

Case Report

Cholecystoenterostomy Surgery in a Cat: A Case Report

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ABSTRACT

ARTICLE
INFO

The purpose of this case report is to evaluate the outcomes of cholecystoenterostomy surgery following the diagnosis of bile duct obstruction in a cat based on clinical, ultrasonographic, and laboratory findings. The subject of this study was an 8-month-old Blue Point cat. The cat was brought Animal Hospital with complaints of vomiting 7-8 times a day, anorexia, and lethargy. A physical examination, ultrasonographic examination, and blood analysis were performed. Leukopenia, neutropenia hypokalemia, and hyperlactatemia and metabolic acidosis were diagnosed. Feline Panleukopenia Virus (FPV) antigen test for diagnosis of panleukopenia was also confirmed as positive. Ultrasonographic examination revealed dilatation of the gallbladder and thickening of its wall. There was a decrease in intestinal transport from the proximal part of the duodenum. Fluid electrolyte and supportive treatment was started for panleukopenia. The common bile duct (ductus choledochus) was incised, and a cholecystoenterostomy 1.0 catheter was placed to relieve the obstruction. The duct was sutured with 4/0 multifilament absorbable suture material. The patient was discharged after staying for one week. One week later, the cat was called for a follow-up to remove the sutures. No complications were observed, and the general condition of the patient was found to be good. The prognosis has been monitored for three month, with the patient's condition being assessed through monthly follow-up visits. This case demonstrates that cholecystoenterostomy can be a successful surgical option for the treatment of biliary obstruction in cats when appropriate case selection and careful postoperative monitoring are performed.

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Bir Kedide Kolesistoenterostomi Cerrahisi: Olgu Sunumu

ÖZET

MAKALE
BİLGİSİ

Bu olgu sunumunun amacı, bir kedide safra kanalı tıkanıklığı tanısını takiben gerçekleştirilen kolesistoenterostomi ameliyatının sonuçlarını klinik, ultrasonografik ve laboratuvar bulgularına dayanarak değerlendirmektir. Bu çalışmada 8 aylık Blue Point ırkı bir kedi değerlendirilmiştir. Kedi günde 7-8 kez kusma, iştahsızlık ve uyuşukluk şikayetleriyle Hayvan Hastanesi'ne getirildi. Fiziksel muayene, ultrasonografik muayene ve kan analizi yapıldı. Lökopeni, nötropeni hipokalemi ve hiperlaktatemi ve metabolik asidoz teşhis edildi. Panlökopeni tanısı için yapılan Feline Panleukopenia Virus (FPV) antijen testi de pozitif olarak doğrulandı. Ultrasonografik muayenede safra kesesinde dilatasyon ve duvarında kalınlaşma tespit edildi. Duodenumun proksimal kısmından bağırsak transportunda azalma vardı. Panlökopeni için sıvı elektrolit ve destekleyici tedavi başlandı. Ortak safra kanalı (ductus choledochus) kesildi ve tıkanıklığı gidermek için kolesistoenterostomi 1.0 kateteri yerleştirildi. Kanal 4/0 multifilament emilebilir dikiş materyali ile dikildi. Hasta bir hafta kaldıktan sonra taburcu edildi. Bir hafta sonra dikişlerin alınması için hasta kontrole çağrıldı. Herhangi bir komplikasyon gözlenmedi ve hastanın genel durumu iyi bulundu. Prognoz üç ay boyunca izlendi ve hastanın durumu aylık takip ziyaretleri ile değerlendirildi. Bu olgu, kolesistoenterostominin uygun vaka seçimi ve dikkatli postoperatif takip ile kedilerde safra kanalı tıkanıklığının tedavisinde başarılı bir cerrahi seçenek olabileceğini göstermektedir

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INTRODUCTION

Cholecystoenterostomy is a surgical procedure in which the gallbladder is connected to the small intestine. It is performed when the bile duct is obstructed due to an unresolvable cause, allowing bile to pass from the liver to the intestine. Extrahepatic bile duct obstruction, which occurs due to blockage along the ductus choledochus or at the point where it meets the duodenum, is a life-threatening condition commonly seen in cats (Mayhew and Weisse, 2008; Otte et al., 2017). The primary causes of extrahepatic bile duct obstruction include pancreatitis, cholangiohepatitis, neoplasia, extra- or intraluminal masses, inflammation in adjacent tissues, cholelithiasis, cholecystitis, diaphragmatic hernia and liver parasites. These etiologies lead to varying degrees of cholestasis in cats and include obstruction, inflammation and exudation processes in the pathogenesis of disease (Willard and Fossum, 2013). Structural changes in the bile duct, such as dilatation, increase the risk of complications by increasing susceptibility to bacterial infection from the intestines. Therefore, clinical signs of biliary tract disease in cats vary depending on the underlying disease and are non-specific (Buote et al., 2006).

