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تأثير التخدير بالكومبلين والبولا ميفيت على دورة الدم وكذلك دم الطحال في الكلاب

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تم دراسة تأثير التخدير بالكومبلين والبولا ميفيت على
خلايا الدم في الدورة الدموية والطحال على ١٥ كلبا .
لقد وجد من الدراسة زيادة حجم كرات الدم المصتمه
وعدد كرات الدم الحمراء وكذلك نسبة الهيموجلوبين في
الطحال وكذلك قلت في دورة الدم كنتيجة لتخزين كمية
كبيرة من كرات الدم في الطحال .

كما وجد نقص واضح في قطر خلايا الدم الحمراء وزيادة
كبيرة في حجم الطحال وصلت الى ثلاث أضعاف الحجم
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**EFFECT OF COMBINED COMBELEN AND POLAMIVET ON THE SPLENIC
AND PERIPHERAL CIRCULATING BLOOD IN DOGS**
(With Two Tables & One Figure)

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SUMMARY

The erythropenic effect of Combelen-Polamivet combination upon the splenic and circulating level of erythrocytes were investigated in 15 dogs. It was demonstrated that the increase in splenic haematocrit, red blood cell count and haemoglobin content as well as the reduction of these parameters in the peripheral blood is largely due to the splenic preservation of red cells. The data indicate that there was a reduction in the red cell diameter and the spleen was dilated more than three times its normal size.

INTRODUCTION

The role of spleen on blood circulation following anaesthesia or tranquillizers has been reported in several domestic animals (ANDERSON and ROGERS, 1957; TURNER and HODGETTS, 1959; ABDEL-WAHAB *et al.*, 1975 and BOLBOL and MISK, 1979). Adequate information is not yet available for the role of spleen. It was previously reported that the spleen is capable of having sudden variation in the peripheral blood (TORTON and SCHALM, 1963; DE MOOR *et al.*, 1978 and BOLBOL and HASSAN, 1982).

We found it therefore interesting to study the influence of these products on the peripheral as well as splenic circulation in order to determine the role of spleen to produce these erythropenic effects.

MATERIALS and METHODS

The study was carried out on 15 clinically healthy mongrel dogs varying in weight from 7-18 Kg. and age from 2-5 years old. The animals were divided into two groups. A control group of five animals were used to determine the effect of epidural anaesthesia on the blood. Blood samples were taken from these animals before and 15, 30, 45 and 60 minutes post-injection. The samples were used for the determination of haematocrit (HCT) and erythrocytic count. The second group includes 10 dogs. The experiment was performed under the effect of epidural anaesthesia, where 5-8 ml of 1% procaine HCL were injected into the lumbo-sacral

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space. A laparotomy incision about 10-12 cm long was performed through the midline. The spleen was drawn out of the abdominal cavity. The splenic hilus was exposed, a plastic cannula was inserted into the splenic vein to facilitate sampling of the splenic blood. Another cannula was introduced into the Saphena vein to obtain the peripheral blood. After withdrawal of the first blood sample from both Saphena and splenic blood, an i.m. injection of 0.05 ml/Kg. body weight of Combelen (Bayer), followed by another i.m. injection of 0.5 ml/Kg. body weight of Polamivet (Hoechst), was administered.

Heparinized blood samples were taken 15, 30, 60, 90, 120 and 180 minutes post-injection. At all these time intervals, length, width and height of the spleen was recorded. Blood samples were analysed for HCT (%), R.B.Cs count (million/cu mm), and haemoglobin (Hb) content (gm/100 ml blood), using the methods described by COLES (1980). The red cell diameter was measured according to the method adopted by FRANKEL et al. (1970).

RESULTS

The use of Combelen-Polamivet combination at a dose of 0.05 ml/and 0.5 ml/Kg. b.wt. respectively produced a complete deep and smooth general anaesthesia with a satisfactory muscle relaxation. All reflexes disappeared 8-12 minutes following injection. The results of the control group revealed that epidural anaesthesia has no effect on the blood profil. HCT and RBCs count still remained within the normal levels.

Table (1) summarises the values of HCT, RBCs count, Hb content and the red blood cell diameter before and up to three hours following anaesthetization with Combelen-Polamivet combination.

Table (2) demonstrates the size of spleen (length, width and height) at different time intervals following anaesthetization.

The most remarkable results that the spleen reach its maximum enlargement for more than three times its normal size within 90 minutes from injection. At the same time, the splenic blood increased in its HTC, RBCs count and Hb content 28.2%, 60.6% and 27.0% respectively. The splenic red blood cell diameter was slightly reduced for about 7.2% with a slight shrinkage. On the other hand, the peripheral blood reach its maximum reduction within 30 minutes following anaesthesia. The HCT, RBCs count and Hb content reduced 15.0%, 21.3% and 15.6% respectively. The peripheral red blood cell was greatly shrinked than those of the spleen (Fig. 1), and its diameter was reduced about 28.2% from its normal size. The red cells of both splenic and peripheral blood begin to return to their normal diameter within 30 minutes from anaesthetization.

