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Postoperative Cognitive Dysfunction in Patients Undergoing Surgery under Monitored Anaesthesia Care

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ABSTRACT :-

Background:-Post operative cognitive dysfunction (POCD) is a transient impairment of cognition that occurs in substantial number of patients after anaesthesia and surgery. It may last for days, months or even years. Elderly population are on the higher risk of developing POCD. It has become an important issue in peri-operative care as surgery under anaesthesia is common in elderly patients.

Methods:-Patients aged 40-80 years undergoing surgery under Monitored Anaesthesia Care (MAC) were studied. Montreal Cognitive Assessment (MoCA) score was used to assess POCD preoperatively and 6 and 24 hours postoperatively. Decrease in MoCA score of ≥ 2 was considered significant.

Results:-Total of 150 patients aged 40-80 years of either sex taken. 9.3 % patient had POCD at 6 hours and it decreased to 7.3 % at 24 hours. Mean MoCA score was lower among those with POCD at 6 and 24 hours compared to those without POCD. It was statistically significant ($p < 0.001$). Incidence of POCD was seen to be higher in patients above 60 years of age.Other factors studied were gender, type and duration of surgery,drugs used intra-operatively and associated co-morbidities.

Conclusion:-Our study found out that incidence of POCD is significant even in patients undergoing Surgery under MAC.

I. INTRODUCTION

Postoperative cognitive dysfunction (POCD) is the decline in cognitive function that occurs after surgery and is characterized by impairment of recent memory, concentration, language, comprehension and social integration.[1] Although earlier recognized after cardiac surgery it has been seen to occur after non- cardiac surgeries under general and regional anaesthesia in major as well as minor surgeries.[2,3,4,5]

Incidence of POCD depends on various factors including age, sex, type and duration of surgery, anaesthetic drugs, systemic disease and certain features of hospital settings like noise, immobilization, isolation, sleep deprivation during hospitalization. POCD may be confused with delirium or excessive sedative state due to residual effect of anaesthetic drugs.

Various neuropsychological tests are used for diagnosing POCD ranging from questionnaires to complex psychological tests. Mini mental state examination (MMSE) and Montreal cognitive assessment score (MoCA) are brief screening tools that helps clinicians to identify patients with cognitive dysfunctions.

POCD increases the morbidity & mortality, poor quality of life, risk of withdrawal from work force and increased dependency. So identifying the etiology and detecting POCD in early postoperative period is important to recognize susceptible patients and improve their perioperative outcome[8]

II. AIMS AND OBJECTIVE

The primary objective was to look for patients aged 40-80 years developing POCD after elective surgery under Monitored Anaesthesia Care (MAC). The secondary objective was to study the factors likely to affect the occurrence of POCD namely age, sex, associated co-morbidities,duration and type of surgery.

III. MATERIALS & METHODS

Ethics

The study was a prospective observational study conducted in the department of Anaesthesiology, Lady Hardinge Medical College and Associated Shrimati Sucheta Kriplani Hospital, after approval by the Institutional Ethical Committee. Detailed pre-anaesthetic checkup and investigations, adequate fasting, pre-medication and a written informed consent for surgery and anaesthesia was taken.

Recruitment

Patients aged 40-80 years, ASA I-II of either sex, planned for elective surgery under MAC were recruited for the study. Patients with ASA III & IV, refusal to participate, emergency surgeries, alcohol consumption, unable to understand scoring system, patients with known psychological and neurological disorder, conversion to general anaesthesia were excluded from the study.

Procedure

Cognitive function was assessed preoperatively using Montreal cognitive assessment Score. Patients were shifted to operating room. As per the institutional protocol, pulse oximetry, electrocardiography and non-invasive blood pressure were attached and readings were noted. An intravenous access was secured and intravenous fluid started. Monitored anaesthesia care was provided with injection midazolam 1mg and injection fentanyl 25 to 30 mcg as and when required depending on the pain and patients discomfort. Patients were observed for any side effects and excessive sedation using Ramsay sedation score and cognitive function assessment were done at 6 and 24 hours postoperatively using the same MoCA score. Decrease in MoCA score of 2 or more from preoperative values were considered significant.

