التغيرات فى خلايا الدم ومكوناته الكيميائية عند نزع الحوصلة المرارية فى الكلاب

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ملخص

تم دراسة التغيرات فى خلايا الـدم والمكونات الكيمائية لدم عدده كلاب نتيجة نزع الحوصلة المرارية وقد ثبت بالفحص أنه قد حدث تغير ملموس فى خلايا الدم الحمراء والبيضاء وكذلك فى كمية الهيموجلوبين وكلسترول الدم وقد عادت لحالتها الطبيعية بعـدعشرون يوما من اجراء العملية .

هذا وقد ظهر زيادة فى كمية اليوريا فى الدم وكذلك فى كمية النتروجين الغير بروتينى بالدم وذلك بعد مرور خمسة واربعـون يوما من تاريخ اجـراء العملية .

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CONTRIBUTION TO HAEMATOLOGY AND SERUM BIOCHEMISTRY OF CHOLECYSTOMIZED DOGS

(with 2 Tables)

By

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SUMMARY

The results obtained in this investigaton indicated that estimation of total serum cholesterol, blood urea and non-protein nitrogen as well as evaluation of the alterations in haematological constituents could be used successfully in prognostication of hepattc surgery. This was well exampiified in 5 dogs by the restoring of haematological constituents and serum cholesterol to their normal values within 20 days after cholecystectomy, and the elevation of blood urea and non-protein nitrogen levels 45 days post operation.

INTRODUCTION

Because of the expansion and growth of veterinary science, as well as the increasing use of domestic animals in comparative medical research, interest in the clinical haematology and biochemistry of animals has increased rapidly. Selected data concering the changes which occur in the cytological and chemical constituents of the blood and tissues can provide for a better understanding of the disease pricess and supply helpful information for tentative differential diagnosis, therapy and prognostication. MONZAHY, BAHGAT, RAGHEB & TANTAWI (1974) described a simple approach for cholecystectomy in the dog. The aim of the present work was to investigate the alterations that may occur in the blood picture and some chemical constituents of blood serum as the result of cholecystectomy in dogs.

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MATERIALS AND METHODS

The present investigation has been carried out on 5 clinically healthy dogs of different age, sex and body weight. Experimental cholecystectomy was performed in all animals. The surgical technique had been described by MONZALbY *et al.*, (1974).

For fulfilment of the aim of this work, blood samples were collected from the cephalic vein at the following intervals : before, 5, 10, 15, 20 and 45 days after operations. Two samples of each were taken :

(1) For cytological examination, in bottles containing EDTA.

(2) In centrifuge tubes to obtain serum for biochemical analysis.

(1) *Blood cytology* : Hayem's and Turk's solutions were used for dilution of red and white blood cells respectively. Blood corpuscles were counted using the bright line improved Neubauer chamber. Two fresh blood films were stained by the panoptic method of Pappenheim (Hallmann, 1958) and 400 cells were diferentiated by the four field meander method (Schalm, 1961).

Haemoglobin concentration was determined by the agency of Sahle's haemometer, whereas sedimentation rate using Westergren method (Medway, 1969).

(2) *Serum biochemical analysis :* Clear serum was used for the determination of total cholesterol (Ilica, 1962), blood urea and non-protein nitrogen (Raitska, 1970). Results were statistically analysed using the student "t" test.

RESULTS

1—*Blood cytology :*

The main haematological changes observed following cholecystectomy were a significant reduction ($P < 0.01$) in the number of R.B.Cs. and Hb concentration. W.B. Cs. count and the sedimentation rate showed significant increase ($P < 0.01$).

These changes were markedly evident from 5 to 20 days post-operation and the initial cytological values were restored within 45 days after surgery (Table 1).

