

BLOOD SUGAR STUDIES DURING THIOPENTONE ANAESTHESIA

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Blood sugar changes were studied in 44 patients after giving thiopentone. The dose administered varied between 0.5 gm. to 1.6 gm. They were premedicated with atropine gr. 1/100, atropine gr. 1/100 and morphine gr. 1/4 or atropine gr. 1/100 and pethidine 100 mgm. Blood sugar estimations were done by Folin & Wu's method. It was found that the thiopentone sodium has got no effect on blood sugar and if any change occurs it is because of the other factors like premedication and hypoxia and apprehension.

These days thiopentone is used very frequently for the conduction of minor surgical procedures and for the induction of anaesthesia for major cases. In view of the frequency with which it is being used it was thought necessary to study the effect of thiopentone on blood sugar. Controversial reports have been published by the various workers. Margot Goldsmith and Holmes (1957) carried out their study on "Effect of thiopentone on carbohydrate metabolism" in orthopaedic cases and they have reported a hyperglycaemic response. Similarly Grewal and Deshpande (1959) studied the action of thiopentone with other barbiturates on rabbits. They also found that the hyperglycaemic response was maximal under deep anaesthesia. Similar reports were published by Fodor and Grafnetter (1960). Almsted and Girazositz (1931) found no change in blood sugar level of dogs, when fed on diet rich in meat. Similarly, Benesova, Kouteska and Wenke (1958) reported that there is no change in blood sugar level following thiopentone narcosis.

CLINICAL MATERIAL

Blood sugar changes due to this drug were studied in 44 patients, undergoing different surgical procedures during the period of five months. The patients were free from systemic diseases, which may alter the carbohydrate metabolism or the metabolism of thiopentone. Out of 44 patients, 20 were premedicated with atropine gr. 1/100, 12 with atropine gr. 1/100 plus morphine gr. 1/4 and 12 with atropine gr. 1/100 plus pethidine 100 mgm. To some of the cases oxygen was also given during the period of anaesthesia.

The samples of blood for estimation of sugar were collected, fasting, half an hour, one hour and one and a half hour after the start of anaesthesia. The blood estimations were done by Folin & Wu's method.

RESULTS

Group I. It consists of 20 patients, who were premedicated with atropine gr. 1/100, I.M. $\frac{1}{2}$ hour before operation. The dose of pentothal sodium administered ranged between 0.5 gm. to 1.5 gm. Slight hypoxia was observed in 4 cases. On the whole a hyperglycaemic response was observed in these cases. Out of 20 patients oxygen was administered to 5 patients (i. e. patients No. 16 - 20). The results are being shown in Table I.

TABLE I

Showing the preanaesthetic and postanaesthetic blood sugar levels in mgms% in patients of group I, in brackets the actual change is shown

S. No.	Pre-anaesthetic level	$\frac{1}{2}$ hour	1 hour	$1\frac{1}{2}$ hour
1	98	115 (+17)	115 (+17)	117 (+19)
2*	100	102 (+ 2)	122 (+22)	105 (+ 5)
3	110	99 (-11)	94 (-16)	102 (- 2)
4	110	100 (-10)	95 (-15)	100 (-10)
5*	98	110 (+12)	151 (+53)	113 (+15)
6	95	110 (+15)	100 (+ 5)	90 (- 5)
7	82	117 (+35)	102 (+20)	97 (+15)
8	98	106 (+ 8)	86 (-12)	81 (-17)
9	100	89 (-11)	84 (-16)	92 (- 8)
10*	90	107 (+17)	107 (+17)	109 (+19)
11	100	108 (+ 8)	121 (+21)	105 (+ 5)
12	96	112 (+16)	100 (+ 4)	93 (- 3)
13	82	117 (+35)	104 (+22)	98 (+16)
14*	98	110 (+12)	155 (+57)	110 (+12)
15	90	105 (+15)	95 (+ 5)	85 (- 5)
16†	82	129 (+47)	129 (+47)	82 (zero)
17†	100	122 (+22)	118 (+18)	114 (+14)
18†	105	110 (+ 5)	110 (+ 5)	105 (zero)
19†	92	112 (+20)	107 (+15)	102 (+10)
20†	85	106 (+21)	102 (+17)	99 (+14)

* Cases where hypoxia was observed.

