

# COMPUTED TOMOGRAPHY EVALUATION OF THE LIVER AND GALLBLADDER IN DOMESTIC CATS (*Felis catus domesticus*) PARASITIZED BY *Platynosomum illiciens* (BRAUN 1901) KOSSAK 1910\*

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**ABSTRACT.** Azevedo F.D., da Veiga C.C.P., Scott F.B., Azevedo T.R.C., de Souza B.G. & Vulcano L.S. **Computed tomography evaluation of the liver and gallbladder in domestic cats (*Felis catus domesticus*) parasitized by *Platynosomum illiciens* (Braun 1901) Kossak 1910.** [Avaliação por tomografia computadorizada do fígado e da vesícula biliar em gatos domésticos (*Felis catus domesticus*) parasitados por *Platynosomum illiciens* (Braun 1901) Kossak 1910]. *Revista Brasileira de Medicina Veterinária*, 34(4):275-278, 2012. Instituto de Veterinária, Universidade Federal Rural do Rio de Janeiro, BR 465 Km 7, Seropédica, RJ 23890-000, Brasil. E-mail: felipeazevedo@globo.com

*Platynosomum illiciens* (Braun 1901) Kossack, 1910, is the most important trematode found in cats, and its prevalence can reach up to 85%. Due to the *P. illiciens* diagnosis is being done exclusively through the eggs presence of this parasite by fecal examination, and this is considered being little sensible, it is necessary the study of complementary tools of diagnosis for the parasite and the hepatic alterations possibly determined by this parasite. Therefore, computed tomography were used for the evaluation of alterations caused by *P. illiciens* in order to evidence alterations that aid in the diagnosis of this parasitosis or even to evidenced alterations caused by the platynosomiasis. Seven positive cats were found, and submitted to compute tomography. Six cats were observed with enlargement of the liver and in regard to the other findings the results were descriptive. The computed tomography were considered good diagnostic tools, evaluating with clarity the hepatic size, the hepatic parenchyma, the configuration and width of bile ducts, the gall bladder and the hepatic vessels.

**KEY WORDS.** Image diagnosis, liver fluck, feline.

**RESUMO.** *Platynosomum illiciens* (Braun 1901) Kossack 1910, é o mais importante trematódeo encontrado em felinos, e sua prevalência pode chegar a até 85%. Devido ao diagnóstico de *P. illiciens* estar

sendo feito exclusivamente através da descoberta de ovos do parasita por exame de fezes, isso é considerado pouco sensível, sendo necessário o estudo de ferramentas complementares de diagnóstico para o

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parasita e as alterações hepáticas determinadas por ele. Utilizou-se a tomografia computadorizada para avaliação de alterações causadas por *P. illiciens* objetivando o diagnóstico desta parasitose ou mesmo evidenciar alterações causadas pela platynosomíase. Sete gatos positivos foram submetidos a tomografia computadorizada. Em seis gatos observou-se aumento do fígado. A tomografia computadorizada foi considerada um bom instrumento de diagnóstico, permitindo avaliar o tamanho do fígado, o parênquima hepático, a configuração e a largura de ductos biliares, da vesícula biliar e dos vasos hepáticos.

**PALAVRAS-CHAVE.** Diagnóstico por imagem, platynosomíase, felino.

## INTRODUCTION

The use of computed tomography in the evaluation of abdominal diseases in small animals has been increasing (Kealy & McAllister 2005). It is associated with the use of used equipment and tolerable prices (Samii et al. 1998).

Several studies have been conducted in various fields of veterinary medicine, but despite the fact that computed tomography has been routinely used in the diagnosis of abdominal diseases in humans, while in the field of veterinary medicine, few studies have been made in recent years (Ohlerth & Scharf 2007). Searches were performed with abdominal CT in the diagnosis of feline hepatic lipidosis (Nakamura et al. 2005) and the study of portosystemic shunts (Ohlerth & Scharf 2007).

In clinical routine of cats, the liver disease is a constant. Among the different pathogens that determine health problems of cats are the helminths of the digestive system and among these is the cat liver fluke *Platynosomum illiciens* (Braun 1901) Kossack 1910, parasite of the bile ducts, which has worldwide distribution.

The cycle of this parasite is not well understood (Salomão et al. 2005). For better understanding it is required at least two intermediate hosts, the first one a terrestrial mollusk and the other one an amphibian, reptile or a beetle (Maldonado 1945). Among the intermediate hosts, there are the lizards (Salomão et al. 2005). The cats will become infected by ingesting the intermediate hosts (Maldonado 1945) and depending on the parasite load, it may be asymptomatic, or may cause diseases of the biliary tract causing severe biliary fibrosis, cholangitis, cholangiohepatitis or obstruction of the extrahepatic bile duct (Salomão et al. 2005).

