



ULTRASONOGRAPHIC DIAGNOSIS AND MANAGEMENT OF CHOLECYSTOLITHIASIS IN DOGS

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ABSTRACT

Cholecystolithiasis, which is more common in middle-aged dogs of small to medium breed, is usually associated with vomiting, anorexia, jaundice, fever and abdomen pain. During a three year (2010 to 2013) study, nine dogs that were diagnosed as cholecystolithiasis were presented to be dull, depressed with poor physical condition, moderate dehydration, icteric mucosa with moderate elevation of rectal temperature but with normal pulse and respiratory rate. Ultrasonographic examination revealed round to oval shaped gall bladder filled with sludge that appeared as uniform echogenic sediment with few hyperechoic structures with thick hyperechoic gall bladder wall, confirming cholecystolithiasis. Further, hematologically moderate leukocytosis with neutrophilia and whereas, elevated enzymatic activity of SGPT, ALP and GGT were the significant biochemistry alterations on the day of presentation. The dogs were conservatively managed with enrofloxacin and ursodeoxycholic acid and other supportive drugs for 3-4 weeks. All the nine affected dogs improved and returned to normal activity with near normal hemato-biochemical parameters by day 30.

KEY WORDS: canine cholecystoliths, diagnosis, treatment.

INTRODUCTION

Disorders of the gallbladder and extrahepatic biliary tract in the dog and cat can easily be confused with other intra-abdominal disorders, as the clinical course and signs are similar to these disorders. Most choleliths in dogs and cats are clinically silent. The incidence of disorders restricted to the gallbladder and the biliary tree is low, when compared with the parenchymal hepatic affections that occur in dogs (Veronica *et al.*, 2006). Diagnosis of cholecystolithiasis in dogs has increased subsequent to the increased use of abdominal ultrasound as a routine diagnostic modality. Choleliths are more common in middle-aged to older animals and incidence may be higher in small-breed dogs. Usually they do not cause any problem; nevertheless they may be associated with cholecystitis and rupture (Duhautois, 2000). The cholelithiasis symptomatic cases generally show signs of abdominal pain, nausea and vomiting because of larger bile ducts and gallbladder rich autonomous innervation (Rothuizen, 2005; Ward, 2006). There is a limited number of reported cases of cholelithiasis in India and hence, the present paper puts on record about manifestations, ultrasonographic diagnosis and therapeutic management of cholecystolithiasis in naturally affected dogs.

MATERIALS & METHODS

Dogs that were presented with signs suggestive of biliary disorders such as, icterus, vomiting, anorexia and loss of weight to the College of Veterinary Science, Hyderabad for three years (2010 to 2013) were considered for the study and were thoroughly evaluated clinically, followed by detailed physical examination. Later blood was

collected and serum separated for hemato-biochemical studies. Further, ultrasonography of abdomen was performed using *Ixos Vet* Doppler machine a real time scanner with L10-5 linear transducer. Dogs diagnosed for cholecystolithiasis were managed with enrofloxacin (10 mg/kg i/m bid for 14 days), DNS (10ml/kg i/v bid for 3-5 days), ondansetron (0.1 mg/kg i/v bid for 3-5 days) along with ursodeoxycholic acid (10 mg/kg/day bid) and tricholine citrate and sorbiline (5ml, bid) orally for two weeks.

RESULTS

Based on the different diagnostic protocols, nine dogs that were aged between 5-8yr (Labrador retriever – 4, German shepherd–2, Lhasoapso –2 and Pomeranian-1) were confirmed to cholecystolithiasis. All these were showing similar manifestations *viz.*, dull and depressed with poor physical condition, moderate dehydration, icteric mucosa with moderate elevation of mean rectal temperature (102.8 C) and normal pulse and respiratory rate. The conjunctival mucous membrane was congested and popliteal lymph nodes were enlarged. Complete blood examination revealed normal hemogram except moderate leukocytosis with neutrophilia. Whereas, mean elevated enzymatic activity of serum glutamic pyruvic transaminase (122 IU/L), serum alkaline phosphatase (676 IU/L) and gamma glutamyl transferase (42 U/L), with normal alanine amino transferase (46 U/L), blood urea nitrogen (16.4 mg/dl) and creatinine (1.40 mg/dl) were the significant biochemistry alterations recorded on the day of presentation. Ultrasonographic examination of sagittal and transverse aspects of liver parenchyma showed echogenically no

