

Cholecystoduodenostomy Secondary to Common Bile Duct Obstruction in a Dog

Karen Magalhães Jovani¹, Pietra Nunes Berger¹, Fernando Peretti Guimarães²,
Felipe Gazza Romão¹ & Victor José Vieira Rossetto¹

ABSTRACT

Background: Cholelithiasis is an obstructive syndrome of the hepatobiliary system associated with altered local homeostasis with thickening and slowing of the flow of bile, condensation of bile secretion, and formation of gallstones. Hepatopathy due to copper accumulation contributes to the formation of gallstones by breaking down cellular components through the synthesis of reactive oxygen species, damaging the hepatobiliary parenchyma and causing inflammation of the liver. This study aimed to report a surgical treatment that could re-establish extrahepatic biliary drainage in a canine patient with total ductal obstruction due to the presence of gallstones adhered to the lumen of the common bile duct.

Case: A 7-year-old neutered male shih-tzu dog, weighing 9.9 kg, was attended with a history of chronic liver disease associated to hypercholesterolemia and hyperammonemia. Liver biopsy showed chronic hepatopathy due to copper accumulation. Additionally, the animal had episodes of emesis, apathy, anorexia, and abdominal pain. Blood count, biochemical, and imaging tests showed altered parameters, as increased hepatic enzymes. Abdominal ultrasonographic evaluation showed liver parenchyma permeated by various spherical and cavitary structures, and the gallbladder with hyperechogenic microstructures forming reverberations. Moreover, the topography of the cystic duct and common bile duct revealed dilatation of both, with hyperechogenic content forming superior acoustic shadowing. The changes indicate chronic hepatopathy, which is related to severe hepatic fibrosis, and an obstructive process of the gallbladder and bile ducts due to lithiasis. Surgical intervention was performed to resolve the cholestasis due to obstruction of the common bile duct, initially by duodenotomy, visualization of the duodenal papilla and unsuccessful choledochal catheterization. Due to this, it was performed cholecystoduodenostomy, effectively diverting, and redirecting the patient's hepatobiliary flow by anastomosing the gallbladder to the descending duodenum. Five months after surgery, the animal was clinically well and had no pain or abdominal palpation.

Discussion: The interruption of the flow of bile by gallstones into the biliary tract makes it progressively dilated. The patient in question had biliary concretion and obstructive biliary calculi, and the retained gallstones became progressively larger as the solutes concentrated. In the case of obstruction, the indication is catheterization and lavage of the common bile duct. During this maneuver, the gallstone is propelled into the gallbladder, which is then excised to prevent recurrence of the obstruction. However, this maneuver was not successful in this case report, as the gallstone was adhered to the wall of the common bile duct. Therefore, when it is not possible to restore the patency of the bile ducts, it is recommended to create an alternative route for the bile to redirect the bile flow. Cholecystoduodenostomy is currently an accepted technique for obtaining biliary enteric anastomoses in dogs. This procedure is only performed when the gallbladder is in good anatomical condition.

Keywords: hepatopathy, hepatobiliary system, liver failure, cholelithiasis, enterobiliary, cholestasis.

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¹Curso de Medicina Veterinária, Pontifícia Universidade Católica de Minas Gerais (PUC MINAS), Campus Poços de Caldas. Poços de Caldas, MG, Brazil. ²Private Veterinary Practitioner, Marília, SP, Brazil. CORRESPONDENCE: V.J.V. Rossetto [vjvrossetto@hotmail.com]. Av. Padre Cletus Francis Cox n. 1661. Bairro Jardim Country Club. CEP 37714-620 Poços de Caldas, MG, Brazil.

INTRODUCTION

The hepatobiliary system is composed of the gallbladder and branched bile ducts, which direct bile and also excrete metabolites, certain drugs [4,5,12] and microminerals, such as copper [1,3,10,13,16].