Due to the fact that the diagnosis of *P. illiciens* is made exclusively through the stool, which is considered to be ineffective by not showing 100% efficiency (Leal et al. 2011), it is necessary to study alternative ways to complement the diagnosis of the parasite and possible liver changes determined by it.

The use of complementary diagnostic tools in the detection of changes triggered by *P. fastosum* infection can be of great value to assist the clinician in identifying it. Thus, the use of computed tomography, increasingly common in the veterinarian routine, may represent an important tool in the detection of this disease.

The diagnostic imaging techniques enable the evaluation of a series of feline liver abnormalities, though nonspecific (Newell et al. 2001). Ultrasonography is the diagnostic technique of choice for evaluation of the liver, although a normal finding in the liver does not exclude a liver disease and in the same way, an abnormal finding may not be pathognomonic (Nyland et al. 2005).

In literature, studies addressing aspects of diagnostic imaging of platynosomiasis are scarce; there are only sporadic reports of clinical cases. A survey of the sonographic features of cats infected by *Platynosomum* sp. was held in Brazil (Salomão et al. 2005).

Through an X-ray of a cat infested by *Platynosomum* sp. hepatomegalia can be observed (Ferreira 2003). By an ultrasound (Foley 1994, Ferreira

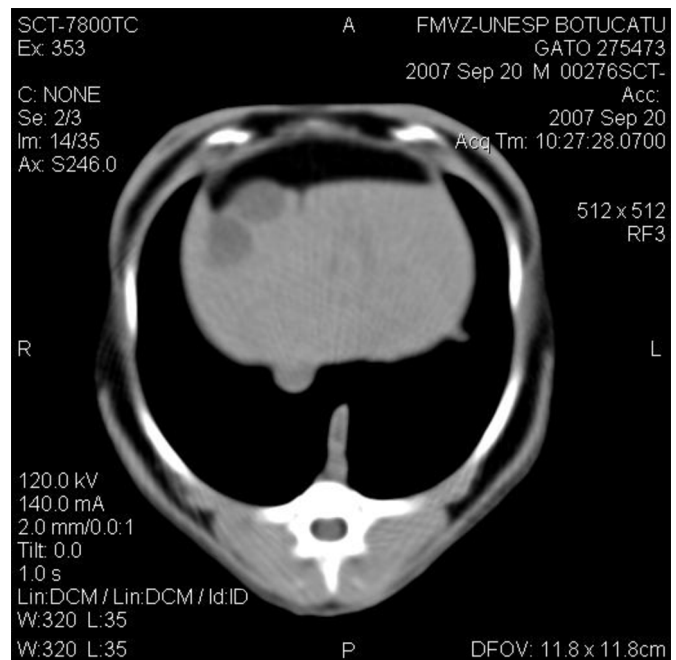


Figure 1. Tomographic imaging in the transverse plane, Cat # 08 showing the bilobed gallbladder.

Table 1. Values found in the CT examination of cats infected with *P. illiciens*.

Cat #	Gall Bladder		Biliary Tract (cm)	
	Size (cm)	HU	Intrahepatic	Extrahepatic
4	1.0	30.7 ± 3.3	-	0.3
5	2.7	35.7 ± 4.0	0.2	0.4
6	1.3	21.3 ± 3.4	-	-
7	2.0	16.4 ± 3.0	-	0.5
8	0.9	24.6 ± 3.8	-	0.4
9	1.9	24.7 ± 2.8	-	-
10	1.4	36.6 ± 5.2	-	0.3

HU – Hounsfield Unit.  
(-) Not observed.

2003) examination dilation of the gallbladder and/or of the common bile duct can be observed, besides hepatomegaly and distended biliary tree in liver and possibly also peri-ductal fibrosis can be observed (Mamprim 2004).

No references were found in the literature as to the tomographic imaging of the liver and gallbladder in cats with liver fluck.

### MATERIAL AND METHODS

During screening for the selection of animals positive for *P. illiciens* a total of seven mongrel cats of various ages were assessed, male and female, all lived in roving habits, ie, with continuous contact with the intermediate hosts of *P. illiciens*.

The CT examination was performed using the CT scanner, from the Faculdade de Medicina Veterinária e Zootecnia, UNESP/Botucatu, SP.

