DIAGNOSTIC STUDIES IN CANINE HEPATIC CIRRHOSIS

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Six dogs suffering from liver cirrhosis showed clinical signs like inappetence, abdominal distension, weight loss, halitosis, melena, anaemia and icterus were presented to the Teaching Veterinary Clinical Complex, Faculty of Veterinary and Animal Science, Belgachia, Kolkata, West Bengal.. The mean values of haemoglobin, PCV, TEC were significantly lower.Mean ALT, AST, ALP, Total bilirubin, BUN and creatinine were significantly higher than that of control group. Mean values of total protein, albumin, globulin and albumin-globulin ratio (A:G), plasma glucose, plasma cholesterol were significantly lower than that of control group. Prothrombin time and APTT were significantly higher than the control values. The radiological finding showed ascitic fluid in abdomen and the liver is bright and small with irregular margin and diagnosed as hepatic cirrhosis .USG revealed diffuse increase in echogenecity, irregular and rounding of liver margins.
Keywords: Coagulation profiles, Diagnostic imaging, Heamatobiochemical profile, Liver cirrhosis.

Liver is the most important vital organ with capacity to regenerate and perform adequately despite even extensive pathological damage to its integrity (Lidbury and Suchodolski, 2016).. Cirrhosis is the end stage of chronic hepatitis and is defined as diffuse distribution with or without ascites and characterised by fibrosis of the liver and the conversion of normal liver architecture into structurally abnormal nodules, macro or micro in size (Bexfield, N., 2017). A reasonable package of screening tests recommended for an animal suspected for liver cirrhosis included a complete blood count, serum biochemical profiles, urine analysis, radiography and ultra sonography. Haemato biochemistry is considered as an important preliminary tool for diagnosis but radiography is useful to evaluate the morphologic abnormalities where as ultra sonography an excellent non invasive way to evaluate liver parenchyma (Lawrence and Steiner, 2017). The aim of the present study is to develop diagnostic protocol for cirrhosis.

Materials and Methods

The dogs presented in the Teaching Veterinary Clinical Complex, Faculty of Veterinary and Animal Science, Belgachia, Kolkata, West Bengal, with the clinical signs of inappetance, ascites, jaundice, icterus mucous membrane, vomiting, lethargy, polyuria (PU) and polydipsia (PD) were selected while apparently vaccinated healthy dogs presented for general health check-up with no clinical signs in the age group of 5-8 years irrespective of breed and sex were selected randomly as healthy control group for the study. Out of 60 dogs diagnosed to be suffering from hepatobiliary disease on the basis of clinico-hemato-biochemical and imaging studies, the 6 dogs were finally diagnosed as liver cirrhosis. Blood was collected as per standard protocol from the peripheral (cephalic/saphaneous) veins for estimation of hematological parameters, blood glucose and the biochemical estimations viz, Alanine aminotransferase (ALT), Aspartate aminotransferase (AST), Alkaline phosphatase ALP, Gamma glutamyl transferase (GGT), plasma glucose, plasma cholesterol, total protein, plasmaalbumin and globulin, albumin and globulin ratio (A:G), Blood urea nitrogen (BUN), creatinine and

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total bilirubin was estimated using diagnostic kit(marketed by ERBA diagnostic Mannheim GmbH). Biochemical parameters were estimated on semi automatic analyzer.Radiological images were captured by using ME-3010-Xray having 300ma capacity and USG images were obtained by using with real time USG equipments (Mindray) using either convex or linear array transducer of 3.5-7.5 MHz frequency based on the size of the patients.

Results and Discussion

Six cases with liver cirrhosis presented to the clinics were diagnosed based on clinical examination, laboratory evaluation and USG findings. The duration of illness ranged from 3-15 days. The clinical signs of dogs suffering from liver cirrhosis were inappetance (58.33%), vomiting (58.33%), halitosis (33.33%), dyspnoea (27.78%), melena (33.33%), diarrhoea (25%), polyuria (8.3%), polydipsia (16.67%), icterus (41.67%), pale mucous membrane (58.33%), weight loss (67.77%) and abdominal distension (100%).