Statistical analysis

- The incidence of cognitive dysfunction after surgery was reported to lie between 6.6% (Canet et al, 2003) to 41% (Monk T et al, 2008). Therefore, assuming 24% as the incidence and 10% margin of error, the minimum required sample size at 5% level of significance is 70 patients. As per the past hospital records approximately 400 patients will be available for the study and taking in account the incidence, inclusion and exclusion criteria we propose to take minimum 100 patients for this study.

- Statistical Package for Social Sciences (SPSS) version 16.0 was used for analysis.The patient characteristics were expressed as mean±sd and analyzed by student's t- test. Descriptive statistics like mean and standard deviation was done for quantitative data and percentages for qualitative or categorical data.The qualitative variables were expressed as frequencies/percentages and compared using Chi-square test. Students t test was used to find out if there was any significant difference between two group means. A p-value < 0.05 was assumed statistically significant.

OUTCOME:

Primary outcome:

The proportion of patients developing POCD in patients undergoing surgery under MAC.

Secondary outcome:

The study the occurrence of POCD with factors namely age, sex, duration of surgery, type of surgery, intraoperative drugs and associated co-morbidities

IV. RESULTS

Total 150 patients posted for minor surgeries under MAC were taken for the study.

Patients Profile

Mean age of the patients was 62.11±6.66 years (range 47 - 76 years). Mean weight of the patients was 58.83±6.57 kg (range 45-80 kg). Out of total 150 patients there were 79 females and 71 male patients. (Table 1)

VARIABLES (n=150)	Mean ± SD or number
Age (years)	62.11±6.66
Weight (kg)	58.83±6.57
Sex M: F	79:71

Table 1: patient profile

OCCURRENCE OF POCD AT DIFFERENT TIMES

Patients were divided into two groups depending on the occurrence of POCD as POCD and No POCD at both 6 and 24 hours postoperatively.

Time	POCD		No POCD	
	No. of subjects	Frequency	No. of subjects	Frequency
At 6 hours (n=15	14	9.3%	136	90.7%
At 24 hours (n=150)	11	7.3%	139	92.7%

Table 2: POCD at different times

Out of 150 patients, 14 patients (9.3 %) had POCD at 6 hours. It decreased to 11 patients (7.3%) at 24 hours. There was no new incidence of POCD at 24 hours.

MEAN MoCA SCORES IN TWO GROUPS AT 6 AND 24 HOURS

Time of assessment	POCD		NO POCD		p value
	No. of subjects	Mean MoCA score	No. of subjects	Mean MoCA score	
At 6 hours (n=150)	14	23.14±1.35 (21-25)	136	25.10±0.73 (24-27)	<0.001
At 24 hours (n=150)	11	23.91±1.22 (22-25)	139	24.55±0.93 (24-27)	0.032

p< 0.05 was considered significant

Table 3: Mean MoCA score in two groups at different times

At 6 hours, 14 patients had POCD with mean MoCA score of 23.14±1.35 which was significantly lower as compared to those who did not develop POCD (p value <0.001). At 24 hours, 11 patients developed POCD with mean MoCA score of 23.91±1.22. Even at 24 hours scores were significantly lower in POCD group (p<0.032) (Table 4) (Fig 3)

