BLOOD PRESSURE CHANGES DURING THIOPENTONE INDUCTION

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The study was carried out on total {n = 160) normotensive patients for elective surgical procedures of shorter duration to evaluate the changes in blood pressure using different concentrations and rates of administration of Thiopentone Sodium solutions as induction agent. The study demonstrated that induction with Thiopentone sodium causes a fall in blood pressure, the more concentrated the solution (5 % solution) the more marked is the fall in the blood pressure as compared to the 2.5 % solution. The rapid injection (administered in 30 seconds) causes a rapid and more fall in blood pressure as compared to administered in 1 minute. Atropine premixed with thiopentone causes inconsistent effect on blood pressure as compared to using plain thiopentone sodium, and there is no significant difference between the male and female in their blood pressure response to thiopentone sodium. Meticulous care is needed in the administration of thiopentone along with pre-oxygenation in the normal patients and particularly in those susceptible to its depressant effects such as those with raised blood pressure, elderly and cardiopulmonary compromised situations whereby it should be used slowly and in reduced dosage.

INTRODUCTION

Proper hemodynamics and circulatory circuit functions are of crucial importance for the health of tissue perfusion and normal functioning of the cells. Anaesthesia influences whole body physiology. It is mandatory for the anaesthetist to ensure satisfactory circulatory and tissue perfusion status. The knowledge of blood pressure along with pulse rate, skin colour and temperature is a better guideline and easily approachable way towards maintenance of tissue perfusion in a well conducted anaesthesia [1,2.3.4].

Blood pressure is influenced by different anaesthetic; the preoperative levels are detrimental but hypotension is caused by most of the anaesthetic agents[5,6,7-8,9,10]. The pharmacokinetics and pharmacodynamics of thiopentone sodium dictates that is quite a potent and rapidly acting agent with the maximum concentration circulating in the plasma equilibrating in the rapidly perfused tissues as brain and myocardium; latter on the concentration tapers off [11.12,13,14.20]. It has been demonstrated that maximum barbiturate concentration is achieved within 3 minutes of injection; in the foetal blood signaling its easy crossing through the placental barrier.

Thiopentone produces progressive depression of the C.N.S, autonomic nervous system, respiratory depression depending upon the dose and rate of injection. Weakened heart's contraction; reduced cardiac output; cardiac arrhythmias, peripheral vasodilatation and hypotension may be detrimental talking in terms of concentration[23], dose

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and rapidity of thiopentone injection especially in cases of cardiovascular and coronary handicap

situations [4,9,15,16,17,18].

Being cheaper; more acceptable[1] and commonly used as compared to the other pharmacological agents used as induction agent, there is need for care while using the drug.

MATERIAL AND METHODS

During the study for Blood Pressure changes during Thiopentone induction total (n=160) patients were entered in the study in groups of (n=20) for the respective assessments of different concentrations and rates of injections of the drug.

The inclusion criteria were: patients above 18 years' age, normotensives, all types of elective surgery of shorter duration. Patients with BP >160/90 mm Hg taking any drug having effect on BP, obese, apprehensive, any pre-existing cardiovascular, respiratory or renal ailments were not included in the study.

Data collection for blood pressure changes during thiopentone induction is tabulated down:

- Name
- Age
- Sex
- Weight in kg
- General condition
- Any history of cardiovascular, renal or respiratory disease
- Drug history
- Record of BP: Night before operation
- Record of BP before entering operation theater
- Record of BP before start of induction
- Record of BP every 30 sec. during induction

An exhaustive pre-anaesthetic assessment of the patient was made and patients were duly reassured to allay anxiety[19].

PROCEDURE

The patients were brought to the operation theatre in the morning, then on their turn were brought to the operating room accompanied by a nurse. Every patient was made to lie on operation table comfortably in supine position.

