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تأثير ربط القناة البنكرياسية على بعض التغيرات البيوكيميائية والصورة الدموية في الكلاب

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تم دراسة تأثير ربط القناة البنكرياسية الرئيسية في تسعة كلاب على الصورة
الدموية قبل وبعد اجراء العملية ٢ ، ٧ ، ١٥ ، ٢١ ، ٢٨ يوما .

أوضحت التغيرات البيوكيميائية ارتفاعا معنويا في معدلات الجلوكوز والكولسترول
والدهون الكلية في مصل الدم والتي عادت الى معدلاتها الطبيعية بعد ثمانية وعشرون
يوما من اجراء العملية .

أما بالنسبة لنشاط انزيم الاميليز فقد حدث ارتفاع ملحوظ والذي استمر طوال
فترة التجربة .

أما معدلات الصوديوم والبوتاسيوم والكلوريدات في مصل الدم فقد سجلت انخفاضا
معنويا في معدلاتها بالمقارنة بقراءات ما قبل العملية .

وأعطت نتائج التربسين في براز الكلاب درجات ايجابية متفاوتة اعتمادا على
كمية التربسين الموجودة بالبراز .

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SOME HAEMATOLOGICAL AND BIOCHEMICAL CHANGES ASSOCIATED WITH PANCREATIC DUCT LIGATION IN DOGS

(With 3 Tables & 1 Fig.)

By

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SUMMARY

Experimental ligation of the major pancreatic duct was conducted on 9 dogs. Blood and faecal samples were collected from the examined dogs before and at 3,7,15,21 and 28 days after ligation.

Haematological studies revealed a significant elevation in total erythrocytic count and packed cell volume. A moderate elevation in total leucocytic count associated with slight lymphocytosis and neutropenia have been recorded however normal count again was observed lateron.

Biochemical analysis revealed a highly significant elevation ($P < 0.01$) in the levels of blood serum glucose, cholesterol, total lipids post operation which returned to the normal at 28 days post-ligation. Blood serum amylase showed a highly significant increase that extended all over the experimental period. A highly significant decrease in blood serum electrolytes was evident. Faecal trypsin was varied from moderate to highly postive degree in the examined dogs.

INTRODUCTION

The pancreas is a compounded gland having two secreting portions, an internal and external one. It is a composite of two unrelated organs associated in the same stroma (COFFIN and THORDAL CHRISTENSEN, 1953). The authors added that the exocrine function of the pancreas is secretion of pancreatic juice, which contains three enzymes: trypsin (protein splitting), pancreatic diastase or amylase (starch splitting) and lipase (fat splitting). The three enzymes are necessary for digestive process.

BASS, *et al.* (1976) recorded an increase in serum amylase level in dogs following ligation of major and minor pancreatic ducts. They found that serum amylase was increased tenfold in 24 hours above normal and returned to base line after 14th day following ligation.

ETTINGER (1975) noticed that increased activity of amylase in blood above normal is indicative of pancreatic cell damage.

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WERK and KNOWLES (1961) established the relation between free fatty acids (F.F.A) and glucose. They reported that when the blood sugar was less than 100 mg%, plasma free fatty acids concentration was normal. Above that level, free fatty acids concentration was increased.

PERMAN and STEVENS (1969) reported that hypercholesterolemia was associated with hyperlipemic state. Also they added that, induced pancreatitis caused an increase level of free fatty acid to reach its highest concentration with the elapse of 24 hours then gradually declines towards the 7th days.

Blood glucose level was elevated abruptly within 24 hours post total pancreatectomy in dogs and remained stable at high level. The blood serum cholesterol level was fluctuated (KRISHNAMURTHY, et al. 1979).

The aim of the present work was to declare the influence of pancreatic ligation of major duct on some haematological and biochemical indices in dogs.

MATERIAL and METHODS

The study was conducted on 9 clinically healthy dogs of different ages, sexes and body weights. The animals were put under clinical observation before and after operations.

Surgical Technique:

The animals were kept without food for twenty four hours before surgical interference. They were injected with Combelen (Bayer) at dose rate of 0.05 ml/kg. body weight as a pre-anaesthetic medication. General anaesthesia was induced by I.V. injection of pantothal sodium at a dose rate of 20 mg/kg. body weight. The animals were placed in dorsal recumbency with the front part of the body raised to produce a caudal retraction of the intestine.