Association of POCD with various co-factors

FACTORS			At 6 hours(n=150)			At 24 hours(n=150)		
			POCD (n=14)	NO POCD (n=136)	p value	POCD (n=11)	NO POCD (n=139)	p value
AGE	**40-60 yrs**		4 (6.8%)	55 (93.2%)	0.387	3 (5.1%)	56 (94.9%)	0.395
	60-80 yrs		10 (11%)	81 (89%)		8 (8.8%)	83 (91.2%)	
Sex	**Female(n=71)**		6 (8.5%)	65 (91.5%)	0.0725	3 (4.2%)	68 (95.8%)	0.166
	Male (n=79)		8 (10.1%)	71 (89.9%)		8 (10.1%)	71 (89.9%)	
Type of surgery	**Cataract (n=142)**		14 (9.9%)	128 (90.1%)	0.448	11 (7.7%)	131 (92.3%)	0.535
	Gynaecological (n=8)		0(0%)	8 (100%)		0 (0%)	8 (100%)	
Sedation	**No sedation**	Y (52)	5 (9.6%)	47 (90.4%)	0.93	5 (9.6%)	47 (90.4%)	0.43
		N (98)	9 (9.1%)	89(90.8%)		6 (6.1%)	92 (93.4%)	
	Midaz	Y (87)	6 (6.9%)	81(93.1%)	0.23	5 (5.7%)	82 (94.3%)	0.38
		N (63)	8 (12.6%)	55(87.3%)		6 (9.5%)	57 (90.5%)	
	Midaz + Fenta	Y (11)	3 (27.3%)	8 (72.7%)	**0.03**	1 (9.1%)	10 (90.9%)	0.82
		N (139)	11 (7.9%)	128 (92.1%)		10 (7.2%)	129 (92.8%)	
Education	**Illiterate** (n=88)		8 (9.1%)	80 (90.9%)	0.946	4 (4.5%)	84 (95.5%)	0.311
	1st -5th std (n=1)		0 (0%)	1 (100%)		0 (0%)	1 (100%)	
	6th - 12th std (n=35)		4 (11.4%)	31 (88.6%)		5 (14.3%)	30 (85.7%)	
	>12th std (n=26)		2 (7.7%)	24 (92.3%)		2 (7.7%)	24 (92.3%)	
Co-morbidities	**Single**	Y(88)	7 (8%)	81 (92.0%)	0.49	6 (6.8%)	82 (93.2%)	0.77
		N (62)	7 (11.2%)	55 (88.7%)		5 (8%)	57 (91.9%)	
	More than one	Y (7)	2 (28.6%)	5 (71.4%)	0.07	0 (0%)	7 (100%)	0.45

		N (143)	12 (8.3%)	131 (91.6%)		11 (7.6%)	132 (92.3%)	
	None	Y (55)	5 (9.1%)	50 (90.9%)	0.94	5 (9.1%)	50 (90.9%)	0.53
		N (93)	7 (7.5%)	86 (92.5%)		7 (7.5%)	86 (92.5%)	

Out of 14 patients developing POCD at 6 hours,4 (6.8%) belonged to the age group of 40-60 and 10 (11%) belonged to age group 60-80years. At 24 hours, out of 11 patients developing POCD, 3(5.1%) belonged to age group 40-60 years and 8 (8.8%) belonged to age group 60-80 years. Incidence of POCD was seen to be higher in patients above 60 years of age but it was not statistically significant.

Out of 14 patients developing POCD at 6 hours, 6 (8.5%) were females and 8 (10.1%) were males. At 24 hours out of 11 patients developing POCD 3 (4.2%) were females and 8(10.1%) were males.Incidence was higher in males both at 6 and 24 hours postoperatively however, it was not statistically significant

Majority of the patients had undergone cataract surgery. 8 patients out of 150 underwent gynecological surgeries. None of them had POCD.

No significant association of POCD was seen with type of surgery

There were three groups of patients based on the drugs given intraoperatively. 52 patients received no sedation, 87 patients received only midazolam and 11 patients received both midazolam and fentanyl.

There was no significant difference in occurrence of POCD in patients who did not receive any sedation as compared to those who received sedation.

There was no association of occurrence of POCD with injection midazolam alone given intraoperatively.

Percentage of patients developing POCD was higher in patients receiving midazolam and fentanyl both at 6 and 24 hours. However, it was statistically significant only at 6 hours ($p<0.05$).

88 patients out of 150 were illiterate and one studied up to 5^{th} standard. All other patients were better educated.

There was no significant association of POCD seen with level of education at both 6 and 24 hours postoperatively.

Out of 150 patients, 88 had single comorbidities. Only 7 patients had more than one comorbidity and 55 patients did not have any comorbidity.

