



## Case Report

# Cholelithiasis, choledocholithiasis and hepatolithiasis with secondary necrotizing hepatitis and cholangiohepatitis in a dairy cow

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## Abstract

Biliary calculi are rare in cattle and occur usually in the gallbladder without clinical signs. In humans, colelithis are a common cause of hepatic abscessation due calculi microbiota. Here is described a case of cholelithiasis, coledocolithiasis and hepatolithiasis in a 10-year-old female mixed breed dairy cow. The animal died during physical examination with signs as cachexia, icterus and fever. At necropsy, a large number of green calculi were observed in the gallbladder, common duct lumen and in markedly distended biliary ducts. The liver was firm and decreased in volume with multiple abscess and multiple red foci measuring 0.5 cm in diameter in the hepatic parenchyma. Microscopically in the liver, marked ductal proliferation and abscedative cholangiohepatitis with abundant fibrosis and multiple foci of hepatocytes necrosis. In conclusion coledocolithiasis and hepatolithiasis may occur in cattle and cause significant clinical signs and pathological alterations.

**Key words:** cattle, calculi, hepatic fibrosis.

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## Introduction

Cholelithiasis, coledocolithiasis and hepatolithiasis are formation and/or allocation of calculi in gallbladder, common bile duct and intrahepatic biliary tree, respectively (2, 3). Calculi, which can be multiple or solitaire, are composed of variable amounts of bilirubin salt, calcium carbonate, calcium phosphate, calcium oxalate and proteic matrix (1, 3 5). Hepatolithiasis with clinical and pathological changes are described in horses (11, 12) and cattle (13). However, in cattle, gallstones occur most commonly in the gallbladder without further clinical signs and aged animals are more propense to calculi formation due to low bile production and reduced flow (1, 3, 10). Microbiota of the bile and gallbladder epithelium with calculi were assessed in Brazil, with a result of multiple species of bacteria (4). Thus, given the scarcity of studies on cholelithiasis with clinical signs and the absence of reports of choledocholithiasis and hepatolithiasis in cattle, this article

aims to report a case of cholelithiasis, choledocholithiasis and hepatolithiasis in a dairy cow.

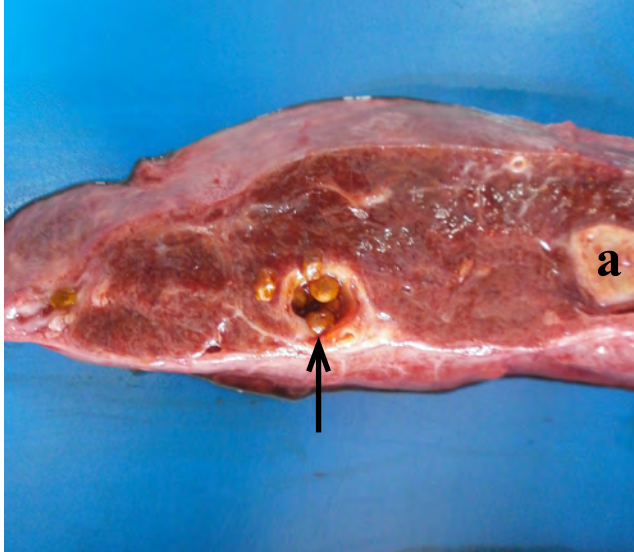
## Case Report

A 10-years-old mixed breed, female, 400kg, dairy cow was referred to Clínica de Bovinos de Garanhuns, Universidade Federal Rural de Pernambuco (CBG/UFRPE). This was the only case in a farm of extensive production system with native pasture, located in Garanhuns, Pernambuco, Brazil. At physical examination, were observed: weakness, permanent lateral decubitus with poor corporal condition (score: 1.75), characterizing cachexia; dehydration (8%), pale ocular mucous membranes and icteric sclera; moderate skin edema at abdominal region; fever (40,2°C) and tachycardia, tachypnea with polypnea. The animal died during clinical examination, therefore, no further laboratorial analysis or other auxiliary exam were