The abdominal cavity was opened by a median incision and extended for about fifteen cm. along from xyphoid cartilage. The duodenum together with part of the pancreas is drawn out and turned so that its dorsal surface faces upward.

The main pancreatic duct is found 3 or 4 cm. above the angle formed by the duodenum and uncinata process. When the duct is found, two catgut threads were passed under it by a ligature dissector and tied without cutting in between. The abdominal wound was closed in the usual manner.

Before operations animals were clinically observed for 15 days.

All animals were proved to be clinically healthy by both clinical and laboratory methods of examination.

Anticoagulated blood samples, blood serum and faecal samples were collected from examined dogs before and after the operation by 3,7,15,21 and 28 days.

Haematological picture was performed according to the method of SCHALM (1979). Blood serum was analysed for glucose, cholesterol, total lipids and amylase activity using test kits* and after the methods of TRINDER (1969); WATSON (1970); ZOELLNER and KIRSCH (1962) and SMITH and ROE (1949 & 1957) respectively.

* Test kits supplied from Biomerieux (Bains/france).

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Serum sodium and potassium levels were determined using flame-photometer (Corning-400) while chloride level was estimated using chloride meter (model 925). Glucose Tolerance Test (G.T.T) was proceeded in the diagnosis (WILLIAMS and GANONG, 1975).

Statistical analysis of data were performed according to the method of SNEDECOR and COCHRAN (1967).

RESULTS

All dogs withstood the surgical intervention well and manifested no post-operative complications in the course of experiment. The laparotomy wound healed by first intension and sutures were removed 8-10 days after the operation.

Mean values of haematological and biochemical constituents were mentioned in tables 1,2,3 and Fig. (1).

DISCUSSION

A highly significant elevation ($P/0.01$) in total erythrocytic count was evident. The obtained data were coincided with those previously obtained by AFONSKY (1955); BRUNER and WAKERLIN (1937); MAYERSON (1930) and POWERS, *et al.* (1930). A significant elevation in haematocrit values (P.C.V) were evident. The elevation in total erythrocytic count and haematocrit value can be attributed to diuretic osmosis produced due to high glucose level-at the same period which leads to haemoconcentration with consequent elevation in both erythrocytic count and haematocrit values.

Haemoglobin values were not significantly affected during the periods of experiment.

There is a non-significant variations in total leucocytic count pre and post pancreatic ligation. The moderate elevation in total leucocytic count coincided with those previously obtained by SCHALM (1979). A slight lymphocytosis and neutropenia was cleared at 15th and 21th day post-ligation. The obtained data agreed with those previously obtained by SCHALM (1979) and COLES (1980). The fluctuation in lymphocytes and neutrophils at 15th and 21 days post-ligation can be attributed either to mechanical body defensive mechanism or to hormonal factors (SCHALM, 1979).

A highly significant elevation ($P/0.01$) in blood glucose level in dogs extended till 21 days post-operation. At the 28th day post-ligation, it reached the base line again. The elevation in blood glucose level, resulted in hyperglycaemia resembling diabetic like syndrome. This laid to application of glucose tolerance test (G.T.T) (Fig. 1) which used in the clinical diagnosis of diabetes (WILLIAMS and GANONG, 1975). The result excluded diabetes syndrome. The elevation in glucose level can be attributed either to pancreatic diseases or to abnormal hormonal function especially adrenal cortex, anterior pituitary and thyroid hormones (COLES, 1980).

Blood cholesterol and total lipids levels showed a highly significant elevation ($P/0.01$) post-operation till the 21 day then begin to decline again however it failed to reach the base line. The obtained results go side by side with those previously obtained by WERK and KNOWLES (1961); PERMAN and STEVENS (1969) and BASS, *et al.* (1976) in similar cases.

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A highly significant elevation ($P/0.01$) in blood serum amylase activity was evident when compared with those obtained before the operation. This elevation coincided with those previously obtained by BASS, et al. (1976) in dogs with pancreatic duct ligation.