No significant association of POCD was seen with presence of one or more comorbidities at both 6 and 24 hours**.**

OCCURRENCE OF POCD WITH DIFFERENT CO MORBIDITIES

COMORBIDITIES (n=150)	**At 6 hours**		**p value**	**At 24 hours**		**p value**
	POCD	**No POCD**		**POCD**	**No POCD**	
Hypothyroidism (n= 3)	0 (0%)	3(100%)	0.744	0 (0%)	3(100%)	0.794
Mood disorder (n= 2)	0(0%)	2(100%)	0.821	0(0%)	2(100%)	0.858
Hemiparesis (n= 1)	0(0%)	1(100%)	0.907	0(0%)	1(100%)	0.927
Diabetes Mellitus (n= 5)	1(20%)	4(80%)	0.392	1(20%)	4(80%)	0.320
Hypertension (n=69)	6(8.7%)	63(91.3%)	0.516	2(2.9%)	67(97.1%)	0.051
Cardiac ds (n=5)	2(40%)	3(60%)	0.069	2(40%)	3(60%)	**0.043**
Asthma/COPD (n=18)	2(11.1%)	16(88.9%	0.523	1(5.6%)	17(94.4%)	0.610

$p< 0.05$ was considered significant

Association of POCD with comorbidities

Various co-morbidities present in patients were hypothyroidism, mood disorder, hemiparesis, diabetes mellitus, hypertension, cardiac condition, asthma and COPD.

5 patients suffered from cardiac condition (ECG, history of angina, Coronary artery disease). Cardiac conditions as a comorbidity was associated with significantly higher incidence of POCD at 24 hours postoperatively($p<0.043$) but not at 6 hours.

There was no statistically significant difference in incidence of POCD in patients with other comorbidities.

Retrospectively, patients who developed POCD at 6 and 24 hours were compared with rest of the patients for preoperative baseline parameters.

The mean baseline parameters heart rate, systolic and diastolic blood pressure, SpO_2 and temperature were comparable in the two groups at both 6 and 24 hours.

All patients remained hemodynamically stable, maintained SpO_2 >95%, did not have significant bradycardia or tachycardia and were normothermic.

None of the patients were excessively sedated (Ramsay score ≤ 3) at the time of scoring.

V. DISCUSSION

Cognition is defined as the mental processes of perception, memoryand processing which allows individual to acquire knowledge, solve problems and plan for future. Therefore,postoperativecognitive dysfunction is the impairment of these processes after surgery.

POCD ASSESSMENT

There are multiple neuropsychological test to diagnose POCD, many of which are computerized to ease the administration and improve standardization. Most commonly used screening tests are MoCA and MMSE. Many studies have used MMSE as a tool for cognitive assessment alone or along with other neuropsychological tests for diagnosis and assessment of POCD. Studies comparing MMSE andMoCA have shown MoCA to be more sensitive screening tool for mild cognitive impairment[6,9,10].

Till date there are few studies using MoCA score as a tool for POCD assessment.[26,29,31.32,33] MoCA scoring was used in our study to assess occurrence of POCD at 6 and 24 hours postoperatively.

TIMING OF ASSESSMENT:

There is no optimum time for assessment of POCD but according to various studies POCD can be seen from as early as first postoperative day to as long as 5 year.

POCD can be divided into early, intermediate and late. Acute POCD is the decline in cognitive dysfunction within one week after surgery.

In our study early POCD was assessed at 6 and 24 hours postoperatively using MoCA score.

Similar to other studies we also found POCD to be higher in early postoperative period and incidence decreased with time[3,9]. **We found 9.3% patients having POCD at 6 hours which decreased to 7.3% at 24 hours.**

INCIDENCE OF POCD:

The incidence of POCD in our study at 6 and 24 hours was 9.3% and 7.3% respectively.

The incidence of cognitive dysfunction after surgery is reported to lie between nil to 60% depending on various factors including patients age, sex, type and duration of surgery, intraoperative medication, associated co-morbidities and education level. The incidence of POCD after minor surgeries have been seen to lie between 6.6% to 18.5% in majority of the studies. Incidence in one study was seen to be as high as 47%.[4]

There are multiple studies on POCD after major surgeries and surgery under general anaesthesia but very few studies on POCD after minor surgeries.