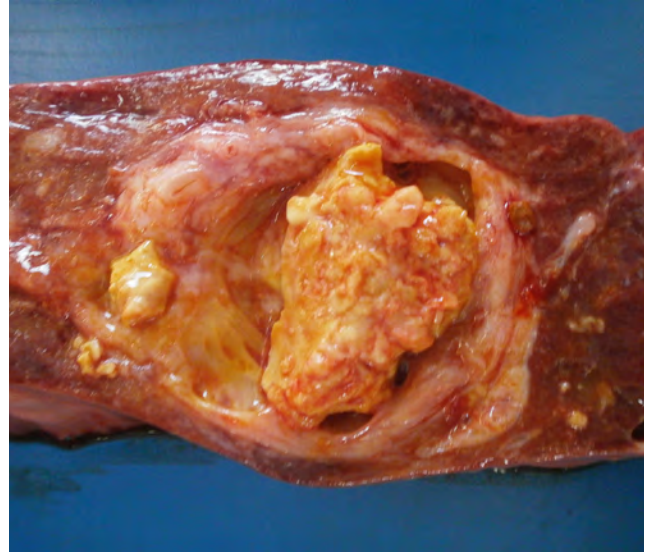
made. Necropsy was immediately performed.

Macroscopic findings were moderate to severe emaciation with icteric mucous membranes and intima layer of the aorta. In the liver there were marked and diffuse decreased in volume and intense increase in consistency of the parenchyma. On the cut surface were observed multiple bile ducts markedly dilated (ectasia), measuring 0,3 to 1.0 cm in diameter, surrounded by abundant fibrous tissue. In the lumens a large number of green and firm to friable concretions, round to oval, measuring approximately 0.3 to 0.5 cm (Fig. 1 and 3).

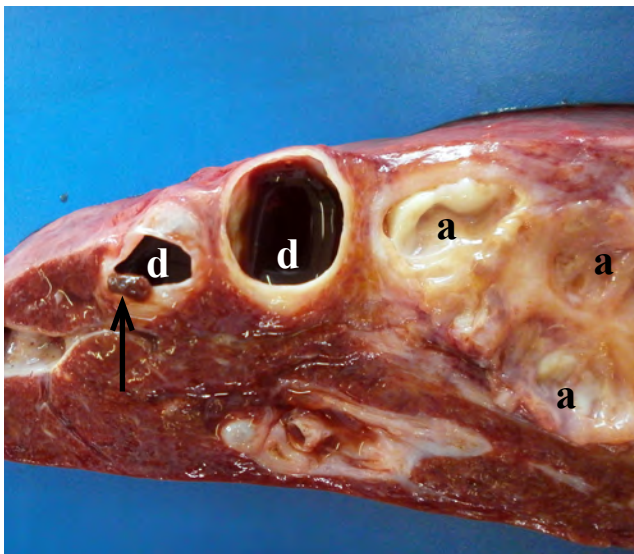
Additionally, in the parenchyma were observed multiple foci of cavities measuring 0.5 to 2.0 cm in diameter surrounded by fibrous tissue and filled with abundant whitish amorphous material (Figs. 2 and 3). Also, multiple random foci of red discoloration, measuring 0,5 cm in diameter through the parenchyma (Fig. 4). In the lumen of gallbladder and common bile duct, a large number of the same concretions were observed, measuring 0.3 to 3.0 cm in diameter, which largely occupied and obstructed luminal spaces (Fig. 4).



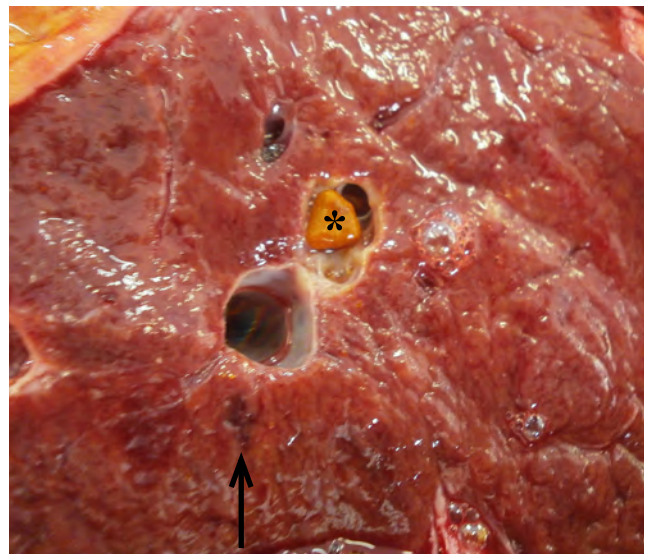
**Figure 1.** Macroscopic findings of a dairy cow with cholelithiasis, coledocolithiasis and hepatolithiasis. Liver, marked dilatation or ectasia of the biliary duct (arrow) surrounded by fibrous tissue containing multiple biliary calculi in the lumen. Notice a focal hepatic abscess (a) and parenchymal fibrous aspect.



