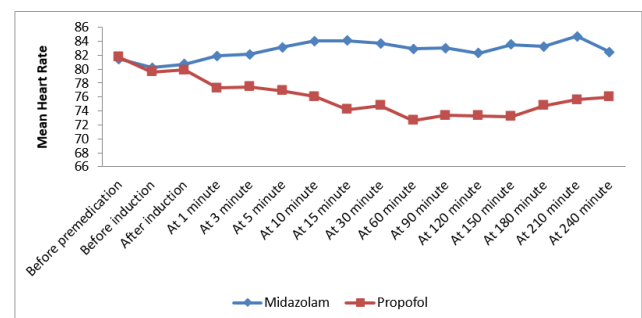


Fig. 1: Expressing pulse rate changes between P group and M group

Table 1: Patient’s characteristic and Age wise distribution in P group vs. M group

Age in years	Propofol		Midazolam	
	n	%	n	%
18-30 years	17	56.7%	8	26.7%
31-50 years	11	36.6%	20	66.7%
>51 years	2	6.7%	2	6.6
Total	30	100	30	100

Mean age (SD) was 31.57 (10.57) in propofol group and 35.33(9.98) in midazolam group

Table 2: Onset of action at target level of sedation in P group and M group

Duration in seconds	Category – I (Propofol)		Category-II(Midazolam)	
	Number	Percentage	Number	Percentage
Less than 30 sec.	4	13.4%	0	0.0%
30-60 sec.	12	40%	1	3.3%
60-90 sec.	13	43.3%	3	10%
90-120 sec	1	3.3%	14	46.7%
120-150 sec	0	0.0%	8	26.7%
More than 150 sec.	0	0.0%	4	13.3%
Total	30	100	30	100

Table 3: Expressing the level of baseline value in P group vs. M group

Indicators monitored	Category –I (Propofol) Mean and Standard Deviation	Category –II (Midazolam) Mean and Standard Deviation	Probability value
Heart rate	79.15 ± 13.54	82.7 ± 8.6	0.234
Systolic Blood pressure	118.6 ± 10.7	115.1 ± 8.1	0.246
Diastolic Blood Pressure	74.7 ± 7.19	78.1 ± 6.2	0.048
Mean Arterial Pressure	83.9± 7.63	89.9 ± 7.3	0.065
Spo2 (%)	98.3 ± 1.65	98.6 ± 1.2	0.645
Respiratory Rate	16.1 ± 2.04	18.1 ± 1.3	0.061

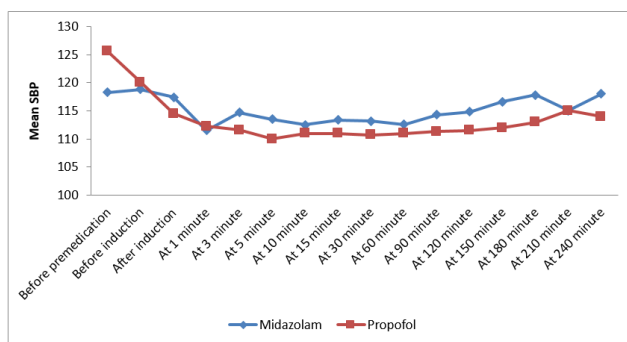


Fig. 2: Expressing changes in SBP (MmHg) and comparison during surgery in P and M Group

3. Discussion

Regulation and maintenance of sedative effect is important aspect which helpful in minimizing complication in spinal anaesthesia. In order to improve patient’s co-operation and compliance it is necessary to provide some sedative medication during procedure. Different form and level of apprehension is common in all patients when they are going

