NECESSITY OF PROPOFOL AS A SEDATIVE ADJUNCT TO SPINAL ANESTHESIA

Erhan ÖZER, M.D., Ahmet MAHLİ, M.D., Mehmet AKÇABAY, M.D., Yener KARADENİZLİ, M.D.

Gazi University, Faculty of Medicine Department of Anesthesiology, Ankara, Turkey
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SUMMARY : *This study was conducted to investigate certain properties of propofol infusion in order to provide sedation as an adjunct to spinal anaesthesia for minor surgical procedures. 20 patients were divided into two equal groups in an randomized manner.*

Propofol was given one group (group P) while the other group received no sedative agent (group N). In group P; systolic, diastolic, mean arterial pressure, heart and respiratory rate were significantly decreased immediately after spinal anaesthesia and during surgical procedure ($p<0.01$-0.001) while in group N these changes were started later and ligtly continued during all operation period.

We investigated cortisol, prolactin and glucose levels in both groups. In group N only cortisol level in three patients (30 %) was increased 10 minutes after incision ($p<0.001$) while in group P this change was seen in only one patient (10 %).

We concluded that propofol infusion as a sedative agent has advantage to the other sedatives in order to provide sedation in spinal anaesthesia. Propofol infusion during the spinal anaesthesia, has a good sedative effect against the stress, but the haemodynamic and respiratory disadvantages are evident. So, the application of propofol has not extreme priority to spinal anaesthesia without any sedative agent.

Key Words : *Anaesthetic i.v., Propofol Anaesthetic techniques, Sedation, Spinal.*

INTRODUCTION

It is established recently that propofol is a good agent to be used via infusion in providing sedation-stress free anesthesia-compared to other sedative agent as an adjunct to regional anesthesia. Propofol is metabolized rapidly with little evidence of accumulation, recovery is rapid and has minimal side effects (Grant and Mackenzie, 1985; Mackenzie and Grant, 1987; Wilson et al. 1990).

This study was designed to show propofol infusion whether or not necessary as a sedative adjunct agent to spinal anesthesia.

MATERIALS AND METHODS

20 patients scheduled for elective minor surgery were included in this study (Table 1). All of them had normal hepatic, renal, hematopoetic and endocrine functions, and none of them displayed serious impairment of respiratory or cordiovascular function. In their past history none of them had allergy to drugs and previous adverse experience of

GROUPS CHARACTERISTICS	NIL n=10	PROPOFOL n=10	P
Sex ratio (M/F)	8/2	8/2	-
Age (yr)	37.5 ± 11.71 (19 - 57)	36.8 ± 11.9 (21 - 65)	ns
Weight (kg)	67.7 ± 11.67 (40 - 83)	72.0 ± 11.48 (54 - 90)	ns
Height (cm)	167.4 ± 11.87 (140 - 185)	174.6 ± 07.36 (158 - 185)	ns
ASA (grade I/II)	7/3	7/3	-
Level of blockade (Dermatome)	T9.5 ± 0.92 (T8 - 11)	T9.6 ± 0.91 (T8 - 11)	ns
Type of operation (x) : Arthroscopy/Hernia repair/Varicectomy	4/4/2	5/4/1	-
Duration of procedure (min)(30 - 75)	56.5 ± 14.67 (35 - 90)	62.5 ± 16.31	ns

ns : nonsignificant, "-" : no measurable variance (x) : All surgery was performed before 11 a.m.
Table -1 : Demographic characteristics of patinets, values expressed as Mean±SD (range in brackets) or number of patients, as appropriate.

general anesthesia. Pregnant or grossly obese patients were excluded from the sutdy.

Patients were not premedicated. Upon arrival to the operation theatre, they received an infusion of 250-500 ml. saline solution as a preload before induction.

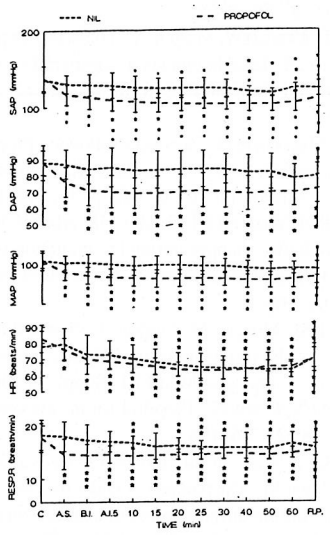
Patients were randomized in two groups. In one group propofol was administered as a sedative agent to spinal anesthesia (Propofol group-P), while the control group did not received any sedative agents (Nil group-N). Propofol infusion was prepared at 1 % concentration and an induction dose of 6 mg/kg/h infused in the first ten minutes and followed by 4 mg/kg/h during the second ten minutes. After reaching the fourth sedation level (Eyes closed but rousable to mild physical stimulation-earlobe tug-) (Wilson et al. 1988) all the patients were performed spinal anesthesia. Throughout the operation period in the group where propofol infusion was administrated, level 4 sedation was maintained (Table 2).

	X ± SD	Range
Total Induction dose (mg)	74 ± 11.78	55 - 90
Start of infusion to :		
- Spinal anesthesia (min)	14.6 ± 2.33	12 - 30
(mg)°	79 ± 18.46	75 - 140
- Level 4. sedation (min)	23.2 ± 03.48	20 - 30
(mg)°	154.5 ± 10.5	140 - 170
- Surgery (min)	30 ± 09.48	20 - 55
(mg)°	181.5 ± 21.68	150 - 230
Maintenance dose (mg/kg/h)	3.75 ± 01.10	2.3 - 6.2
Duration of surgery (min)	62.5 ± 16.31	35 - 90
(mg)°	251.5 ± 47.64	180 - 320
Duration of infusion (min)	92.5 ± 20.76	60 - 130
(mg)°	433 ± 47.96	350 - 500
End of infusion to		
- Open eyes (min)	3.75 ± 00.46	3 - 4.5
- Repeat date of birth (min)	4.4 ± 00.37	4 - 5

° : The amount of propofol given in his time period
Table - 2 : Propofol infusion and recovery data (n=10).