Copper accumulation results in successive lesions in the organelles of the hepatocytes, that predispose to hepatitis and alterations in the hepatic architecture due to hepatocellular degeneration [1-3,6,7,9,13,14,18]. Hepatic architecture abnormalities predispose to increased cellularity, that combined to bilirubin, phospholipids, bile acids and cholesterol, results in the condensation of these constituents into crystals, which become compacted and precipitate in the lumen of the bile ducts, as choleliths [2,3,5,15].

Choleliths can result in biliary obstruction with serious clinical complications, such as gallbladder rupture [2,3,5,8,11]. Obstructive cholelithiasis may require catheterization and choledochal lavage to restore the patency of the biliary tract. Since these procedures are refractory, cholecystoduodenostomy through biliary enteric anastomoses may be necessary to redirect the bile flow [12,16,17].

This study aims to report the surgical treatment of cholecystoduodenostomy for reestablishment of the extrahepatic biliary drainage in a dog with total obstruction of the common bile duct. The preserved gallbladder allowed the diversion of the enterobiliary route with resolution of clinical signs.

CASE

A 7-year-old neutered male shih-tzu dog, weighing 9.9 kg, was attended with a history of chronic liver disease associated to hypercholesterolemia and hyperammonemia. Due to acute peritonitis of unknown origin, the patient was submitted to an exploratory laparotomy 3 years ago. At this moment, a liver biopsy was performed and revealed chronic hepatopathy due to copper accumulation. Since then, the dog receives adjuvant nutritional treatment with a commercial diet with moderate content of high-quality protein, high content of essential fatty acids and highly digestible carbohydrates [Veterinary Hepatic Royal Canin¹]. Additionally, it was continued the treatment with silymarin² [Forfig[®] - 50 mg/kg, BID], ursodeoxycholic acid³ [Ursacol[®] - 15 mg/kg, BID], s-adenosyl-methionine⁴ [Denosyl[®] - 20 mg/kg, BID], colchicine⁵ [Cixin[®] - 0.03 mg/kg, SID], prednisone⁶ [Predsim[®] - 0.5 mg/kg,

SID], d-penicillamine⁷ [Cuprimine[®] - 10 mg/kg, BID], and lactulose⁸ [Lactulona[®] - 0.25 mL/kg, BID].

According to the owner, the dog presented episodes of vomiting, apathy, anorexia and abdominal pain. Laboratory exams showed an increase in alanine aminotransferase [269 U/L (ref: 21-102 U/L)], alkaline phosphatase [681 U/L (ref: 20-156 U/L)], gamma glutamyltransferase [8.3 U/L (ref: 1.2-6.4 U/L)], total cholesterol [226.1 mg/dL (ref: 135-270 mg/dL)], triglycerides [195.5 mg/dL (ref: 20-112 mg/dL)], total bilirubin [1.43 mg/dL (ref: 0.1-0.6 mg/dL)], direct bilirubin [0.16 mg/dL (ref: 0-0.3 mg/dL)], indirect bilirubin [1.27 mg/dL (ref: 0.1-0.3 mg/dL)], and activated thromboplastin time [22.5 s (ref: 8-18 s)].

Due to the altered parameters, an abdominal ultrasonographic examination was requested, and revealed heterogeneous hepatic parenchyma with several spherical and cavitary structures, indicative of chronic liver disease, related to severe hepatic fibrosis. Additionally, several hyperechoic microstructures forming reverberation were observed into the gallbladder (Figure 1A), suggestive of lithiasis. The cystic duct and the common bile duct (Figure 1B) were both dilated, and a hyperechoic content with acoustic shadowing forming was observed close to the duodenal papilla, indicating an obstructive process of the bile ducts.

A tomographic evaluation was suggested, but the owner declined. Due to progression of the clinical signs, surgical intervention was performed to restore bile flow.

At the laparotomy, were seen some tortuous vessels, and the dilated common bile duct (Figure 2). The gallbladder was released from the hepatic fossa by divulsion. Sequentially, a duodenotomy was performed by an incision of approximately 2 cm in length on the antimesenteric border to visualize the duodenal papilla. The cholelith was palpable externally to the duct, but it appeared immobile. Then, the duodenal papilla was catheterized to allow retrograde lavage with sterile saline. This procedure was unsuccessful, because the cholelith was firmly attached to the wall of the common bile duct.