**Figure 2.** Macroscopic findings of a dairy cow with cholelithiasis, coledocolithiasis and hepatolithiasis. Liver, large hepatic abscess, surrounded by fibrous tissue with abundant amorphous whitish content.



**Figure 3.** Macroscopic findings of a dairy cow with cholelithiasis, coledocolithiasis and hepatolithiasis. Liver, multiple ectatic intrahepatic ducts (d) with small calculi (arrow). Notice multiple hepatic abscesses (a).

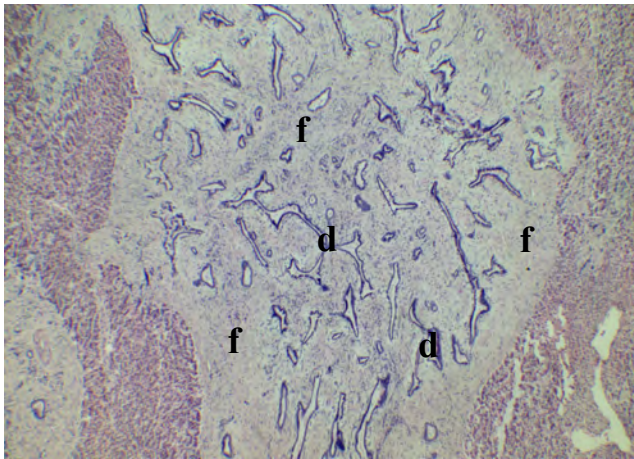


**Figure 4.** Macroscopic findings of a dairy cow with cholelithiasis, coledocolithiasis and hepatolithiasis. Multiple and random red foci in the parenchyma, measuring approximately 0,5 cm in diameter (arrows). Also, another ectatic biliary duct with a calculus.

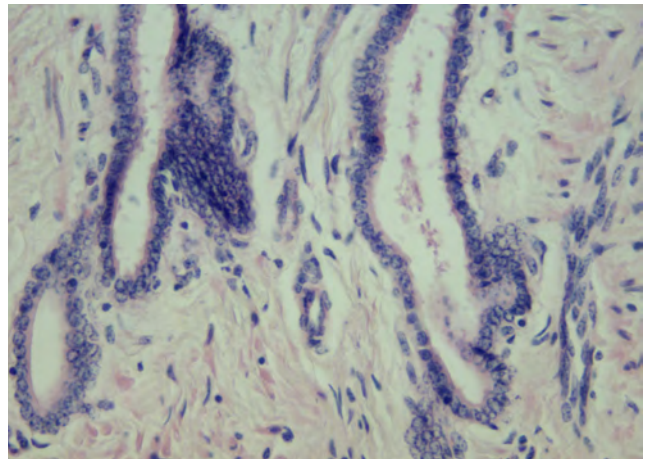
Histologically, at liver, there was moderate multifocal fibrosis of the portal spaces with bile duct hyperplasia ranging from mild to intense (Fig. 6 and 7), and multiple foci of dense lymphocytic infiltrate. Multiple focally extensive areas surrounded by abundant proliferation of matrix-producing fibroblasts containing in the central region a large amount of amorphous eosinophilic material and neutrophilic inflammatory infiltrate with macrophages; characterizing an hepatic abscess. Moreover, occasional foci of initial abscess were observed (Fig. 8) and multifocal areas of hepatocytes loss and necrosis with moderate neutrophilic infiltrate (Fig. 9), also mild accumulation of yellowish pigment in Kupffer cells cytoplasm (bilirubin). The diagnosis was cholelithiasis and severe choledocholithiasis with severe multifocal abscessive hepatitis, moderate multifocal necrotizing hepatitis and severe, multifocal portal fibrotic lymphocytic cholangiohepatitis.



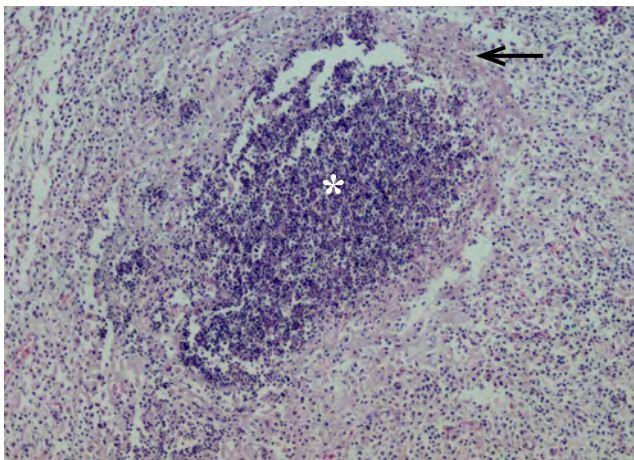
**Figure 5.** Total of calculi collected in a dairy cow with cholelithiasis, choledocholithiasis and hepatolithiasis.