TABLE 1. Haematological picture of cholicystectomised dogs

Haematological constituents	Before operation	After operation				
		5 days	10 days	15 days	20 days	45 days
Erethrocy es (millions/1 mm³)	6,72± 0,02	5,86± 0,33**	6,24± 0,38	5,90± 1,42*	5,98 ± 1,26	6,84± 0,05*
Leucocytes (Thous./1 mm³) .	15,4 ± 0,28	21,3 ± 1,14**	23,0 ± 1,85*	21,9 ± 1,34*	21,7 ± 1,30*	15,7 ± 0,23
Haemoglobin (in gram %) .	14,2 ± 0,50	11,8 ± 0,65**	11,1 ± 0,36**	12,1 ± 0,48**	13,5 ± 0,48*	13,8 ± 0,19
Sedimentation rate (per hour)	1,1 ± 0,02	1,8 ± 0,02**	2,0 ± 0,01**	2,6 ± 0,36**	1,9 ± 0,05**	1,6 ± 0,05**

* Standard error.
* P 0.05
** P 0.01

Blood sedimentation showed highly significant increase ($P < 0.01$) during the whole period of experiment (from 5 to 45 days post-surgery).

2—*Serum biochemistry :*

The alterations in the serum values of total cholesterol, urea and non-protein nitrogen are shown in Table 2.

Total serum cholesterol showed a significant increase ($P < 0.01$) 5 days post operation that lasted for 15 days and regained its normal level 20 days after surgery.

Blood urea and non-protein nitrogen presented a different picture. Their values were shown to be increased 45 days after operation. This increase was significant ($P < 0.05$) in blood urea, whereas it was highly significant ($P < 0.01$) in serum non-protein nitrogen.

DISCUSSION

The analysis of blood has become clinically important from several points of view.

The available literature lacks information about the haematological and biochemical consequences of cholecystectomy in the dog However, EL-AMROUSI, EL-GINDI, MONZALY & MOTTILIB (1971) reported the alterations in serum transaminases (SGPT and SGOT) following hepatectomy in dogs.

Laboratory studies on cholelithiasis in dogs reported signs of hepatobiliary dysfunction (Scott, Hoffer, Amand & Raenigk, (1973). These findings included increased activity of serum glutamic transminase (SGPT), serum glutamic oxalacetic transaminase (SGOT), and serum alkaline phosphatase (SAP), and increased serum bilirubin, serum cholesterol, and urine bilirubin content (Binns, 1964 ; Cartmell, Edwards & Hammonds, 1964 and O'Brien & MITCHUM, 1970).

SCHALL, CHAPPAN, FINCO GREINER, MATHER, ROSIN & WELSER (1973) in a study on cholelitheasis in dogs reported that total serum bilirubin, activities of seurm glutamic pyruvic transminase (SPGT) and serum alkaline phosphatase (SAP) were increased, whereas blood urea nitrogen (BUN) was normal. Blood picture showed haemoconcentration and leukocytosis (WBC 30, 100 -54, 300 cmm). Of the total WBC, 55% were segmented neutrophils and 26% were nonsegmented neutrophils, Lymphocytes were within normal limits (12% but monocytes were increased (5-7%).

TABLE 2. **Biochemical constituents of blood serum (mg%) in Cholecystectomized dogs**

Chemical constituents	Beratore operion	After operation				
		5 days	10 days	15 days	20 days	45 days
Blood serum urea	16,8± 0,019	21,6±3,68	15,6±2,24	13,6±2,65	18,5±2,77	23,7±2,05*
Serum N.P.N.	18,4± 0,99	24,9±4,35	19,2±1,64	16,8±1,00	22,4±3,29	30,1±1,82**
Serum total cholesterol . .	21,0±10,2	277,2±0,87**	283,2±4,94**	278,6±0.17**	202,8±6,25	214,4±5,38

* Standard error.
* P 0.05
** P 0.01

The alterations in haematological constituents described in the present study could be explained as being a defense mechanism of the animal body against inflammatory process arising from the surgical intervention. Moreover, the decrease in R.B.C.S. count could be considered as a sequell to the probable loss of blood during operation, as well as a consequent result of stress factors post surgery. The sudden change in blood constituents and consequently the alterations in electric charges of blood (mainly, R.B.Cs.) caused the increase in the sedimentation rate.

Analyses of the obtained results showed that the decrease in R.B.Cs. count was correlated with the increase of S.R. This finding coincide with the statement of SCHALM (1961) and MEDWAY (1969) that fast blood sedimentation rates are seen with anaemias. It is a well-known fact that when the rate is increased, it suggests that a disease process is present. Accordingly the rapidity of the sedimentation rate could be considered as a measure for the severity of the disease.