The anatomy of the hepatobiliary system in cats differs from that in dogs, which increases the susceptibility of cats to inflammatory hepatobiliary disease. About one in eight cats has some form of accessory gallbladder. These are usually asymptomatic, and these anomalies are often discovered incidentally during ultrasound examination or necropsy. Most cats with cholelithiasis, lymphocytic cholangitis, and neoplasia are male. The gallbladder is supplied by a single artery, but infarction has never been reported in cats. Biliary cysts are found not only in domestic cats but also in many wild felids. In domestic cats, liver cysts are associated with polycystic kidney disease. Histology, cytology, and culture are valuable diagnostic tools in feline biliary diseases (Otte et al., 2017).

The anatomical and etiological diversity of hepatobiliary disease makes medical and surgical treatment decisions in cats complex. However, surgery is indicated in cases of biliary peritonitis, severe cholestasis, focal neoplasia or resistance to medical treatment. For the surgical treatment of extrahepatic bile duct obstruction, temporary procedures such as cholecystostomy catheter placement and choledochal stenting, as well as permanent procedures like cholecystectomy, cholecystoenterostomy, choledochojunostomy, or choledocotomy, are used to restore bile flow and reduce bile duct tension (Bradley and Smeak, 2016; Mayhew and Weiss, 2018).

The purpose of this case report is to evaluate the outcomes of cholecystoenterostomy surgery following the diagnosis of bile duct obstruction in a cat based on clinical, ultrasonographic, and laboratory findings.

Case Presentation

The subject of this study was an 8-month-old Blue Point cat. The cat was found on the street and was brought to the Selçuk University Veterinary Faculty Animal Hospital after one week with complaints of vomiting 7-8 times a day, anorexia, and lethargy. A physical examination, ultrasonographic examination, and blood analysis were performed. During the physical examination, abdominal pain was noted upon palpation. A complete blood count revealed leukopenia (WBC count 1.7) and neutropenia (Neu count 0.13), and blood gas analysis revealed hypokalemia, hyperlactatemia and metabolic acidosis. In addition, alanine aminotransferase, total bilirubin and direct bilirubin levels were high (Table 1) Feline Panleukopenia Virus (FPV) antigen test (Vcheck V200 automatic veterinary hormone analysis and immune tests device, BIONOTE, Korea) was performed on the fecal sample, and the diagnosis of panleukopenia was confirmed as positive (Table 2).

Table 1: The results of haemogram, blood gases and biochemical analysis parameters are shown on admission

Hematological values			Blood gases values		
Parameters	Results	Referans value	Parameters	Results	Referans value
WBC (x10 ⁹ /L)	1,77	3,46-17,5	pH (mmol/L)	7,31	7,35-7,45
NEU (x10 ⁹ /L)	0,13	1,95-11,5	pCO ₂ (mmHg)	43,3	29,0-45,0
LYM (x10 ⁹ /L)	1,23	0,73-7,40	pO ₂ (mmHg)	27,6	35,0-100,0
MON (x10 ⁹ /L)	0,14	0,07-1,36	sO ₂ %	31,1	60,0-100,0

EOS (x10 ⁹ /L)	0,27	0,06-1,63	K (mmol/L)	3,2	3,5-5,8
NEU %	7,5	30-83,5	Na (mmol/L)	158	135,0-152,0
LYM %	69,4	7,0-60	Ca (mmol/L)	0,77	1,1-1,6
MON %	7,7	1,0-9	Cl (mmol/L)	120	106,0-115,0
EOS %	15,2	1,0-11,0	Glu (mg/dL)	91	65,0-160,0
RBC (x10 ¹² /L)	11,86	4,6-10,2	Lac (mmol/L)	4,3	0,6-2,2
HGB (g/dL)	17,0	8,5-15,3	HCO ₃ (mmol/L)	22,2	23,0-27,0
HCT %	46,7	26,0-47,0	BEecf (mmol/L)	-3,9	-5,0-5,0
MCV (fL)	39,4	38,0-54,0	Biochemical values		
MCH (pg)	14,3	11,8-18,0	ALT (U/l)	42,33	7-38
MCHC (g/dL)	36,3	29,0-36,0	AST (U/l)	55,84	25-97
MPV (fL)	12,1	9,9-16,3	ALP (U/l)	26,05	0-45
PDW(10GSD)	14,8	12,0-17,5	GGT (U/l)	2,52	1-10
PCT (mL/L)	2,63	0,9-7,0	Tbil (mmol/L)	1,24	0,1-0,6
PLT (x10 ⁹ /L)	217	100,0-518,0	Dbil (mmol/L)	0,41	0-0,3