After animals were under anesthesia, they were placed in a supine position with the aid of foam rails and then submitted to the examination of computed tomography.

Upon completion of the CT tomographic, angiography was performed simply for Contrasting substance diatrizoate meglumine 60% was administered at dose of 800 mg / kg via intravenous.

All images were captured via DICOM 3.0 system and stored digitally for later analysis.

The parameters evaluated for liver were: size, shape, uniformity of the Hounsfield Unit and uniformity of parenchyma; the gallbladder was assessed by its shape, size and HU. Visualization of intrahepatic and extrahepatic bile ducts was also evaluated.

With regard to the standards of normality for the biliary tract and for the values of HU and the size of the gallbladder, no data were found in the literature. Moreover, given the small number of animals tested positive, it is not possible to use an appropriate statistical analysis, it was opted to describe the values for these parameters. For the evaluation of gallbladder HU, the mean and standard deviation of the most central part of the gallbladder corresponding to an area of 0.5 cm<sup>2</sup> were evaluated.

### RESULTS AND DISCUSSION

As for animals used, no clinical change was observed throughout the experimental phase of this work.

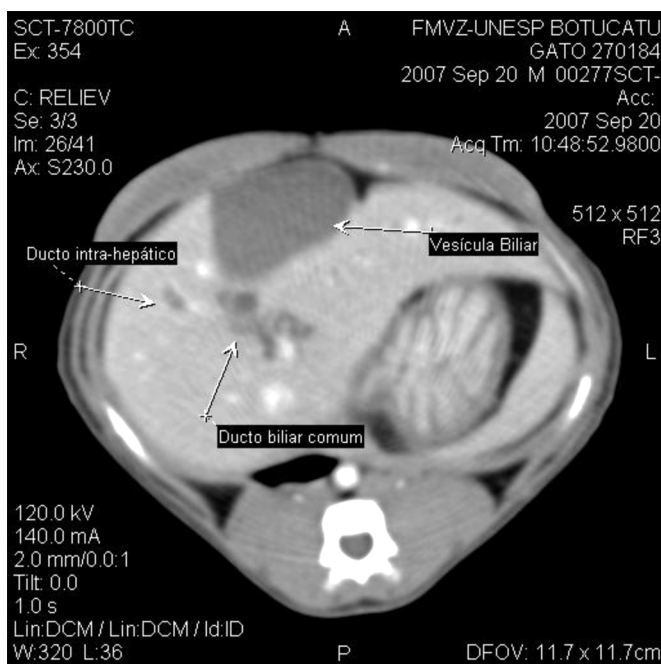


Figure 2. Contrasted CT imaging in the transverse plane, Cat # 05 showing dilatation of the gallbladder and intrahepatic bile duct and also showing the tortuous common bile duct.

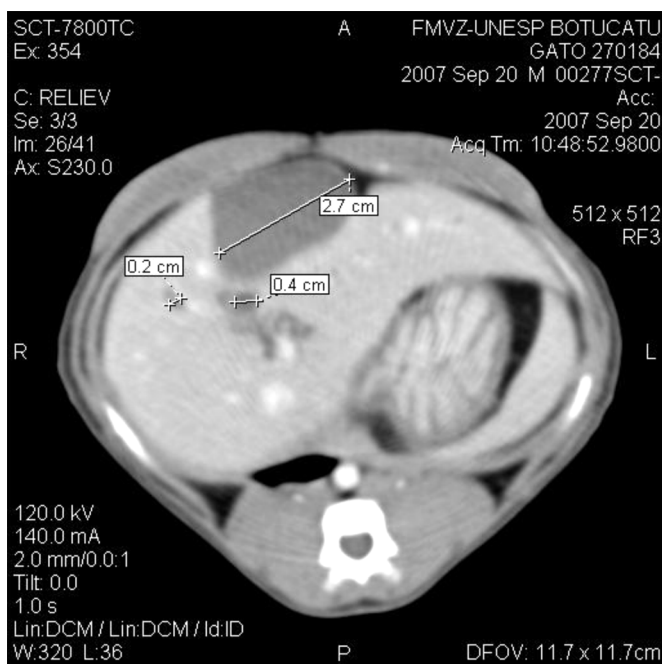


Figure 3. Contrasted CT imaging in the transverse plane, Cat # 05 showing measures of the gallbladder, common bile duct and intrahepatic duct.