Therefore, the released gallbladder was mobilized with retention sutures (Figure 3), performed using 3-0 nylon, and positioned adjacent to the antimesenteric border of the duodenum, close to the duodenojejunal transition, and in order not to tension it. The gallbladder was emptied with a 13 mm x 0.3 mm hypodermic needle. The bile obtained from the puncture was sent

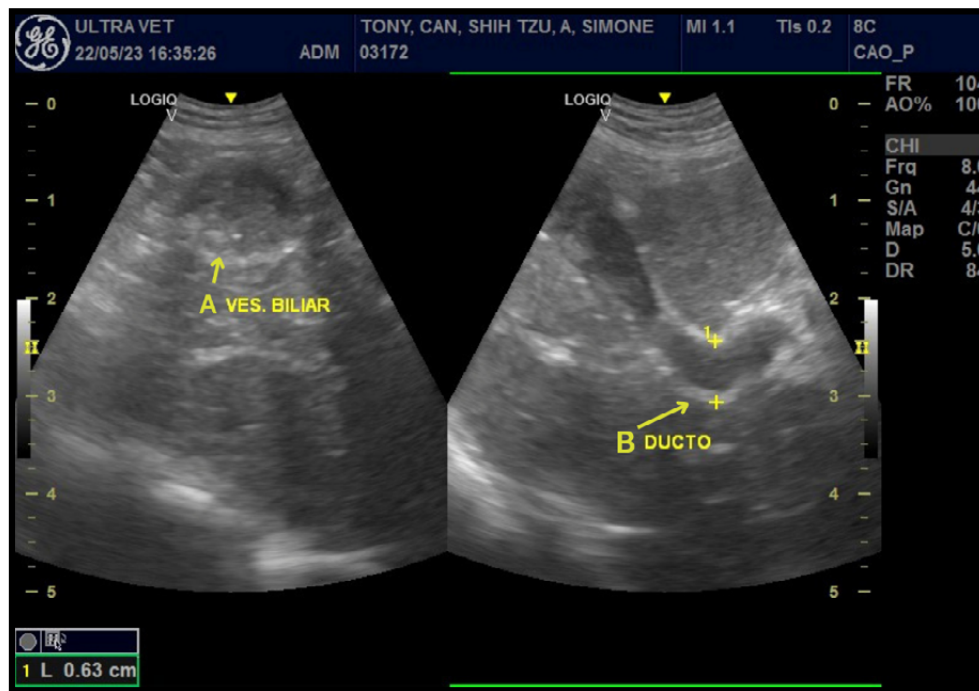


Figure 1. Abdominal ultrasonographic examination of a 7-year-old shih-tzu dog with common bile duct obstruction secondary to cholelithiasis. A- Distended and irregular gallbladder filled with hyperechoic microstructures. B- Dilated common bile duct.

for culture and antimicrobial susceptibility test, which confirmed the presence of *Escherichia coli*.

The 1st duodenal incision was closed in full thickness and with a simple interrupted suture pattern, using 4-0 nylon. A 2nd duodenal incision of approximately 2 cm in length was performed on the antimesenteric surface, close to the duodenojejunal transition. The gallbladder was then opened using an iris scissor and for approximately 2 cm in length. The

area around the gallbladder was isolated with sterile laparotomy compresses. Sequentially, the gallbladder was sutured to the small intestine in 2 planes. The 1st plane between the serous of the gallbladder and the intestine in a continuous pattern of 3 cm in length, using 4-0 polydioxanone, and the 2nd plane between the mucous of the opened gallbladder and the intestine, in a continuous pattern of 2 cm in length, using 4-0 polydioxanone (Figure 3).