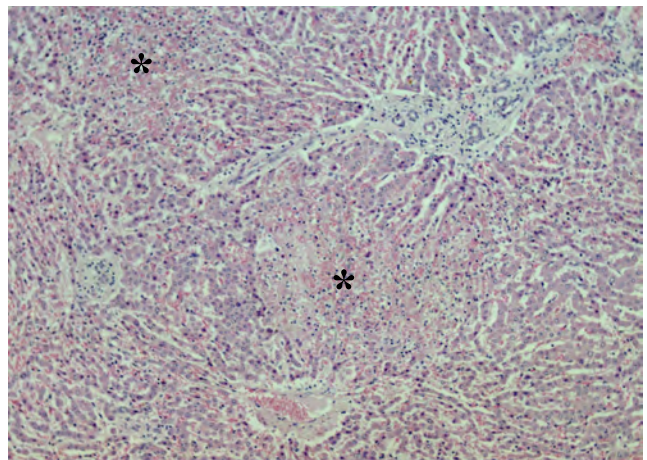
**Figure 6.** Microscopic findings in the liver of a dairy cow with macroscopic hepatolithiasis. Abundant ductal proliferation (d) and marked periportal fibrosis (f). HE. 50x.



**Figure 7.** Microscopic findings in the liver of a dairy cow with macroscopic hepatolithiasis. Higher magnification of ductal proliferation and periportal fibrosis. HE. 400x.



**Figure 8.** Microscopic findings in the liver of a dairy cow with macroscopic hepatolithiasis. Initial abscess formation. Note central area of abundant neutrophils (\*) surrounded by debris and fibrinous exudate. HE. 100x.



**Figure 9.** Microscopic findings in the liver of a dairy cow with macroscopic hepatolithiasis. Multifocal areas of hepatocytes necrosis (\*) Notice mild periportal fibrosis with ductal hyperplasia (h). HE. 100x.

## Discussion

For the best of our knowledge this is the first report of cholelithiasis, coledocolithiasis and hepatolithiasis with secondary necrotizing hepatitis and abscedative cholangiohepatitis in a dairy cow. There is just one report of hepatolithiasis in a cow (13), which lacks hepatic necrosis and abscedation, with clinical signs that are somewhat similar, but milder than to those observed in the present case. A survey in Brazil found colelithis only at the gallbladder of 91 bovines, without any macroscopic hepatic lesion; being calculi considered as an incidental finding (10), and any case of 13 cholangiohepatitis in cattle was caused by coleliths in another survey (6). Hepatolithiasis lesions are well described in horses, with firm liver, diffuse proliferation of fibrous connective tissue and bile ducts, and atrophy of one of the lobes (11, 12). Advanced age in extensive system production probably may have contributed to calculi formation in the present case; also coledocolitiasis and hepatolithiasis are likely to be secondary, which means that calculi formation probably had formation in the gallbladder and later ascended the biliary tract.

Once in the common duct and liver biliary tree, calculi caused compression of the biliary flow, resulting in post hepatic icterus, cholangiohepatitis, biliary ducts dilatation and fibrosis, which is compatible with the described in the literature in horses (8, 9) and also in cattle (13). Moreover, similarly to the present case, abundant portal fibrosis was visualized in an experimental study of rats submitted to extrahepatic obstruction; concluding that fibrosis occurs due initial deposition of collagen surrounding the biliary ducts and progress to bridge fibrosis (14).

Unfortunately, microbiological identification was not possible to be performed in the present case, however, hepatic abscesses and necrosis are likely to be caused by bacterial infection. In fact, colelithis in cattle has its own microbiota, formed by *Staphylococcus* spp., *Enterobacteriaceae*, *Enterococcus* spp. and *Salmonella* spp. (4). In human beings, colelithis are a common cause of bacterial infection with abscedation of biliary tree and biofilm formation by salmonella or other gram negative bacteria (7). In conclusion cholelithiasis, coledocolithiasis, and mainly hepatolithiasis, may occur in cattle associated to clinical and anatomic pathology alterations; and necrotizing hepatitis or abscedative cholangiohepatitis should be expected with unfavorable clinical outcome.

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