Analyzing the results obtained from the CT scan we can see that six animals (85.71%) showed an enlarged liver and only one (24.29%) presented liver without changes. With respect to the shape and homogeneity of the hepatic parenchyma, all seven cats (100%) had normal parameters. All animals also showed normal parenchymal density between HU 50 and 70.

With respect to the gallbladder, six animals (85.71%) had normal conformation and one animal (24.29%) had a bilobed gallbladder.

A cat had the gall bilobed though this finding does not correlate with parasitism of *P. illiciens* (Figure 1).

The findings concerning the size of the gallbladder, HU average of the gallbladder and intra- and extrahepatic biliary tract size, are listed in Table 1.

In relation to the size of the gallbladder in a subjective evaluation, it was believed that only the animal # 05 presented a distended gallbladder. The same animal was the only one which showed the intrahepatic ducts, measuring 2 mm in the portion of greatest strain. This finding was considered increased and it was considered that the observation of the normal intrahepatic bile ducts is not possible by the CT examination. Also in animal # 05 the common bile duct with 4 mm, considered to be normal values, however, the same animal was twisted in the CT scan (Figures, 2 and 3).

With respect to the thickness of the gallbladder wall, it was not liable for assessment in CT examination in any of the cats. It is believed that it is not commonly seen.

## CONCLUSIONS

Although Computed tomography is not frequently used in veterinary medicine, it will certainly be of great use in the near future, as with ultrasound. The CT scan was an easy tool to evaluate and measure the structures studied and can be used in the

evaluation of liver and bile changes caused by *P. illiciens*.

## REFERENCES

- Ferreira A.M.R. & Almeida E.C.P. Platinosomose, p.385-393. In: Souza H.J.M. (Ed.), *Coletâneas em Medicina e Cirurgia Felina*. L.F. Livros de Veterinária, Rio de Janeiro, 2003.
- Foley R.H. *Platinosomum concinnum* infection in cats. *Comp. Cont. Educ. Pract. Vet.*, 16:1271-1277, 1994.
- Kealy J.K. & McAllister H. *Radiologia e ultra-sonografia do cão e gato*. Manole, São Paulo, 2005. 436p.
- Leal P.D.S., Campos D.P., Rodrigues M. de L. de A., Botelho G.G. & Labarthe N.V. Avaliação da administração oral de ácido ursodesoxicólico (AUDC) no diagnóstico da infecção natural por *Platynosomum illiciens* em gatos. *Rev. Bras. Med. Vet.*, 33:229-233, 2011.
- Maldonado J.F. The life history and biology of *Platynosomum fastosum* Kossack, 1910 (Trematoda: Dicrocoeliidae). *Public Health Trop. Med.*, 21:17-39, 1945.
- Mamprim M.J. Fígado e Vesícula Biliar, p.51-73. In: Carvalho C.F. (Ed.), *Ultra-sonografia em Pequenos Animais*. Roca, São Paulo, 2004.
- Nakamura M., Chen H., Momoi Y. & Iwasaki T. Clinical application of computed tomography for the diagnosis of feline hepatic lipidosis. *J. Vet. Med. Sci.*, 67:1163-1165, 2005.
- Newell S.M., Graham J.P., Roberts G.D., Ginn P.E., Greiner E.C., Cardwell A., Mauragis D., Knutsen C., Harrison J.M. & Martin F.G. Quantitative hepatobiliary scintigraphy in normal cats and in cats with experimental cholangiohepatitis. *Vet. Radiol. Ultrasound*, 42:70-76, 2001.
- Nyland T.G., Mattoon J.S., Herrgesell E.J. & Wisner E.R. Fígado, p.95-130. In: Nyland T.G. & Mattoon J.S. (Eds), *Ultra-som Diagnóstico em Pequenos Animais*. 2ª ed. Roca, São Paulo, 2005.
- Ohlerth S. & Scharf G. Computed tomography in small animals – Basic principles and state of the art applications. *Vet. J.*, 173:254-271, 2007.
- Salomão M., Dantas L.M., Mendes-de-Almeida F.S., Branco A.S., Bastos O.P.M., Sterman F. & Labarthe N. Ultrasonography in hepatobiliary evaluation of domestic cats (*Felis catus* L. 1758) infected by *Platynosomum* Looss, 1907. *Int. J. Appl. Res. Vet. Med.*, 3:271-279, 2005.
- Samii V.F., Biller D.S. & Koblik P.D. Normal cross-sectional anatomy of the feline thorax and abdomen: comparison of computed tomography and cadaver anatomy. *Vet. Radiol. Ultrasound*, 39:504-511, 1998.