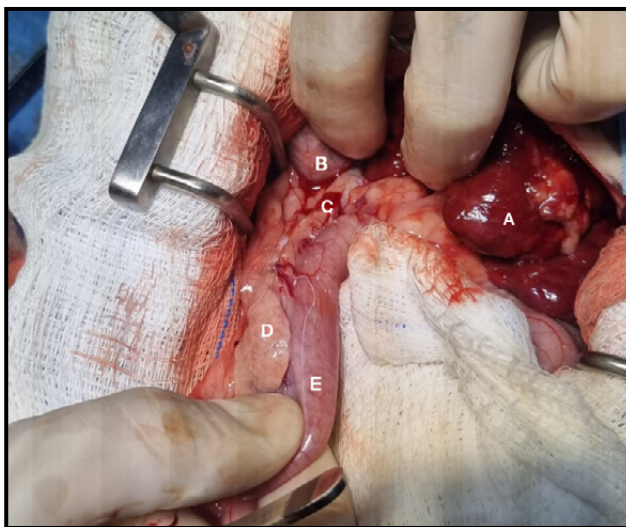


Figure 2. Hepatobiliary system of a 7-year-old shih-tzu dog with chronic liver disease and obstructive cholelithiasis. A- Liver. B- Gallbladder. C- Common bile duct. D)- Pancreas. E- Duodenum.

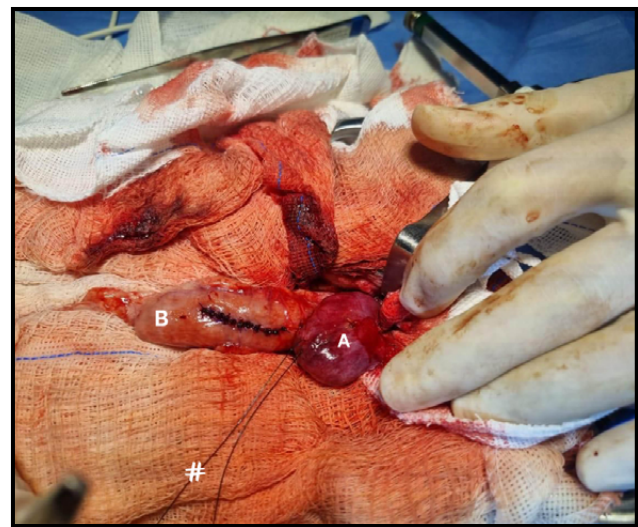


Figure 3. Cholecystoduodenostomy in a 7-year-old shih-tzu dog with obstructive cholelithiasis. A- Gallbladder. B- Duodenum. #- Retention suture.

Finally, the luminal occlusion was evaluated by compressing the gallbladder, and excluding the possibility of leakage, the omentum was mobilized and sutured over the site of the cholecystoduodenostomy.

In the postoperative period, the animal received tramadol hydrochloride⁹ [Cronidor® - 4 mg/kg, BID], dipyrone¹⁰ [Novalgina® - 25 mg/kg, TID], meloxicam¹¹ [Maxicam® - 0.1 mg/kg, SID], and amoxicillin with potassium clavulanate⁹ [Agemoxi® - 25 mg/kg, BID]. After the antimicrobial susceptibility test result, the antibiotic was changed to cephalexin¹¹ [Celesporin® - 25 mg/kg, BID].

Five months after surgery, the animal recovered well without abdominal pain. A new abdominal ultrasonographic examination was performed and revealed the relation of the gallbladder to the duodenum, filled with anechoic content with hyperechoic microstructures. The volume of the gallbladder was established in a half of the 1st ultrasonographic examination. Additionally, the gallbladder wall presented a regular pattern and was normally thickened. The duodenal papilla, the cystic duct and the common bile duct remained dilated.

DISCUSSION

The interruption of the bile duct flow occurs chronically due to changes in intraluminal homeostasis and inflammation, which induces progressively the bile thicker [3,4,13,15]. The inflammation in the present case may be due to the chronic liver disease, secondary to copper accumulation [1,9,18].

When there is obstruction of the common bile duct, the bile is not drained into the small intestine and it gradually accumulates into the gallbladder, dilating it. Cholestasis contributes consequently to precipitation of bile constituents and choleliths formation [2,3]. The dog of the reported case, in fact, presented biliary concretion and an obstructive cholelith into the common bile duct.