ZAIETSEV, CINEV, IONOV, VACILEV and SHERABRIN (1971) report that blood S.R. is increased in all pathological process ; mainly those of inflammatory nature. The non-protein nitrogen (NPN) content of blood of all common domestic animals varies between 20 and 40 mg per 100 ml (MEDWAY, 1969). Its elevation may be due to any pathological process in the animal body.

Urea, as an end product of protein catabolism, is mainly produced in the liver. Consequently, changes in the liver condition would result in variations in its percentage in the blood. The alterations obtained in the present study could be attributed to the stress factors post surgery. Cholesterol has received great attention in the human because of its involvement in arteriosclerosis. Its importance in diseases of domestic animals is not yet established. However, DARRASPEN. FLORIO & ROCHE (1951) reported that serum total cholesterol may increase in liver damage. SCOTT *et al.*, (1973) and SCLAL *et al.*, (1973) recorded high values of total serum cholesterol in cholelithiasis in dogs. The increase of total cholesterol obtained in the present investigation agreed with the findings of the available literature.

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REFERENCES

Binns, R.M. 1964. Cholelithiasis causing obstructive jaundice in a Boxer.Dog. Vet. Rec 76, 239-243.

Cartmell, W.B., Edwards, H.G. and Hammonds, P. 1964. Cholelithiasis in a Dachshund Bitch and its surgical treatment. Vet. Rec. 76, 1323.

Darra E. Fllorio, R. and Roche, L· 1951. Desquelques tests seriologique dans l'insufficisance hepatique du CHEIN. C. R, Soc. Biol. (Paris) **145**, 883.

El-Amrousi, S., El-Gindi, El-Monzaly, M. and Mottilib, A. 1971. Experimental studies on partialhepatectomy in dogs. I. Surgical procedure and alterations in serum transaminases. U.A.R. J. Vet. Sc, 8, 1, 1-24.

Hallman, R. 1958. Cited by MEDWAY, PRIER & WILHINSON, 1969.

Juniper,K. 1969. Disorders of Bilary Tract. In "Gastroenterologic Medicine". LEA & FEBIGER, phila Philadelphia : 1125-1149.

Ilca, C. 1962. Quoted by ZAIETSEV, CINEV, IONOV, VACILEV and SHARABRIN, 1971.

Monzaly, M., Bahgat, A. Ragab, F. Amer, A. and Tantawi, M. 1974: Surgical Approach to Cholecystectomy in Dogs. (in press).

Medway, W., Philer, J.E. and Wilkinson, J.S., 1969: A Text-book of Vet. Clinical Pathology. BALLIERE, TINDALL & Cox, London.

O'Brien, T.R. and Mitchim, G.D., 1970. Cholelithiasis in a Cat. J. Ames. Vet. Med. Assoc., 156, 1015-1017.

Raitska, J. 1971. Quoted by ZAIETSEV, CINEV, IONOV, VACILV Eand SHARABRIN, 1971.

Schall, W.D., Chapman, W.I., Finco, D.R., Greiner, T.P., Mather, G.W., Rosin, E. and, Welser, J.R. 1973. Cholelithiathiasis in Dogs. J. Amer. Vet. Med. Assoc., 163 5, 469-472.

Schalm, O.W., 1961. Vet. Haematology, LEA & FEBIGER, Philadelphia.

Scott, D.W., Hoffer, R.E., Amand, W.B. and Roenigsk, W.J. 1973. Cholelithiasis in a Dog. J. Amer. Vet. Med. Assoc, **163**, 3, 254-257.

Wakim, K.G. and Mahour, G.H. 1971. Patho-physiological Consequences of Cholecystectomy. Surg., Gynec. & Obstet,133, 1‘ 113-125.

Zaitsev, V.E., Cinev, A.V., Ionov, P.C., Vacilev, A.V. and Sharabrin, I.G. 1971. Clinical Diagnosis of Internal Diseases of Domestic Animals. 3*rd.* Ed., Kolos Press, Moscow

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