Haemato biochemical and other laboratory findings:

The mean of haematological and biochemical values of the control and liver cirrhosis groups are presented in Table 1. The mean values of haemoglobin, PCV, lymphocytes and platelets were significantly lower in liver cirrhosis group than control group, while TLC, neutrophils were significantly higher than the control group. Anaemia was observed in all the cases.

There was a significant increase in the concentration of ALT, AST, ALP, Creatinine, PT and APTT in the liver cirrhosis group compared to the control group. The concentrations of glucose, total proteins, albumin, A:G ratio and fibrinogen were significantly lower in the liver cirrhosis group compared to the control group. Although BUN and GGT were much higher than the control group but such parameters did not differ significantly similar findings were reported by Elhiblu *et al*., 2015. .

Examination of urine sediment smear showed bilirubin casts in three cases with mild to moderate hyperbilirubinaemia.

Table 1: THE MEAN OF HAEMATO BIOCHEMICAL VALUES OF THE CONTROL AND LIVER CIRRHOSIS GROUPS

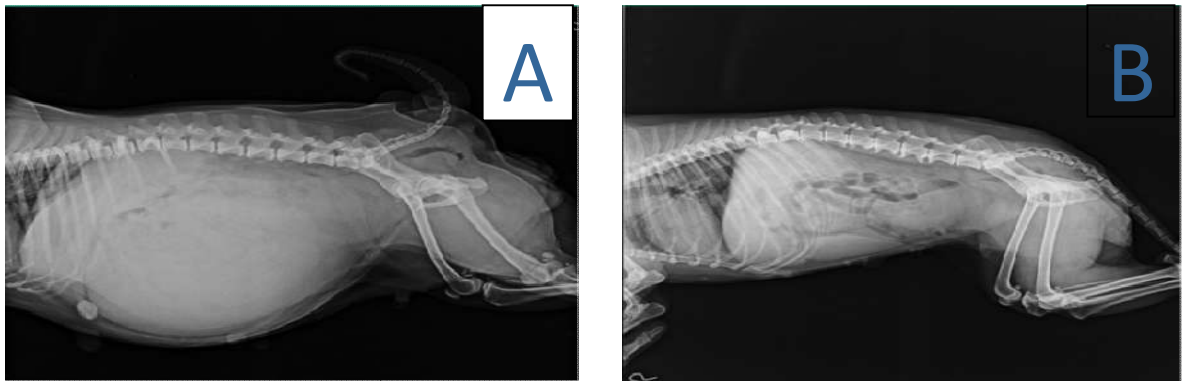
PARAMETER	CONTROL GROUP	LIVER CIRRHOSIS GROUP
Haemoglobin (g/dL)	12.66±0.07	10.21±0.12**
TEC (x10^6/µl)	5.69±0.06	4.54±0.05**
PCV (%)	39.98±0.06	26.81±0.08**
TLC(10/µl)	12.52±0.11	32.78±14.81**
Neutrophil(%)	66.19±0.26	89.66±6.14**
Eosinophil (%)	3.25±0.16	0.33±0.8**
Lymphocyte(%)	25.34±0.09	10.00±6.42**
Monocyte(%)	5.20±0.05	2.81±0.20**
Platelet(10/µl)	2.95±0.06	1.94±0.27**
Fibrinogen(g/dL)	2.10±0.08	0.96±0.02**
Cholesterol (mg/dL)	176.67±24.99	124.83±28.53**
ALT(U/L)	28.08±0.46	102.78±1.91**
AST(U/L)	36.57±0.40	101.76±1.42**
ALP(U/L)	52.49±0.34	233.07±9.70**
GGT(U/L)	2.50±0.10	11.60±1.19
Total bilirubin(mg/dL)	0.37±0.01	1.67±0.12**
Direct bilirubin(mg/dL)	0.25±0.01	0.98±0.08**
Indirect bilirubin(mg/dL)	0.12±0.01	0.68±0.05**
Total protein(g/dL)	6.30±0.07	4.85±0.09**