Minor surgeries

Billig N et al (1996)[8] conducted study on subjects ≥60 years scheduled for cataract surgery under LA with sedative and hypnotics. Cognitive assessment was done using MMSE preoperatively, at 1&6 weeks, 6 months and 1 year postoperatively. Cognitive impairment was seen in 9% of the surgical cases during the study year.

Canet J et al(2003)[5] studied 372 patients aged 60 years and above scheduled for minor surgeries under GA. Cognitive function was assessed preoperatively and at 7 days and 3 months postoperative. The study reported a 6.8% incidence of POCD at 7 days and 6.6% at 3 months.

Rohan D et al (2004)[4] conducted study on 30 patients aged 65 years and above posted for minor urological and gynecological surgeries under GA. Non-surgical control group was taken. cognitive function was assessed preoperatively and at 24 hours postoperatively. The study showed that POCD was present in 47% of patients and in 7% of the control groups. Therefore, concluding that incidence of POCD in older patients on first postoperative day after minor surgeries are higher than previously reported studies.

Padmanabhan U et al (2009)[13] conducted study on 200 adult patients aged 18 years and above presenting for elective outpatient colonoscopy. Patients were randomized to receive propofol alone or propofol plus midazolam, and/or fentanyl for IV sedation. Baseline cognitive function was measured before and after sedation. At discharge, cognitive dysfunction was present in 18.5% of patients.

Kotekar N et al (2014)[27]conducted study on 200 patients aged ≥60years scheduled for elective minor or major non-cardiac surgeries under GA or RA. The cognitive assessment was done pre-operatively and post-operatively on day 3, day 7, and 1

month after the study. The study showed a gradual decline of POCD incidence with 12% at day 3, 8% at day 7, and 7.5% at day 30. The study concluded that POCD is a definite complication after surgery and anaesthesia.

Major surgeries:

Mohamed S et al (2005)[21] used **MOCA score** to study incidence of POCD in patients aged more than 60 years posted for abdominal surgery expected to last more than 2 hours. Patients were randomized into 2 groups: those receiving Dexmedetomidine and those receiving 0.9% normal saline as placebo group. Incidence of POCD was seen in 20% of the patients in both groupsS at 1day after surgery. At 1 week also the incidence was almost similar.

Shoair O.A et al(2015)[27] did a prospective cohort study of 69 patients aged 65 years or older undergoing major non-cardiac surgery under general, regional anaesthesia or a combination of both. Cognitive function was assessed preoperatively and at 3 months after surgery using a computerized neurocognitive battery administering various tests. Results showed that POCD was present in 11 patients (15.9%) at 3 months after surgery.

Chi Y L et al (2017)[31]aimed to study the neuron-specific enolase (NSE) and S100b proteins in the evaluation of postoperative cognitive dysfunction in elderly patients with GA. The study included 142 patients aged ≥60 years planned for transurethral resection of the prostate (TURP) surgery under GA with propofol. MMSE and **MoCAscore** were used for assessing cognitive function preoperatively and on postoperative day 2 and day 9. POCD was seen in 4 patients (4/142) in experiment group, while 21 cases (21/142) of POCD patients seen in control group.

Hou R et al (2018)[32] conducted a study on 66 patients aged ≥ 60 years posted for total knee replacement surgery under GA. Patients were randomised to receive anaesthesia at either deep level, LOBIS group (BIS at 40-50) or a light level HIBIS group (BIS at 55-65). Cognitive function was assessed using **MoCA score.** POCD was seen in 6 patients (20%) in the LOBIS group and only in 1 patient (3.3%) in HIBIS group.

There is wide variability in the method and timing of cognitive assessment, type of surgery and type of anaesthesia administered. So, the incidence cannot be directly compared.

Incidence of POCD in our study was similar to other studies with minor surgeries like studies by Canet et al (2003)[5], Kotekar et al (2014)[27] and Billig et al (1996)[8].