Table 2: Feline Panleukopenia Virus (FPV) Ag Test result.

VCHECK V200	COI ≥ 1 positive COI < 1 negative
FPV Ag	COI:38 positive

Ultrasonographic examination revealed dilatation of the gallbladder and thickening of its wall. In addition, thickening of the mucosa layer with fluid accumulation was observed in the intraluminal part of different segments of the small intestine (Figure 1).

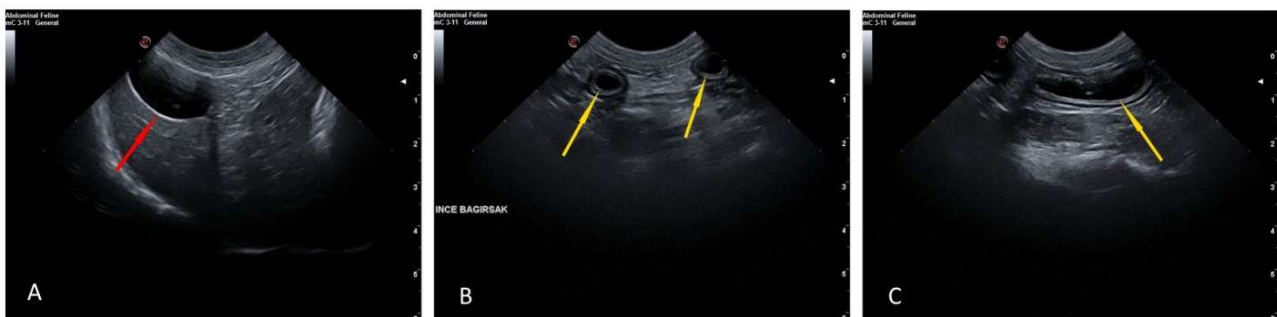


Figure 1: Ultrasonographic examination: Dilatation and wall thickening in the gallbladder (red arrow) (A), intraluminal fluid accumulation and thickening of the mucosal layer in the transversal view of the small bowel segments (yellow arrows)(B,C).

Fluid electrolyte and supportive treatment was started for panleukopenia. The following treatments were administered: Isolen 40 mL/kg, Duphalayt 2 mL/kg, 50% dextrose 1g/kg, Ceforce 30 mg/kg, Metrosel 5 mg/kg, Nacosel 100 mg/kg, Rextenol, Ondansetron 0.5 mg/kg, Zygosil 1 mg/kg, and Filgrastim in the serum. Despite two days of treatment, the vomiting did not resolve and jaundice developed. Ultrasonographic examination performed on the 2nd post-treatment day showed aggravation of gallbladder dilatation and dilatation of intrahepatic bile ducts. While gastrointestinal content was present in different segments of the small intestines, fluid accumulation was detected in some segments. In addition, thickening

of the mucosal layer and hypomotility were observed in the intestinal segments. There was a decrease in intestinal transport from the proximal part of the duodenum (Figure 2).