Catheterization and lavage of the biliary tract indicated an obstructive process. During this maneuver, the cholelith is propelled to the gallbladder, which is

subsequently excised in order to prevent recurrence of the obstruction [8,12,16,17]. Catheterization and lavage of the biliary tract, however, was not successful in the present case, because the cholelith was adhered to the wall of the common bile duct. Cholecystoduodenostomy, as an alternative route for the bile, is recommended when it is not possible to reestablish the patency of the bile ducts [12,16,17], and was performed in the present case.

The possible complications of enterobiliary anastomosis are necrosis and ulceration of the gallbladder wall, retractions and dehiscence of the suture, and cholangitis secondary to inadequate drainage of the gallbladder into the duodenum and reflux of the intestinal contents [8,12]. Such complications may result in biliary peritonitis, which was not evidenced in the present case, because the clinical improvement of the patient, and the abdominal ultrasonographic findings.

It can be concluded that cholecystoduodenostomy creates a permanent communication between the gallbladder and the duodenum, which is effective to reestablishes the exocrine bile flow, ensuring the anatomical integrity of these structures and the biliary tract. The reported dog presented a satisfactory clinical response and improvement in the postoperative abdominal ultrasonographic examinations.

MANUFACTURERS

¹Royal Canin of Brazil Industry and Commerce Ltd. Descalvado, SP, Brazil.

²Eurofarma Laboratórios S.A. Itapevi, SP, Brazil.

³Chiesi Farmacêutica Ltda. Aparecida de Goiania, GO, Brazil.

⁴Laboratórios Nutramax Veterinary Sciences Inc. Lancaster, SC, USA.

⁵Geolab Indústria Farmacêutica S.A. Anápolis, GO, Brazil.

⁶Brainfarma Indústria Química e Farmacêutica S.A. Anápolis, GO, Brazil.

⁷Cellera Farmacêutica S.A. Indaiatuba, SP, Brazil.

⁸Fresenius Kabi Áustria GmbH. Estermanstrasse, Linz, Austria.

⁹Agener União Saúde Animal. Pouso Alegre, MG, Brazil.

¹⁰Sanofi Medley Farmacêutica Ltda. Suzano, SP, Brazil.

¹¹Ourofino Saúde Animal. Cravinhos, SP, Brazil.

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REFERENCES

- 1 Amudson L.A., Kirn B.N., Swensson E.J., Millican A.A. & Fahey G.C. 2024. Copper metabolism and its implications for canine nutrition. *Translational Animal Science*. 8. DOI: 10.1093/tas/txad147.
- 2 Campos A.G., Daneze E.R., Terra Jr. J.A., Barbosa A.B.R., Sliuzas G.T.S., Silva A.A. & Terra S.A. 2013. Estudo ultrassonográfico morfométrico do fígado e trato biliar de suínos submetidos a obstrução biliar experimental. *Radiologia Brasileira*. 46(2): 89-95. DOI: <https://doi.org/10.1590/S0100-39842013000200012>.