ASSOCIATION OF POCD WITH VARIOUS FACTORS

AGE:

In our study patients were separated into two groups 40 to 60 years and 60 to 80 years for analysis. **Incidence of POCD was seen to be higher in patients aged 60 years and above both at 6 hours (11%) and 24 hours (8.8%) compared to patients less than 60 years. However, no association of POCD was seen with increased age.**

Very few studies have included young population for studying cognitive dysfunction.

We had 39% patient between 40-60 yrs of age.

Majority of the studies on POCD are done in elderly age groups(60 years).

Most of the studies have found increased incidence of POCD with increasing age.[3,4.5.14.18.27]

Monk T et al (2008)[3]found out that advancing age is major risk factor for developing POCD. They found that the incidence of POCD were maximum in elderly age group (≥60 yrs) compared to younger age groups (40-59 yrs) at hospital discharge (41.4 vs 30.6%) and at 3 months after surgery (12.7% vs 5.6%).

Hsu Y.H et al(2012)[14]study also stated that advanced age is a risk factor for prolonged cognitive impairment. They studied 32 patients posted for colonoscopy with mean age 54.27yrs and 25 non-operated control patients with mean age of 55.04 yrs.

On the other hand, some studies did not find age as a significant factor for development of POCD.[8,17]

In our study, more number of patients had POCD in the age group of 60-80 years than 40-60 years age group at both 6 and 24 hours but it was not statistically significant.

GENDER:

In our study out of 150 patients,71 were females and 79 were males. We found no influence of gender on incidence of POCD.

Most of the studies do not show association of POCD with age [5,8,13]

Although, Kotekar N et al (2014)[27] study showed that female sex was more prone to develop POCD in patients after major orthopedic surgery.

DURATION OF SURGERY:

There was no significant association of duration of surgery with occurrence of POCD in our study. Other studies also did not find any association of POCD.

Kotekar et al (2014)[27] study stated that duration of surgery had no influence on the incidence of cognitive dysfunction.

Rasmussen et al (2003)[2] study showed that there is no association of duration of anaesthesia and surgery on occurrence of POCD.

Study conducted by Canet et al (2003)[5] showed no association of duration of anaesthesia and surgery with occurrence of POCD.

On the contrary, Moller et al (1998)[20]study showed a significant relation between increasing duration of anaesthesia and early postoperative cognitive dysfunction. The incidence was 18% when the duration was < 2 hours and 27% when the duration was longer.

Similar to study conducted by Canet et al, Rasmussen et al, and Kotekar et al our study also showed no association of duration of surgery with occurrence of POCDAnaesthetic medication:

TYPE OF SURGERY

In our study majority of the patients had undergone cataract surgery. POCD was not seen in any of the patients who underwent gynecological surgeries (8/150). There was no significant difference seen in the incidence of POCD with type of surgery.

Most of the studies on POCD are conducted on patients undergoing major surgery under GA. Some are conducted with RA and still fewer studies on local anaesthesia. Number of studies on minor surgeries are also less[5,8,12]. Overall incidence of POCD is less in minor surgeries. Our study also shows similar trend.

Most of the studies have not shown association of POCD with different surgeries.

ANAESTHETIC DRUGS:

In our study patients were separated into those receiving no sedation, those receiving injection midazolam alone and those receiving midazolam with fentanyl for the purpose of analysis. There was no significant association of POCD found with drugs given intraoperatively except for patients receiving both midazolam and fentanyl at 6 hours ($p< 0.05$) but not at 24 hours.

Padmanabhan et al (2009)[13] and Hsu Y et al (2012)[14] and Anil gupta et al (1995)[18] found cognitive decline with midazolam. We did not find any association of midazolam with occurrence of POCD.

Amount of midazolam used in our study was ≤ 2 mg.

Similar to studies by Cosmo d et al (2016)[30], kotekar et al (2014)[27] and Dressler et al (2007)[24] our study also showed a higher incidence of POCD with use of intraoperatively fentanyl. However, in our study fentanyl was given along with midazolam and the difference was significant only at 6 hrs but not at 24 hours postoperatively.

LEVEL OF EDUCATION:

In our study there was no significant association seen with level of education on incidence of POCD.