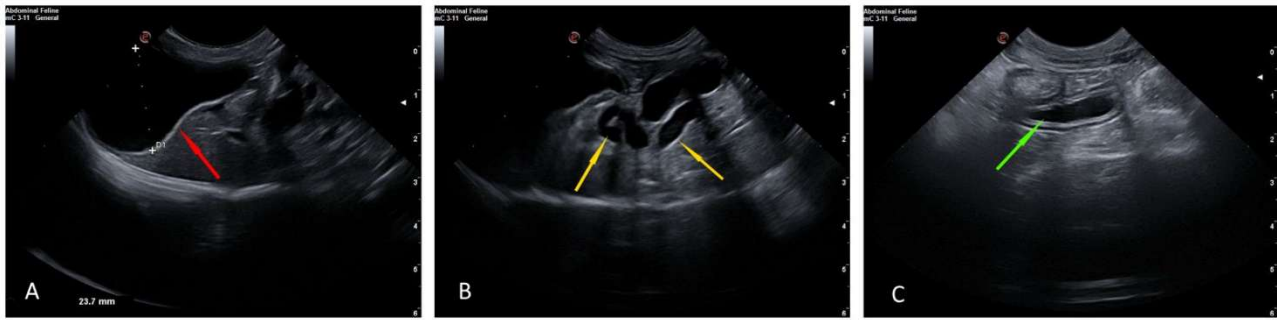


Figure 2: Ultrasonographic examination: Severe dilatation of the gallbladder (red arrow)(A), dilatation of intrahepatic bile ducts (yellow arrows) (B), and intraluminal fluid accumulation and gastrointestinal content in the transversal view of the small bowel segments (green arrow) (C).

On the basis of a repeat clinical and ultrasound examination, it was suspected that the case contained a foreign body and surgery was considered to be necessary. After fluid therapy, the cat was prepared for surgery. Following routine laparotomy preparations, sedation was induced using Medetomidine (Domitor-Zoetis) 0.04 mg/kg IM, and Butorphanol (Butomidor-İnterhas) 0.02 mg/kg IM, followed by induction with Propofol (Propofol-Lipuro %1) 4 mg/kg IV. Anesthesia was maintained with isoflurane (İsoflurane-ADEKA İlaç) at 2-3% concentration (Forane liquid 100 mL).

The cat was positioned in ventro-dorsal position, and an incision was made starting from the caudal umbilicus and extended to the pubis. The skin and subcutaneous tissue were separated using blunt dissection, and upon reaching the abdominal cavity, it was observed that the gallbladder was dilated, and the duodenal papilla opening into the duodenum was obstructed. The area surrounding the gallbladder and duodenum was covered with sterile, moist gauze. The common bile duct (ductus choledochus) was incised, and a cholecystoenterostomy 1.0 catheter was placed to relieve the obstruction. The duct was sutured with 4/0 multifilament absorbable suture material. A single-layer suture technique was performed. The abdominal wall was closed routinely with 3/0 multifilament absorbable suture material (polyglycolic acid), and the skin was closed with 3/0 multifilament absorbable suture material (Figure 3 and 4).

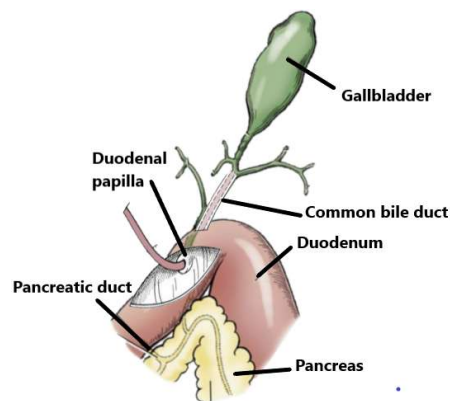


Figure 3: Anatomical section of the biliary system and the application of cholecystoenterostomy.

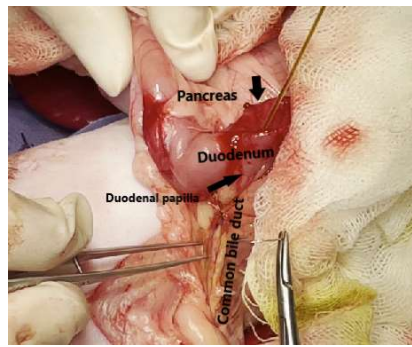


Figure 4: The duodenal papilla opening into the duodenum was observed to be obstructed. The common bile duct (ductus choledochus) was incised, and a cholecystoenterostomy 1.0 catheter was placed to relieve the obstruction.

In the postoperative period, the cat was given antibiotics Ceftriaxone (Ceforce- İstanbul İlaç) 40 mg/kg, twice daily IV for 7 days, along with daily fluid therapy at 50 mg/kg. Ursodeoxycholic acid (Ursomed-World Medicine İlaç) 10 mg/kg, twice daily PO, was administered for 5 days. Sukralfat (Antepsin- Bilim İlaç) 1g/5mL oral suspension was given at 0.5 g twice daily for 10 days. Additionally, postoperative analgesia was provided with Butorphanol (Butomidol-İnterhas) 0.04 mg/kg IM for 2 days.