The subarachnoidal puncture in all patients of both groups was performed in the lateral position at the L_{3-4} intervertebral space and 2 % plain prilocaine 4 ml was injected at 1 ml per 5 second, than the patients were turned to supine position.

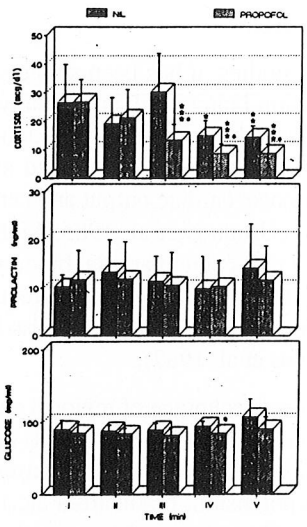
The electrocardiogram and heart rate were monitorized continuously. Systolic (SAP) and diastolic (DAP) arterial pressures were measured using sphygmomanometer by the same person. Mean arterial pressure (MAP) was calculated by using the formula [MAP=DAP+1/3 (SAP-DAP)]. Respiratory rate was determined by counting respiration and venous blood samples for metabolic studies were drown from the contralateral arm. All of these parameters were determined before induction and during the procedure intermitantly as shown in the figure 1 and 2.



(p values versus same group at C time)
C : Control AS : After spinal anaesth. BI : Before incision
AI.5 : 5 min after incision RP : Recovery period
Fig. 1 : Haemodynamic and respiratory changes (Mean ± SD) (n=10+10), (*= p<0.05 : **= p<0.001)

Blood glucose levels were determined by the glucose oxidase technique (Technicon RA 1000). The plasma was separated and frozen for later determination of cortisol and prolactin by RIA (Count-a-Coat, Cortisol and prolactin kits, Diagnostics Products Corporation, Los Angeles CA.).

All results are expressed as mean ± SD. Statistical analysis of patients charateristics was evaluated using student's T test to compare the groups. Within group comparisons of hemodynamics, metabolic and hormones values were made with a Freidmann Two-way analysis of variance (ANOVA) followed



(*:p values versus same group at I. time
. : p values versus other group at the same time)
I : 5 min after prior propofol infusion or spinal anaesth.
II : 5 min after spinal anaesth.
III: 10 min after incision
IV : 30 min after incision
V : 30 min after operation.
Fig. 2 : Plasma cortisol, prolaktin and blood glucose values (mean ± SD), (n=10+10), (./*=p<0.05; .. :=/ **=p<0.01; .../***p<0.001).

by a comparison with levels of 0.0 h by a Wilcoxon matched pairs signed-ranks test. Between group comparisons were made at each time using the Mann-Whitney U test. The null hypothesis was rejected when $p<0.05$.

RESULTS

SAP showed significant decrease following the first ten minutes in group N, but it never decrease more than 15 %. In group P, SAP showed decrease following propofol infusion and at the first five minutes, it reached to 20 % and even to 25 % which is clinically important. Similar to this decrease DAP and MAP also decreases. Heart and respiratory rate were decreased significantly in both groups but in group P this decrease started earlier (Fig 1). When plasma cortisol, prolactin and serum glucose concentrations were evaluated (Fig 2) it was found that, only in group N 10 minutes after incision period, mean cortisol value was found elevated (30.45 ± 13.36 µg/dl). The reason for this increase was, in three patients of group N the cortisol values were higher (45.05, 46.62 and 52.39 µg/dl) in group P despite propofol infusion in one patient value was found to be elevated (34.71 µg/dl).

DISSCUSSION

In various studies, it has been suggested that; propofol infusion being used as a sedative agent with regional anesthesia, whether for induction of anesthesia or maintenance. Decreased systemic vascular resistance, cardiac output and central venous pressure (Gruonds et al. 1985; Monk et al. 1987) causes a reduction in arterial blood pressure (Fanard et al. 1988). In another study a reduction in both tidal volume and respiratory has also been reported (Grounds et al. 1987).

The combined technique of regional anesthesia with continuous infusion of propofol has the disadvantage of superimposing the cardiovascular disturbances (hypotension, bradicardia etc.). Which may be due to effect of propofol, sympathetic blockade or a combination of both (De Grood et al. 1987).

This study shows that while propofol infusion produces an effective sedation and rapid recovery during spinal anesthesia, it also produces clinically significant adverse decrease on arterial blood pressures.

In group N, a transient rise in plasma cortisol level as a result of emotional stress, 10 minutes after the beginning of the operations, has been detected in three cases (30 %). However in group P, this rise in spite of an adequate sedation, has also been detected in one case (10 %)

Our results confirmed the failure of minor surgery to stimulate the secretion of all assayed hormones or to produce a constant hyperglycemia (Fragen et al. 1987; Malatinsky et al. 1986; Pflug and Halter, 1981).

CONCLUSION

We concluded that propofol infusion should not be used for every case of spinal or epidural anesthesia. It should be preferred for nervous patients, or whose previous spinal or epidural anesthetic attempt continued with general anesthesia because of teir anxiety or for patients where anxiety appears during the operation for a longer duration of more than 1-1.5 hours.

Correspondence to : Dr.Ahmet MAHLİ
Gazi Üniversitesi Tıp Fakültesi
Aneşteziyoloji ve Reanimasyon
Anabilim Dalı
Beşevler
06510 ANKARA - TURKEY
Phone : 4-212 65 65 / 442

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