Albumin(g/dL)	3.30±0.07	1.96±0.07**
Globulin(g/dL)	3±0.03	2.89±0.05**
A:G	1.10±0.02	0.69±0.03**
Glucose (mg/dL)	100.50±0.56	83.67±5.18**
BUN(mg/dL)	13.67±0.96	28.67±6.31
Creatinine(mg/dL)	0.92±0.04	1.60±0.16**
Prothrombin time (s)	6.9±0.09	10.9±1.1**
APTT(s)	12.4±1.3	18.3±1.6**

**Significant at 1% ($p<0.01$)

Radiographic feature:

The radiograph of lateral abdomen of dog showed shrunken, rounded liver and excessively enlarged spleen. The edge of the spleen found to be extended almost up to the level of pelvic inlet. The outer margin of liver appeared to be rounded and cranial border touching up to 8th inter costal space in the xiphoid region. The present findings were inconformity with the observation of Elhiblu *et al*., 2015. Lateral radiograph of dog evidenced ground glass appearance of entire abdominal cavity with indistinct differentiation of adjacent visceral organs. The radio density of entire abdominal cavity was non differentiable amongst adjacent all abdominal visceral organs. The outline of diaphragm appeared to be pushed forward up to 8th intercostal space thus making the bigger abdominal cavity and smaller thoracic cavity due to excessive pressure of ascetic fluid.