The patient was discharged after staying for one week. One week later, the cat was called for a follow-up to remove the sutures. No complications were observed, and the general condition of the patient was found to be good. The prognosis has been monitored for two month, with the patient's condition being assessed through monthly follow-up visits.

RESULTS AND DISCUSSION

The gallbladder is part of the digestive system, and its primary function is to store bile. The gallbladder is connected to the digestive system via the ductus choledochus. Upon the onset of eating, the gallbladder receives signals to contract and push the stored bile through the bile ducts. Bile eventually reaches the common bile duct, the largest bile duct. It is then released into the duodenum via the common bile duct. The bile ducts in cats can be affected by a variety of disease processes and may be associated with concurrent disease in other organs such as the pancreas, liver and gastrointestinal tract (Cerna et al., 2020). Intrahepatic cholestasis is associated with inflammation, fibrosis, endotoxins or certain drugs, whereas extrahepatic cholestasis is usually secondary to cholelithiasis, neoplasia or inflammation of surrounding tissues (Gaillot et al., 2007). On the other hand, chronic inflammatory disease involving the liver, gallbladder, pancreas or intestines has been reported to be the most important aetiological factor in extrahepatic biliary obstruction in cats (Buote et al., 2006). In the present case, inflammation due to panleukopenia infection in the cat is thought to play a role in the etiology of the extrahepatic biliary obstruction. Cats that undergo cholecystectomy for non-neoplastic causes can have a favorable prognosis in terms of recovery and quality of life. Concurrent extrahepatic biliary duct obstruction is not a contraindication for cholecystectomy, provided that the common bile duct is reopened (Simpson et al., 2022). In cats that underwent cholecystectomy, 18 cats (78.3%) survived until discharge. Long-term follow-up (>60 days) was available for 16 cats, with a median of 1003 days (range: 81-4995 days). Fifteen cats survived for more than 6 months, while eight cats (44.4%) survived for more than 3 years. However, it must be emphasised that the overall prognosis in cats with extrahepatic biliary obstruction and cholecystoenterostomy is guarded to poor. Despite careful application of surgical techniques, the frequency of postoperative complications such as anorexia, anaemia and infection remains high due to surgical trauma to the pancreas, duodenum and gallbladder. Vomiting is the most common short and long term postoperative complication (Simpson et al., 2022). In the present case, the clinical condition of the cat improved completely during the two-month follow-up period, with no postoperative signs of gastrointestinal or hepatobiliary disease. This favourable outcome was considered to be related to the absence of neoplastic or progressive chronic inflammatory disease in the cat and the restoration of bile flow by surgery. The body needs bile to break down fats into fatty acids, which are then absorbed to facilitate various vital functions. The gallbladder aids this process by releasing bile when needed and storing it when not needed (Di Ciaula et al., 2018). Research in humans has shown that the removal of the gallbladder can cause significant changes in metabolism and may lead to a condition known as metabolic syndrome. This syndrome, which is characterized by high blood pressure, high blood sugar,

high cholesterol, and excessive abdominal fat, significantly increases the risk of heart disease and stroke (Di Ciaula et al., 2018). Compared to individuals without a history of cholecystectomy, the long-term risk of heart failure is increased by 22%, and the risk of a heart attack is increased by 45% after gallbladder removal (Kim et al., 2021). There are no studies on metabolic syndrome and long-term prognosis in cats. However, this does not mean that such issues will not arise during long-term follow-up. Immediate cholecystectomy in these cases may result in the cats continuing their lives with a diet-based management plan. This process is not easily controllable for cats. In cases without cholecystectomy, removing the gallbladder should not always be considered the first option. Instead, when there is an obstruction, opening the blockage with a surgical procedure like cholecystoenterostomy can improve the quality of life for the cats.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

AUTHOR CONTRIBUTION

Motivation / Concept: MA; Design: MA,Mİ; Control/Supervision: MA,Mİ; Data Collection and / or Processing: İS,TY,HES; Analysis and / or Interpretation: MA,Mİ, İS,TY,HES; Literature Review:MA,Mİ, İS,TY,HES; Writing the Article: MA,Mİ, İS,TY,HES; Critical Review: MA,Mİ, İS,TY,HES

ETHICAL APPROVAL

Selcuk University, Animal Experiments Ethics Committee 02.01.2025,/ E-34804145-020-911009 Number Ethics Committee Decision

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