After securing an I/V cannula, a sphygmomanometer cuff of suitable size was tied around one upper arm resting on arm-rest horizontally. No pre-medication given except Atropine Sulphate 0.015 mg/kg mixed with thiopentone was used in 50% of the cases.

Thiopentone sodium calculated on weight basis 7mg/kg I/V was given, with the blood pressure (both systolic and diastolic) changes studied according to the following plan:

Thiopentone Sodium 2.5 % plain Thiopentone Sodium 2.5 % with atropine Thiopentone Sodium 5 % plain Thiopentone Sodium 5 % with atropine	The drug injected in 30 sec. And in one minute respectively in each group of (n = 20) patients.

The injection was given and the blood pressure was recorded every 30 seconds from the start of injection for the next five minutes whereas during this period no other drugs were given. The patient was ventilated gently through a face mask giving 100% Oxygen. The patient was not disturbed during this period and the rest of the anaesthetic techniques was completed later on. The surgery and/or change in position was started afterwards.

RESULTS

The detail breakdown of the study is tabulated in table I-IV and figure 1-2, revealing the following results

- The addition of atropine with thiopentone has inconsistent effect on blood pressure.
- Thiopentone sodium 2.5% administered I/V in 1 minute caused fall of BP in 77 % of males and 76 % of females compared to its rapid administration in 30 seconds in which case there is fall of BP in 89.7 % males and 81.8 % females.
- Thiopentone sodium 5 % solution given in 1 minute caused decrease in BP in 88 % males and 86.6 % females as compared to 96 % males and 93.3 % females when administered in 30 seconds.
- Thiopentone sodium 2.5 % caused fall in BP in 91.2 % of patients.
- The concentrated thiopentone sodium solution (5 %) causes fall in BP rapidly as compared to 2.5 % solution when given at the same rate.
- Rapidly administered drug shows rapid fall of blood pressure.
- Rise of only 10 mm Hg occurred only 1 in 80 patients of 5 % solution as compared to rise of 10-20 mm Hg in 5 out of 80 patients of 2.5 % solution induction.
- No change in BP was noticed in 6 out of 80 patients of 5 % solution as compared to 9 out of 80 patients with 2.5 % solution.
- The fall of BP (15-45 mm Hg) was more marked using 5 % solution as compared to the fall in BP (10-25 mm Hg) with 2.5 % solution.
- There is not much significant difference in the two sexes regarding changes in BP during thiopentone induction.
- Total 13 females and 5 males (n= 160) showed a rise of 20-40mm Hg systolic blood pressure just before induction as compared to their BP taken a night before the operation.

DISCUSSION

Blood pressure is influenced by different anaesthetic agents and techniques differently; no anesthetic agent is cardiotonic and blood pressure is commonly lowered.[2,5,6,7 8,9,10,18] In this study; evaluation of blood pressure changes using Thiopentone Sodium as an induction agent in different concentrations and with different rates of administration of intravenous injection was carried out.

Table-1: THIOPENTONE SODIUM 2.5% GIVEN I/V IN 30 SECOND

No. of Patients 20 each	Plain (n = 20) Male(14)	Female(6)	With Atropine (n=20) Male(15)	Female(5)
Increase in B.P. (10 mmHg)			1	-
Decrease in B.P. (10-25 mmH)	13 (92.8%)	5 (83.3%)	13 (86.6%)	4 (80.0%)
No Change in B.P.	1	1	1	1

The induction of anaesthesia with Thiopentone Sodium can cause circulatory collapse with dangerous consequences. Pre-anaesthetic general health, age, cardiopulmonary status, age, sex, profession, social status, build of the patient, patients' psychology in relation to anaesthesia and operation have their role in influencing the blood pressure.