DISCUSSION

The combined use of Combelen-Polamivet in dogs was found to be very efficient to produce a state of general anaesthesia with complete muscular relaxation. The results were similar to that of HALL (1971) and BERGE and WESTHEUSE (1966). SCHWANDT (1957) found that Polamivet satisfies all demands during surgical operations on small domestic animals. In addition, FOUAD (1958) supported our results in that there is no side effects observed, such as increased respiration, vomition or salivation.

EFFECT OF COMBELEN AND POLAMIVET

The combined use of Combelen-Polamivet was followed by a rapid reduction of the peripheral haematocrit (HCT) level and P-RBCs count. The lowest values were reached within 30 minutes, these were 17.63% and 21.25% respectively less than the initial values. On the other hand, the increase of the S-HCT and S-RBCs count to 28.18% and 60.59% respectively of their original levels (Table 1). This increase, with the enlargement of the spleen, reach its maximum within 90 minutes post-injection. These findings indicate that the spleen is the principal erythrocyte depot in the body, where the cells are concentrated. In addition, the peripheral blood cells were reduced in their diameter. The cell membrane was highly shrinked in the first thirty minutes, then returned to normal. The blood cells of the spleen were also reduced in their diameter but to a lesser degree, reached only 7.14% with a slight shrinkage. This is confirmed by the results of De MOOR *et al.* (1978) and BOLBOL and HASSAN (1982) that the spleen is the only organ or tissue capable of storing large amounts of erythrocytes. It also refutes the statement of DALTON (1972) that the spleen is capable of containing a large amount of blood with a high HCT must be disposed of in the capillaries of other tissues.

It can be concluded that when anaesthetic agent is administered it acts in two ways, it causes first relaxation of the smooth musculature of the spleen (BYKOV, 1960), as well as it prevents the sympathetic adrenaline discharge by blocking nervous impulses within C N S (TURNER and HODGETTS, 1959). As a result, the spleen is dilated largely and preserving large amounts of erythrocytes. This observation was augmented by the findings of REEVE *et al.* (1953), HECKER (1974), De MOOR *et al.* (1978) and BOLBOL and MISK (1979). on the other hand, the drug itself acts on the red cells as a hypertonic solution leading to outflow of the blood cellular fluids with the reduction of cell diameter (BOLBOL and HASSAN, 1982). This hypothesis was confirmed by our findings that the red blood cells were reduced in their diameter from 28.17% in the peripheral blood to 7.14% in the splenic blood. Moreover, the red blood cells were shrinked just after the injection of the anaesthetic drug. The shrinkage of the blood cells is more clear in the peripheral blood than that in the splenic blood. This behaviour was a transient condition, as the blood cells return to their normal levels with the disappearance of the anaesthetic effect.

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EFFECT OF COMBELEN AND POLAMIVET

Table (1)

Blood Profil Before and After i.m. injection of Combined Combelen - Polamivet

Time	HCT		RBCs		Hb		Diam.	
	S	P	S	P	S	P	S	P
Before	51.1	41.6	7.79	7.39	15.6	15.4	7.00	7.10
15 m.	54.5	36.7	8.85	5.97	16.4	13.4	6.50	5.10
30 m.	56.2	35.4	10.46	5.82	17.1	13.2	6.70	6.10
60 m.	58.7	40.7	11.12	7.01	17.3	15.5	6.90	6.30
90 m.	65.5	39.9	12.51	6.43	19.8	13.6	7.00	6.30
120 m.	62.1	38.1	12.32	6.02	18.6	13.0	6.80	6.80
180 m.	54.3	40.6	8.06	7.71	15.9	15.2	7.00	7.10

S. Splenic blood.

P. Peripheral blood.

RBCs. Blood cell count (mil./cu. mm.).

Hb. Haemoglobin content (gm/100 ml blood).

Diam. Diameter of the red blood cell/micron.

Table (2)

Measurements of spleen before and after anaesthetization

TIME	HIGHT	WIDTH	LENGTH	SIZE
Before	3.25	8.00	15.25	396.5
15 m.	4.00	9.75	19.00	741.6
30 m.	4.25	10.75	19.80	904.6
60 m.	4.50	11.50	21.75	1125.6
90 m.	4.50	12.00	22.50	1215.0
120 m.	4.25	11.00	19.50	911.6
180 m.	3.75	9.25	18.00	624.4

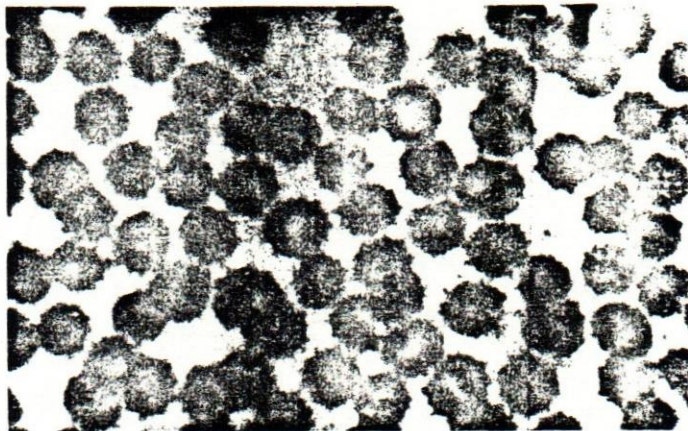


Fig. 1

Shrinking of Paripheral red blood
cells thirty minutes following
anaesthesia.