abnormality. The gall bladder was round to oval in shape with symmetrically thickened wall that was hyperechoic when compared with the surrounding liver tissue. The gall bladder was filled with sludge (Fig. 1) which appeared as uniform echogenic sediment with few hyperechoic structures suggestive of cholecystolith (Fig. 2 and 3). Further, the gall bladder wall was also seen as hyperechoic structure with 'double rim' effect. Thus confirming cholecystolithiasis. The dogs were conservatively managed with enrofloxacin (10 mg/kg i/m bid for 14 days), DNS (10ml/kg i/v bid for 5 days),

ondansetron (0.1 mg/kg i/v bid for 3-5 days) along with ursodeoxycholic acid (10 mg/kg/day bid) and tricholine citrate and sorbiline (5ml, bid) orally for two weeks. Following therapy, the affected dogs showed gradual improvement from 5-7 days, such as reduction of vomiting, gradual appetite and improvement in hydration status and returned to normal activity with near normal hemato-biochemical parameters by day 20. However, ursodeoxycholic acid and tricholine citrate and sorbiline was further continued for two more weeks.



FIGURE 1: Inflammatory gall bladder with sludge (GB) and hyperechoic wall with double rim effect (arrow)



FIGURE 2: Gall bladder (GB) with hyperechoic gall stones (GS) and wall (arrow)



FIGURE 3: Gall bladder (GB) with sludge, gall stones (solid arrow) and double rim effect of GB wall (arrow)

DISCUSSION

Cholecystolithiasis may be associated with vomiting, anorexia, jaundice, fever and abdominal pain. However, many animals remain asymptomatic (Veronica *et al.*, 2006). Laboratory features of cholelithiasis most commonly reflect related cholecystitis. In dogs with small duct lithiasis, clinicopathologic features reflect involvement of biliary structures in the form of high alkaline phosphate and GGT activity. Jaundice is only directly related to cholelithiasis associated with EHBDO or sepsis; thus, many animals with cholelithiasis are not hyperbilirubinemic (Centre, 2009). Cholelithiasis may occur secondary to infection, or stones may promote infection. The findings in the present report are in agreement with the above authors. Haematological abnormalities like neutrophilic leukocytosis could be associated with inflammatory condition of the gall bladder and whereas, serum chemistry abnormalities like elevated alkaline phosphatase and serum GGT might be due to obstruction of biliary tract as the inflammatory condition of the bile duct and gall bladder could elicit sufficient inflammatory cells infiltrate and edema that may lead to biliary obstruction (Singh *et al.*, 2008). The hematological abnormalities in gall bladder diseases are inconsistent and may include mild to moderate leukocytosis with a left shift

or a non-regenerative anemia, with increase in ALP, AST and serum GGT (Ward, 2006). Aguirre (2007) opined that probable cause of cholecystitis in dogs is bacterial infection particularly of *E. coli*, and *Staphylococcus spp* usually manifested by elevated temperature, that could probably ascend to hepatic parenchyma causing cholangiohepatitis suggested by elevated levels of ALP in the present case.

The occurrence of cholecystolithiasis is rarely recognized in small animal practice and the pathogenesis of cholelithiasis in dogs is unknown. Proposed causes for formation of choleliths include trauma, biliary stasis, diet alterations, cholecystitis and parasitic or bacterial biliary infection (Veronica *et al.*, 2006). Choleliths in dogs, as in human beings, have been classified as cholesterol, pigment or mixed. The stones were reported to appear dark brown or black in colour and were soft (Rothuizen, 2005). Mixed or cholesterol choleliths were reported to contain more than 70% cholesterol monohydrate plus an admixture of calcium salts, bile acids and pigments, proteins, fatty acids and phospholipids, which appear as hyperechoic structures on ultrasonography (Willard & Fossum, 2005). Although people commonly develop dietary induced cholesterol gallstones, canine gall stones were reported to usually contain bilirubin, calcium and mucin. Parasites of