Fig. 1

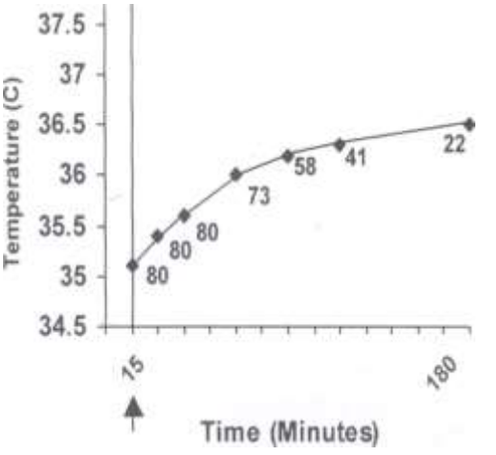

Figure:2-Mean Admission temperatures of the patients

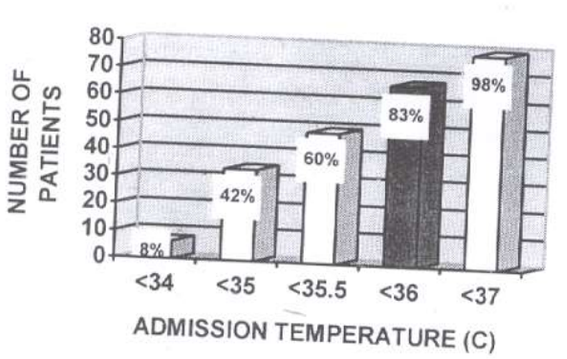

TABLE-2: THIOPENTONE SODIUM 2.5% GIVEN I/V IN I MINUTE

No. of Patients 20 each	Plan (n = 20)		With Atropine (n=20)	
	Male (13)	Female (7)	Male (14)	Female (6)
Increase in B.P. (10 mmHg)	1	-	2	-
Decrease in B.P. (10-25 mmH)	10 (76.9%)	6 (85.7%)	11 (78.5%)	4 (66.6%)
No Change in B.P.	2	1	1	1

TABLE-3: THIOPENTONE SODIUM 5% GIVEN I/V IN 1 MINUTE

No. of Patients 20 each	Plian (n = 20)		With Atropine (n=20)	
	Male (12)	Female (8)	Male (13)	Female (7)
Increase in B.P. (10-20 mmHg)	-	-	1	1
Decrease in B.P. (15-30 mmH)	11 (91.6%)	7 (87.5%)	11 (84.6%)	6 (85.7%)
No Change in B.P.	2	1	1	1

Table-4: THIOPENTONE SODIUM 5% GIVEN I/V IN 30 SECOND

No. of Patients 20 each	Plian (n = 20)		With Atropine (n=20)	
	Male (11)	Female (9)	Male (14)	Female (6)
Increase in B.P.	-	-	-	-
Decrease in B.P. (20-45 mmH)	11 (100%)	8 (88.8%)	13 (92.80%)	6 (100%)
No Change in B.P.	2	1	1	-

Exhaustive pre-anaesthesia evaluation and preparations during the study by selecting normotensive individuals of normal build, reassurance; brought comfortably to the operating room, avoidance of strange movements or noises in the operation room and start of the procedure soon after the arrival of the patient minimised the factors influencing blood pressure changes.

As completion of the rest of the anaesthetic technique, start of surgery or change in posture were done after the recording of BP during thiopentone induction, thus had no effect on study of blood pressure changes. The study revealed more rapid and more pronounced fall in BP with higher concentration and rapid administration of the drug as compared to its lower concentrations and slower injection used for induction of anaesthesia. The changes in blood pressure during Thiopentone anaesthesia largely depends upon its dose and the rate of injection, the state of myocardium and peripheral circulation. Large doses of Thiopentone given rapidly can cause a profound fall in blood pressure due to its direct myocardial depressant and peripheral vasodilatation effects. Patients with poor cardiovascular status might suffer severe

hypotension and cardiac arrest even with smaller doses. Severe hypotension is more likely to occur in elderly and hypertensive patients. The anaesthetist shoulders greater responsibility in patient selection/and/or assessment, proper administration and pre-oxygenation before embarking on Thiopentone anaesthesia.

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