

A STUDY OF THE BLOOD-OXYGEN SATURATION IN CHILDREN UNDER RECTAL PENTOTHAL* ANESTHESIA †

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RECTAL pentothal used for basal anesthesia in children has been known to cause a prolonged state of "depression" and a prolonged recovery period following the supplementary use of ether-air or ether-oxygen anesthesia.

The determination of oxyhemoglobin saturation of blood from a series of unselected cases of children for whom rectal pentothal and ether-air anesthesia was to be used would show whether or not hypoxia was a factor in the prolonged recovery period and depression. Patients were selected at random from those undergoing tonsillectomy and adenoidectomy. These patients were given atropine sulfate one hour before operation; the amount used was determined from the scale of Leigh and Belton (5). They were then given a basal anesthetic, by rectum, of pentothal sodium. The amount of pentothal sodium given was 0.2 cc. of 10 per cent solution per pound of body weight (1).

The method for determination of oxygen content was that of Roughton and Scholander (8). The method for determination of oxygen capacity was the Roughton-Scholander microgasometric procedure as modified by Grant (3). The oxyhemoglobin saturation expressed in percentage was determined using the method of Root (7), with all gas volumes corrected from wet gas to dry gas at 0 C. and 760 mm. of mercury pressure. Correction was made for the oxygen dissolved in the plasma according to the method of Peters and Van Slyke (6).

METHOD

Using the technic described by Lilienthal and Riley (4), an ear was heated with radiant heat for ten minutes. A stab wound was made in the ear lobe and a free flow of "capillary" blood obtained. Three samples were collected from each patient to determine the degree of

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saturation of the blood with oxygen during three phases of the procedure.

1. A blood sample was collected while the patient was awake; this was for a resting, preanesthetic control.

2. Pentothal sodium was then given by rectum and thirty minutes after the loss of the eyelid reflex another blood sample was collected.

3. The third blood sample was drawn sixty (\pm ten) minutes after the cessation of anesthesia; ether-air was administered for maintenance during the tonsillectomy and adenoidectomy. This was thought to be the optimal time during the recovery period to draw the blood sample, since the subjects began to react shortly after this time had elapsed. The patients studied were watched carefully from the beginning to the end of the procedure and at no time was cyanosis observed.

TABLE 1
OXYGEN CONTENT AND CAPACITY
VOLUMES CORRECTED FROM MOIST GAS TO DRY GAS AT 0° C AND 760 MM. PRESSURE

Patient	Control (awake)		After Basal Anesthesia		During Recovery Period	
	Content	Capacity	Content	Capacity	Content	Capacity
DH	12.69	12.87	13.41	13.59	13.05	13.32
DW	14.66	14.92	11.98	12.15	14.76	15.11
WS	12.30	12.80	11.40	11.85	11.60	11.94
RP	13.43	13.88	14.25	15.05	14.25	14.69
CF	13.60	14.10	13.80	14.52	14.17	14.61
TL	12.56	12.92	11.32	11.67	12.74	13.10
JO	13.17	13.71	14.07	14.33	14.78	15.14
AS	14.05	14.57	14.50	14.91	14.56	15.09
RP	14.94	15.38	15.56	15.91	15.02	15.38
BA	13.26	13.60	13.17	13.51	13.70	14.14

TABLE 2
CALCULATED OXYHEMOGLOBIN SATURATION
(FROM CORRECTED VOLUMES OF CONTENT AND CAPACITY)

Patient	Control (awake), per cent	After Basal Anesthesia, per cent	During Recovery Period, per cent
DH	98.6	98.6	97.9
DW	98.2	98.5	97.6
WS	96.5	96.2	97.0
RP	96.8	*94.7	96.9
CF	96.8	*95.1	96.9
TL	97.2	96.9	97.2
JO	96.1	97.4	97.6
AS	96.4	96.0	96.0
RP	96.5	96.5	97.6
BA	97.3	97.4	96.8

* Below 96.0 but above 94.0 considered the lower limits of normal.

The method employed was not accurate for the absolute oxygen contents and capacities, since the anticoagulant enters as a dilution factor in these small blood samples. The dilution factor, however, was constant for any one sample for content and capacity; thus, the determination of percentage saturation was accurate(4).

RESULTS

The oxygen content and capacity of the individuals studied are presented in table 1.

The inspection of these data revealed a range of content from 11.32 to 15.56 volumes per cent. The range of capacity varied from 11.67 to 15.91 volumes per cent.

The percentage of oxyhemoglobin saturations (table 2) ranged from 94.7 to 97.6. In 2 cases (table 2), however, the percentage of oxyhemoglobin saturations were below 96.0, but above 94.0 which has been considered the lower limit of normal (2).

SUMMARY

The reaction time, postoperatively, of patients who have had rectal pentothal and ether-air anesthesia was prolonged.

Cyanosis was not observed clinically in the patients studied.

In the control study, the oxyhemoglobin saturation was not below 96.1 volumes per cent in any subjects studied.

On two occasions after basal anesthesia was instituted, the oxygen saturations were 94.7 volumes per cent and 95.1 volumes per cent. All other oxygen saturations were above 96.0 volumes per cent.

During the recovery phase, no oxyhemoglobin saturations were below 96.0 volumes per cent.

From the patients studied, it does not appear that anoxia plays a role in the prolonged recovery time and depression following rectal pentothal as a basal anesthetic in children.

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