gall bladder, bile ducts or both are seldom diagnosed in small animal practice (Willard & Fossum, 2005). Ultrasonographic appearance of the normal gall bladder in dogs is anechoic, round to oval structure with smooth margins located within the liver. The size of the gall bladder varies with fasting or feeding condition of the patient. Normally the gall bladder wall is not visualised or poorly visualised. But when there is inflammation of gall bladder the wall becomes thickened that can be recorded as hyperechoic thick structure some times as a double rim effect when there is edema (Aissi and Slimani, 2009). Gall stones are typically identified on ultrasonography as hyperechoic foci or by the observation of acoustic shadowing originating from the gall bladder (Willard and Fossum, 2005). Gallbladder sludge is considered as a precursor of cholelithiasis in human. However, the higher prevalence of gallbladder sludge and the lower prevalence of cholelithiasis in dogs, as compared to humans, suggest that biliary sludge in dogs rarely results in cholelith formation (Catherina *et al.*, 1998). Rothuizen (2005) reported that the non-calcified stones may resolve in response to oral medication with ursodeoxycholic acid along with the silymarin and vitamin E. Clinical improvement in the present cases could be attributed to the above authors. However, surgical options for the cholelithiasis in dogs are reported to be cholecystotomy, choledochotomy (Baker, 2011) and finally, by cholecystectomy and biliary diversion (Fossum, 2002). The improvement in the dog's health status observed after four weeks of therapy in the present study indicated the beneficial effects of the medical therapy in the clinical management of cholecystolithiasis in dogs

CONCLUSION

Nine dogs of different age, sex and breed were ultrasonographically diagnosed for cholecystolithiasis, that were presented with dull and depression, vomiting and poor physical condition. The gall bladder was oval in shape with hyperechoic 'double rim effect' wall, filled with sludge and hyperechoic calculi. Enrofloxacin, ursodeoxycholic acid and other hepatoprotective agents were found effective.

REFERENCES

Aguirre, A.L. (2007) Gallbladder disease in Shetland Sheepdogs: 38 cases (1995-2005). *J. Am. Vet. Med. Assoc.* **1**, 79-88.

Aissi Slimani, C. (2009) Ultrasound Diagnosis of Cholecystitis in a Dog (A Case Report). *Global Veterinarian*. **3**, 514-515.

Baker, S. G. (2011) Choledochotomy and primary repair of extrahepatic biliary duct rupture in seven dogs and two cats. *J. Small Anim. Pract.* **52**, 32-37.

Catherina, B., Baethez, P.Y. and Scrinani, P.V. (1998) Prevalence Of Gallbladder Sludge In Dogs as assessed by Ultrasonography. *Vet. Rad. & Ultra.* **39**, 206-210.

Center, S.A. (2009) Diseases of the gallbladder and biliary tree. *Vet. Clinics North Am. Small Anim. Pract.* **39**, 543-598.

Duhautois, B. (2000) Rupture of the gall bladder secondary to cholelithiasis and necrotising cholecystitis. *Pratique Médicale et Chirurgicale de l'Animal de Compagnie.* **35**, 581-584.

Fossum, T.W. (2002) Surgery of the extrahepatic biliary system. In Fossum TW: *Small Animal Surgery*, 2nd ed., Mosby, St.Louis. Pp. 102-127.

Rothuizen, J. (2005) Diseases of the biliary system. In: *BSAVA Manual of canine and feline gastroenterology*, Hall EJ, Simpson JW, Williams DA, 2nd ed, BSAVA. Pp. 269-278.

Singh, R.S., Chand, N. and Sindhu, S.S.(2008) Cholecystitis in a dog. *Indian Vet. J.* **85**, 77-78.

Veronica, M., Modenato, M., Citi, S. and Guidi, G. (2006) Choledocholithiasis in a Dog. *Annali Fac. Med. Vet., Lix.* 209-218.

Ward, R. (2006) Obstructive cholelithiasis and cholecystitis in a keeshond. *Can. Vet. J.* **47**, 1119-1121.

Willard, M.D. and Fossum, T.W. (2005) Diseases of the Gallbladder and Extrahepatic Biliary System. In : *Ettinger, S.J.; Textbook of Veterinary Internal Medicine*, 6th Edn., W.B.Saunders, Philadelphia. Pp.1478-1482.