It was evident that there was a generally significant decrease in blood serum electrolytes post-ligation if compared with before-operation. The obtained results can be attributed to osmotic diuresis caused by excess of glucose level in the blood (KRISHNAMURTHY, et al. 1979).

Faecal trypsin was varied from moderate to highly positive degree. This can be attributed to the amount of the present trypsin.

The study declared the influence of the pancreatic ligation on some haematological and biochemical constituents in dogs.

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Table (1)
Mean values of biochemical parameters in examined dogs

Parameters	Units	Before operation	Post-Operation				
			3 days	7 days	15 days	21 days	28 days
Glucose	mg%	83.1 _± 3.1	97.4 _± 8.7**	113.2 _± 5.4**	124.0 _± 9.6**	142.1 _± 3.1**	80.9 _± 0.7
Cholesterol	mg%	117.3 _± 7.5	790.3 _± 10.4**	616.7 _± 56.9**	1333.3 _± 37.4**	575.0 _± 11.5**	480.0 _± 17.3**
Total lipids	mg%	815.2 _± 16.5	948.7 _± 27.5	1066.7 _± 32.6*	1085.0 _± 32.6*	1085. _± 32.6	930.0 _± 25.9
Amylase	U/100ml	60.0 _± 11.3	65.1 _± 3.5	72.6 _± 2.0**	80.0 _± 1.0	86.7 _± 1.5**	93.3 _± 9.5**
Sodium	mmol/L	142.0 _± 9.1	148.3 _± 7.6	127.7 _± 12.1	123.3 _± 12.1	115.6 _± 8.5**	105.1 _± 1.49**
Potassium	mmol/L	4.6 _± 0.6	4.9 _± 0.7	3.9 _± 0.7	3.4 _± 0.5	3.1 _± 0.1**	2.3 _± 0.3**
Chloride	mmol/L	116.7 _± 1.5	108.7 _± 6.7	107.6 _± 6.8	103.3 _± 1.5	102.0 _± 1.4**	101.7 _± 0.5

Table (2)
Haematological picture of examined dogs

Parameters	Units	Before operation	Post-Operation				
			3 days	7 days	15 days	21 days	28 days
T.R.B.Cs	T/L	6.6 _± 0.6	10.1 _± 2.3**	8.6 _± 0.3**	8.6 _± 0.9**	8.9 _± 1.1**	8.3 _± 0.7**
HB	gm/L	114.0 _± 0.8	127.0 _± 2.7	155.0 _± 4.5	168.0 _± 2.5*	130. _± 0.9	113.7 _± 0.9
P.C.V.	%	45.7 _± 2.1	48.3 _± 9.9	55.0 _± 7.0*	60.1 _± 6.6*	63.7 _± 5.8*	53.0 _± 6.9*
T.W.B.Cs	G/L	14.0 _± 1.0	19.5 _± 7.7	18.3 _± 3.7	17.1 _± 5.3	16.5 _± 4.4	16.3 _± 3.2

T/L = Tera/Liter ($\times 10^{12}$ /L) G/L = Giga/Liter ($\times 10^9$ /L)
 T.R.B.Cs = Total erythrocytic count T.W.B.Cs = Total leucocytic count
 HB = Haemoglobin P.C.V. = Packed cell volume

Table (3)
Differential leucocytic count in examined dogs

Cell	Before operation	Post-Operation				
		3 days	7 days	15 days	21 days	28 days
Neutrophils	66.0 _± 5.3	59.0 _± 6.9	58.7 _± 9.5	52.0 _± 6.6*	48.0 _± 7.5*	62.6 _± 3.1
Esinophils	3.3 _± 1.5	3.6 _± 1.2	3.3 _± 1.2	3.7 _± 2.1	3.0 _± 1.0	4.3 _± 0.6
Basophils	0.6 _± 0.5	1.6 _± 0.5	0 _± 0	0 _± 0	0.3 _± 0.5	1.3 _± 1.5
Lymphocytes	23.3 _± 5.8	29.3 _± 5.9	33.3 _± 7.1	39.7 _± 8.7*	43.0 _± 4.4**	27.0 _± 2.6
Monocytes	6.7 _± 2.5	6.3 _± 1.5	4.7 _± 2.3	4.6 _± 0.6	5.3 _± 3.2	4.7 _± 1.5