† Cases where oxygen was given.

Group II. This group consists of 12 patients getting sodium pentothal for different surgical procedures. These patients were premedicated with atropine gr. 1/100 and pethidine mgm.100, I. M. $\frac{1}{2}$ hour before the operation. The dose of thiopentone varied from 0.5 gm. to 1.5 gm. and to half of the cases oxygen was also administered to guard against hypoxia. A slight hyperglycaemic response was observed in the patients who did not get oxygen, while in general a slight hypoglycaemic response was observed in the cases who were given oxygen during the period of anaesthesia. The results are being summarised in Table II.

TABLE II

Showing the blood sugar levels in mgm% in the patients of group II, in brackets the actual change in mgm% is being shown

S. No.	Pre-anaesthetic level	$\frac{1}{2}$ hour	1 hour	$1\frac{1}{2}$ hour
1	90	93 (+ 3)	97 (+ 7)	102 (+ 12)
2	99	112 (+ 13)	99 (zero)	98 (- 1)
3	94	104 (+ 10)	94 (zero)	94 (zero)
4	100	107 (+ 7)	109 (+ 9)	102 (+ 2)
5	110	122 (+ 12)	112 (+ 2)	108 (- 2)
6	90	101 (+ 11)	93 (+ 3)	90 (zero)
7*	104	84 (- 20)	94 (- 10)	89 (- 15)
8*	100	93 (- 7)	94 (- 6)	112 (+ 12)
9*	111	116 (+ 5)	116 (+ 5)	116 (+ 5)
10*	99	89 (- 10)	95 (- 4)	89 (- 10)
11*	89	82 (- 7)	82 (- 7)	94 (+ 5)
12*	105	110 (+ 5)	109 (+ 4)	107 (+ 2)

* Cases where oxygen was given.

Group III. This consists of 12 patients getting sodium pentothal for different surgical procedures. The dose varied from 0.5 gm. to 1.6 gm. These patients were premedicated with atropine gr. 1/100 and morphine gr. 1/4 I.M. $\frac{1}{2}$ hour before the operation. To half of the patients oxygen was given during the period

of anaesthesia. In this group a comparatively stronger hyperglycaemic response was observed. The results are being summarised in Table III.

TABLE III

Showing the blood sugar levels in mgm% in the patients of group III, in brackets the actual change in mgm% is being shown

S. No.	Pre-anaesthetic level	$\frac{1}{2}$ hour	1 hour	$1\frac{1}{2}$ hour
1	99	121 (+22)	153 (+54)	137 (+38)
2	111	116 (+5)	116 (+15)	113 (+2)
3	84	104 (+20)	101 (+17)	84 (zero)
4	95	115 (+20)	112 (+17)	95 (zero)
5	100	100 (zero)	95 (-5)	89 (-11)
6	88	105 (+17)	100 (+12)	95 (+7)
7*	105	133 (+28)	133 (+28)	127 (+22)
8*	98	104 (+6)	96 (-2)	96 (-2)
9*	104	125 (+21)	125 (+21)	125 (+21)
10*	84	89 (+5)	82 (-2)	82 (-2)
11*	96	122 (+26)	124 (+28)	116 (+20)
12*	110	130 (+20)	116 (+6)	111 (+1)

*Cases where oxygen was given.

DISCUSSION

The effect of sodium pentothal on blood sugar is not an established one and controversial opinions are existing at present. This drug is being frequently used by the anaesthetists for conduction of minor surgical procedure and for the purpose of induction of anaesthesia, in cases where major surgical procedures are to be carried out. In view of the frequency with which it is being used it was thought necessary to study the effect of sodium pentothal on blood sugar in combination with different premedications and oxygen.