- 3 **Center S.A. 2014.** Doenças Hepáticas em Pequenos Animais. In: Khan C.M. (Ed). *Manual Merck de Veterinária*. 10.ed. São Paulo: Roca, pp.440-449.
- 4 **Cosme A.R.M. 2021.** Alterações ecográficas da árvore biliar associadas à realização de cultura de bÍlis: estudo retrospectivo de 22 casos. 75 p. Lisboa. Dissertação (Mestrado Integrado em Medicina Veterinária) – Universidade de Lisboa - Faculdade de Medicina Veterinária.
- 5 **Couteiro M.C.M.P. 2021.** Colecistite bacteriana em cães: estudo de sete casos clÍnicos. 65 p. Lisboa, PEs. Dissertação (Mestrado em Integrado em Medicina Veterinária) - Universidade de Lisboa - Faculdade de Medicina Veterinária.
- 6 **Elias C. 2015.** Qualidade nutricional de rações para cães: Influência de Zn na absorção de Cu e na prevenção de doença hepática. 141 p. Piracicaba, SP. Tese (Doutorado em Ciências) - Programa de Pós-Graduação em Ciências, Centro de Energia Nuclear na Agricultura da Universidade de São Paulo. DOI: 10.11606/T.64.2016.tdc-05072016-150743.
- 7 **Fieten H., Leegwater P.A.J., Watson A.L. & Rothuizen J. Dez. 2021.** Canine models of copper toxicosis for understanding mammalian copper metabolism. *Springer Mammalian Genome*. Springerlink, pp.1-14. DOI: 10.1007/s00335-011-9378-7.
- 8 **Folk C. & Lux C. 2019.** Choledochotomy for Obstructive Choledocholithiasis in Two Dogs. In: Case Reports in Veterinary Medicine (Tennessee, USA). *Hindawi Limited*. 2019: 4748194. DOI: 10.1155/2019/4748194.
- 9 **Freitas J.F.S. 2021.** Avaliação da retenção de cobre em casos de patologia crônica no fÍgado de cão (*Canis familiaris*). 56p. Lisboa, PEs. Dissertação (Mestrado integrado em Medicina Veterinária) - Universidade de Lisboa - Faculdade de Medicina Veterinária. Disponível em: <https://www.repository.utl.pt/handle/10400.5/22172>
- 10 **Gupta A. & Al-dissi A. 2022.** Correlation of hepatic copper levels, rhodanine scores and histological diagnosis in archived canine liver samples. *The Canadian Journal of Veterinary Research*. 86(4): 300-305. PMID: 36237829.
- 11 **Lee S., Lee A., Kweon O.K. & Kim W.H. 2019.** Changes in pre- and postoperative serum leptin concentrations in dogs with gallbladder mucocele and cholelithiasis. *BMC Veterinary Research* (Republic of Korea). Ed. 15: 215, pp.1-9. DOI: 10.1186/s12917-019-1964-z.
- 12 **Mehler S.J. 2011.** Complications of the Extrahepatic Biliary Surgery in Companion Animals: Extrahepatic Biliary Surgery in Companion Animals. *Veterinary Clinics: Small Animal Practice*. 41(5): 949-967. DOI: 10.1016/j.cvsm.2011.05.009.
- 13 **Nakaichi M., Iseri T., Horikirizono H., Komine M., Itoh H., Sunahara H., Nemoto Y., Itamoto K & Tani K. 2021.** Copper-associated hepatitis in a young Dalmatian dog in Japan. *The Japanese Society of Veterinary Science*. 83(6): 911-915. DOI: 10.1292/jvms.21-0061.
- 14 **Nivy R., Kuzi S., Swinburne J., Constantino-casas F., Gajanayake I., Bruchim Y., Berkowitz A. & Watson P. 2023.** Copper-associated chronic hepatitis in Cavalier King Charles spaniels. *Veterinary Record*. 194(3) :c3561. DOI: 10.1002/vetr.3561.
- 15 **Prestes R.S. 2020.** Análises Comparativas Entre Exames Ultrassonográficos e Histopatológico da Vesícula Biliar em cães. 52p. Belo Horizonte, MG. Dissertação (Mestre em Ciência Animal) - Programa de Pós-Graduação em Ciência Animal, Universidade Federal de Minas Gerais.
- 16 **Radlinsky M.G. 2021.** Surgery of the extrahepatic biliary system. In: Fossum T.W., Hedlund C.S. & Hulse D.A. (Eds). *Small Animal Surgery*. 5th edn. Philadelphia: Elsevier, pp.573-576.
- 17 **Todescato N.K., Silva R.G., Gudiel C., Kaspari P.E., Beckenkamp M.B., Raiser A.G. & Cartana C.B. 2020.** Colecistoduodenostomia em Cão: Relato de Caso. In: *III Simpósio e Mostra Científica de Pequenos Animais* (Itapiranga, Brazil). p.20.
- 18 **Webster C.R.L., Penninck D.G., Center S.A., Cullen J.M., Richter K.P., Twedt D.C. & Watson P.J. 2019.** ACVIM consensus statement on the diagnosis and treatment of chronic hepatitis in dogs. *Journal of Veterinary Internal Medicine*. DOI: 10.1111/jvim.15467.