Canet et al (2003)[5] study showed no association of level of education with occurrence of POCD.

Shoair et al (2015)[28] study stated that lower level of education is not associated with higher incidence of POCD.

Many studies showed increasing incidence of POCD with lower level of education.[3,19,22,27]

In our study more than half of the patients were illiterate. Similar to studies by Canet and Shoair, we also did not find any association of level of education with occurrence of POCD.

ASSOCIATED CO-MORBIDITIES:

In our study, Cardiac condition as a comorbidity was associated with significantly higher incidence of POCD at 24 hours postoperatively. While there was no significant association of other existing comorbidities on POCD in our study.

Similar to study by Ingrid Rundshagen our study also showed higher incidence of POCD with associated cardiac condition (CAD, angina, ECG changes). There were only 5 cardiac patients out of 150 study population. Other comorbidities in our study were hypertension, hypothyroidism, mood disorder, diabetes mellitus, asthma and COPD. No significant association of POCD was seen with any of these similar to various other studies. [19,27]

HEMODYNAMIC PARAMETER:

Hemodynamic parameters (heart rate, systolic blood pressure, diastolic blood pressure, temperature, SpO_2) were comparable in both the groups.

Similar to studies conducted by Moller et al (1998)[20], Campbell et al (1992)[12] and Biedler et al (1998)[19]no relation of hemodynamic parameters were observed with occurrence of POCD. None of the patients had hypoxia or hypotension in our study.

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REFERENCES

[1]. Altun C et al. Effects of anesthesia type on short-term postoperative cognitive function in obstetric patients following cesarean section. Journal of the Turkish German Gynecological Association. 2015;16(4):219.

[2]. Campbell D N et al. A prospective randomized study of local versus general anaesthesia for cataract surgery.1993 May 1;48(5):422-8.

[3]. Monk T G, et al. Predictors of cognitive dysfunction after major noncardiac surgery. Anesthesiology: The Journal of the American Society of Anesthesiologists. 2008 Jan 1;108(1)

[4]. Rohan D et al. Increased incidence of postoperative cognitive dysfunction 24 hr after minor surgery in the elderly. Canadian Journal of Anesthesia. 2005 Feb 1; 52(2):137-42.

[5]. Canet J, et al. Cognitive dysfunction after minor surgery in the elderly. Acta AnaesthesiologicaScandinavica. 2003 Nov 1; 47(10):1204-10)

[6]. Terrando N, Brzezinski M, Degos V, et al. Perioperative cognitive decline in the aging population. *Mayo Clin Proc*. 2011;86(9):885-93.

[7]. Nasreddine Z S, Phillips NA, Bédirian V, Charbonneau S, Whitehead V, Collin I. The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. Journal of the American Geriatrics Society. 2005 Apr 1; 53(4):695-9.

[8]. Chung, Frances &Seyone, C & Dyck, B & Chung, A & Ong, D & Taylor, A & Stone, R. (1990). Age-Related Cognitive Recovery After General Anesthesia. Anesthesia and analgesia. 71. 217-24

[9]. Kotekar N, Kuruvilla CS, Murthy V. Post-operative cognitive dysfunction in the elderly: A prospective clinical study. *Indian J Anaesth*. 2014;58(3):263-8.

[10]. Billig N, Stockton P, Cohen-Mansfield J. Cognitive and affective changes after cataract surgery in an elderly population. The American Journal of Geriatric Psychiatry. 1996 Dec 1; 4(1):29-38.

[11]. Das S, Ghosh S. Monitored anaesthesia care: An overview. J Anaesthesiology Clin Pharmacol 2015;31: 27-9

[12]. Sohn HM, Ryu JH. Monitored anaesthesia care in and outside the operating room. *Korean J Anaesthesia*. 2016;69(4):319-26.

[13]. Dressler I, et al. Psychomotor dysfunction after remifentanil/propofol anaesthesia. European journal of anesthesiology. 2007 Apr;24(4):347-54

[14]. Neilson W R. Long term Cognitive and sequelae of general versus regional anaesthesia during Arthroplasty in the elderly: Anesthesiology 1990;73:1105-09