Out of 20 patients who were premedicated with atropine gr. 1/100, oxygen was given to 5 patients throughout the period of anaesthesia. 80% of the patients

not receiving oxygen have shown hyperglycaemic response and 20% of them have shown a weak hypoglycaemic response. The hyperglycaemia was marked in patients where hypoxia occurred. A weak hyperglycaemic response was observed in all the patients who were given oxygen.

12 patients were premedicated with atropine gr. 1/100 plus morphine gr. 1/4. 50% of them received oxygen during the course of anaesthesia. 66% of the patients, who were not given oxygen, have shown an appreciable hyperglycaemic response, 17% have shown a weak hyperglycaemic response and 17% of them have shown slight hypoglycaemia. 66.6% of the patients, who were given oxygen, also have shown an appreciable hyperglycaemic response, while 33.3% of the cases have shown a weak hyperglycaemic response.

12 patients were premedicated with atropine gr. 1/100 and pethidine 100 mgm., in 50% of the cases oxygen was also given during the period of anaesthesia. All the patients, who did not get oxygen, have shown a weak hyperglycaemic response. 66.6% of the patients who had oxygen during the period of anaesthesia have shown hypoglycaemic response and 33.3% of the patients have shown negligible hyperglycaemic response.

Margot, Goldsmith and Holmes (1957) carried out their study of "Effect of thiopentone on carbohydrate metabolism" in orthopaedic cases. They did not give any premedication to their patients. They found that there was decreased glucose tolerance in these cases. Their findings are comparable to our findings in the patients who were premedicated with either atropine alone or along with morphine but it differs with our findings in cases who were premedicated with atropine and pethidine and oxygen was given during the operation. This difference is because of the fact that their patients were not sedated properly and the factor of apprehension may be responsible for the decreased glucose tolerance in those cases. In cases who were premedicated with atropine alone there was slight hyperglycaemic response and that too can be because of the apprehension. Patients who were premedicated with atropine and morphine have also shown hyperglycaemic response but here too sodium pentothal cannot be held responsible as morphine itself induces slight hyperglycaemia. Grewal and Deshpande (1959) studied the action of thiopentone along with other barbiturates on rabbits. They found that there was weak hyperglycaemic response after a dose of 20 mgm/kg. of body weight, they also found that blood sugar rise was maximal under deep anaesthesia. In their work they have not given any consideration to the sedation of the animals. The handling of the animals definitely causes some excitation, which may be responsible for the weak hyperglycaemic response. Marvin, Papper, Bueding and Rovestine (1945) proved experimentally that a general depression of carbohydrate metabolism occurs during anaesthesia.

Fodor and Grafnetter (1960) studied the effects of thiopentone on dogs after giving a dose of 30 mgm/kg. body weight, and reported a rise in concentration of blood sugar. They too have not given any consideration to the factor of sedation and subclinical hypoxia which are potent causes of hyperglycaemia (Murdoch, 1958).

The patients, who were sedated with pethidine, which has got no effect on blood sugar, have shown either hypoglycaemic response or negligible rise in blood sugar. Benesova, Koutenska and Wenke (1959) studied the effects of thiopentone on blood sugar and blood sugar curve following a glucose load in rabbits after giving a dose of 25 mgm/kg. of body weight intravenously. They found no change in blood sugar level during narcosis but a decrease of about 10%, 1-2 hours after the animals regained consciousness. They also found that thiopentone caused a significantly more rapid return of blood sugar to normal than after glucose load. But in his series factor of operative trauma was not present which causes slight hyperglycaemia (Annamunthodo, Keating and Patrick, 1958).

Dundee and Todd (1958) studied the effects of thiopentone on human beings. They paid due regard to the premedication also. They premedicated their patients either with morphine (10 mgm.) and atropine (0.6 mg.) or promethazine (25 mg.) plus atropine (0.6 mg.). They found that hyperglycaemia occurred only when either of the premedication was given or thiopentone was supplemented with oxygen and nitrous oxide. It was significant only when morphine was used for premedication. They concluded that factors other than the thiopentone are responsible for the hyperglycaemic response. They also proved that pethidine has got no effect on blood sugar. That way our findings are comparable to theirs.

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