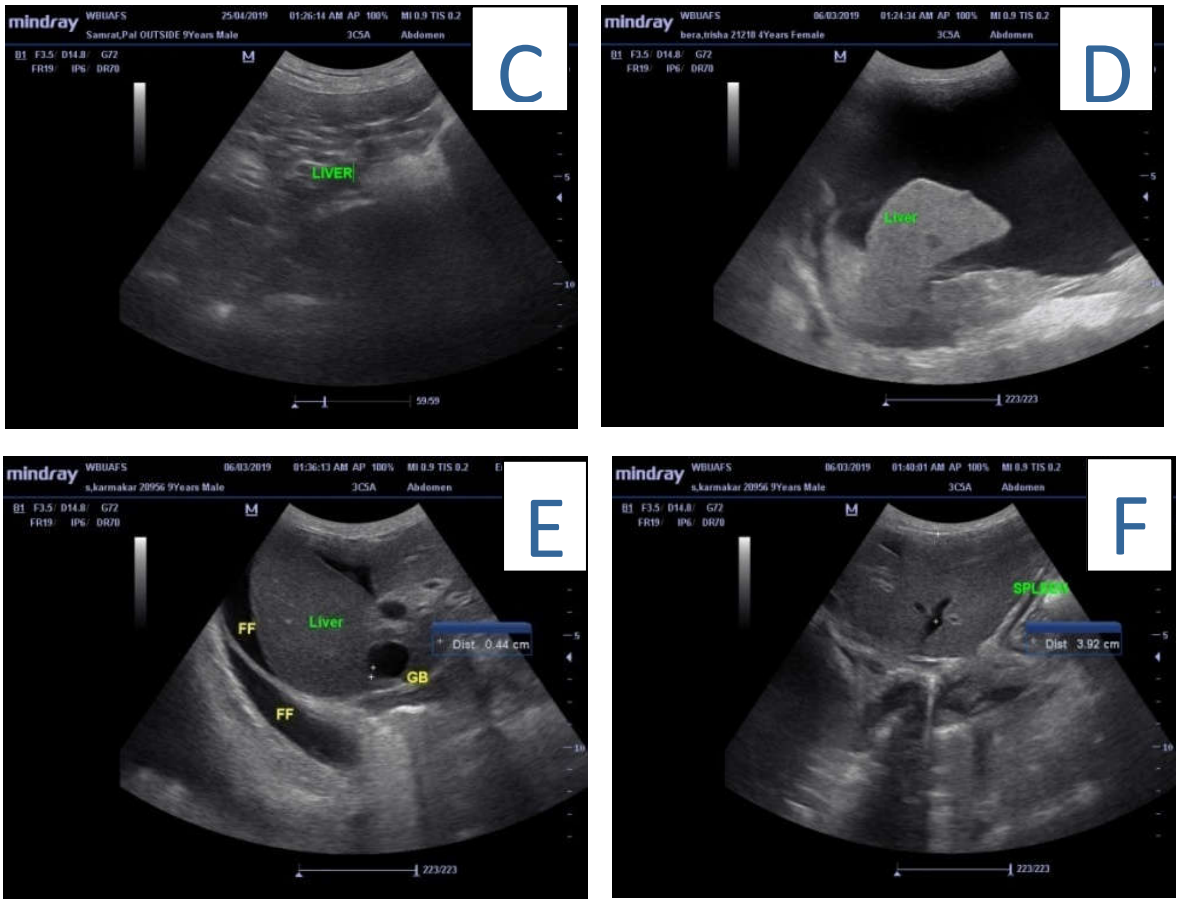


FigA. Radiograph showing ground glass appearance of entire abdominal cavity with indistinct of adjacent visceral abdominal cavity indicating accomolaytion of fluid in peritoneal cavity in dog suffering from ascites.

FigB. The radiograph of lateral abdomen of dog showing shrunken rounded liver and excessively enlarged spleen (splenomegaly).

Ultrasonographic feature:

In USG findings the dog suffering from the different stages of cirrhosis revealed diffused, echogenic, liver parenchyma which apparently appeared brighter than normal tissue. These findings were agreement with Samy *et al.,* 2014. The margin of liver was dissimilar to that of normal one almost rounded in shape. The present findings were inconformity with the observation of Assawarachan *et al.*, 2019. Comparatively liver parenchyma looked to be more echogenic than that of spleen tissue as observed by Kemp *et al.*, 2015. In few cases of such dogs the wall of the gall bladder was measured to be thicker than the normal one, but contents appeared to be non significant. In some dogs, hyperechoic liver capsule also appeared to be thicker.



FigC.USG of liver of a dog suffering from chirrhosis shows hypoechoic nodular structures within hepatic parenchyma.

FigD. An ultrasound shows in a cirrhotic dog fluid filled abdomen with hyperechoic liver parenchyma and slight irregular margin.

FigE. An ultrasound shows thickened gall bladder wall and shrunken herperechoic liver with free anechoic fluid in the abdominal cavity in dog suffering from cirrhosis.

FigF. An ultrasound shows spleenomegaly with hyperechoic hepatic parenchyma in adog suffering from liver cirrhosis.

Melena observed has been ascribed to the gastrointestinal ulceration or coagulopathies, which may be due to hyperfibrinolysis, where the patients with advanced hepatocellular liver disease and cirrhosis produce decreased thrombin activable fibrinolysis inhibitor. Weight loss could be due to the inadequate nutrient intake as a result of inappetance and enhanced tissue catabolism and abdominal distension was ascribed to ascites.

Conclusions

In chronic liver cirrhosis the most important clinical sign included inappetance,weight loss, vomition, diarrhoea, melena, ascites, polyuria, polydipsia and icterus. Levels of Hb, lymphocytes, PCV, platelet count and fibrinogen were significantly lower while TLC, neutrophils, prothrombin time and APTT were significantly higher than the control values.Radiographic imaging showed shrunken, rounded liver. In USG, diffuse increase in echogenecity of liver, rounding and irregularity of liver margins were the consistent findings. So it can be concluded

that diagnostic imaging along with haemato-biochemical alterations may be used as a diagnostic tool for liver cirrhosis in dogs.

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