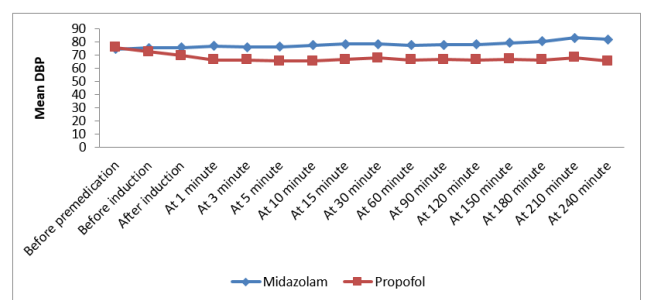


Fig. 3: Expressing changes in DBP (MmHg) and comparison between P and M group

for short or long duration surgical intervention.^{5,9}

Past studies have reported that onset of action was significantly faster, the maximum increase in pulse rate was at 10 min in propofol group, mean (SD) was 80.40 (12.7) intra operatively and in midazolam group 79.25 (13.44) at 15 minutes. Average oxygen saturation was 99.7 + 0.73% in both groups.²

There are many pharmacological methods in practice which are useful in decreasing apprehension to various

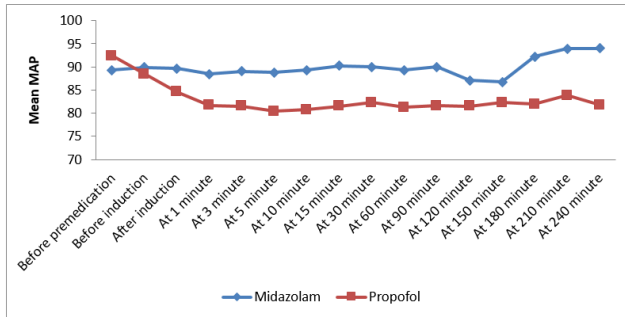


Fig. 4: Expressing changes in MAP and comparison between P group and M Group

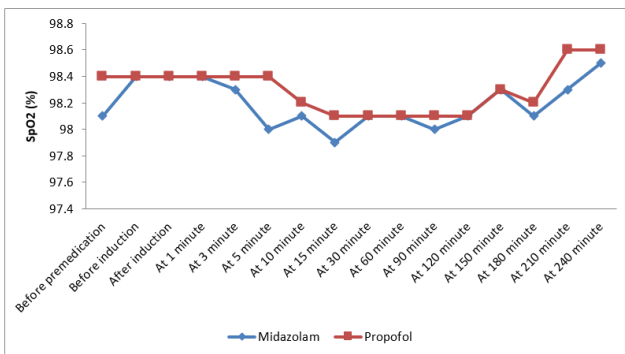


Fig. 5: Expressing the changes in SpO₂ (%) and comparison between P and M Group

degrees. Both propofol and midazolam have almost all properties which provide advantage over other agents especially in subarachnoid block like rapid onset of action and maintenance through easy titration and also targeted controlled infusion.

Monika Danielak et al (2016) studied the sub hypnotic dose of propofol and midazolam during spinal anaesthesia for elective caesarian section and observed good sedative effects for both agents and also rapid onset and fast recovery with propofol.¹⁰

Ni Ni Win et al (2005) study specifically done to study hemodynamic changes and heart rate variability during use of intravenous propofol and midazolam reveal that, there is fall in systolic blood pressure, diastolic blood pressure and also in heart rate.¹¹

S.Yadanapudi et al (2007) in their study reveals that onset and offset of sedation was faster in propofol than midazolam which is statistically significant. The duration of adequate sedation was also longer in propofol group compare to midazolam group. Significant change in vitals were recorded during infusion but immediately after withdrawal of sedative agents all parameters came back to base line values.¹²

G Clark et al (2009) concluded that propofol provide a higher quality of sedation in terms of neuropsychiatry

recovery and patient tolerance compare to midazolam.¹³

Bipul Deka et al (2016) in relation to side effects observed 12% incidence of nausea and vomiting intra-operative, and midazolam was safe and reduce incidence of hypotension and bradycardia.¹⁴

4. Conclusion

1. We concluded that time taken for onset of sedation and recovery from effect was much faster with propofol compare to midazolam in surgery done under spinal anaesthesia.

5. Source of funding

None.

6. Conflict of interest

None.

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