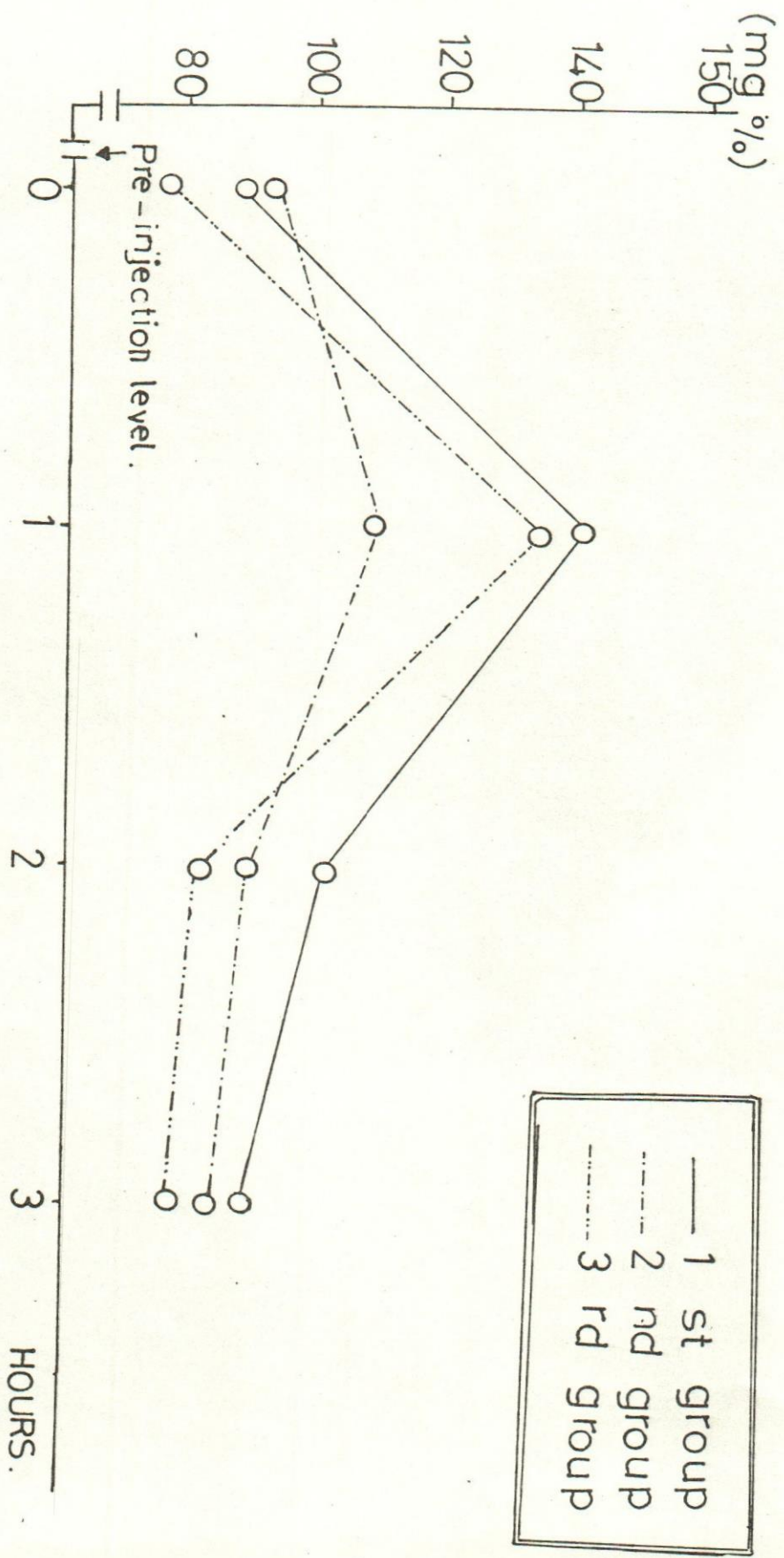


FIG (1) Intra-venous glucose tolerance in experimental DOGS.