
Renal Papillary Carcinoma in a Shih-Tzu Bitch: Case Report

Carcinoma Papilífero Renal em Cadela da Raça Shih-Tzu: Relato de Caso

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RESUMO

Em animais domésticos, a ocorrência de tumores renais primários é uma condição rara. Esses tumores são categorizados com base em sua origem, sendo epitelial, embrionária ou mesenquimal, e seu padrão histológico, como papilar, tubular ou sólido. Os sinais clínicos são inespecíficos, tornando o diagnóstico desafiador e muitas vezes confundido com outras doenças. O diagnóstico definitivo é obtido por meio do exame histopatológico, e a abordagem preferencial para neoplasias unilaterais é a nefrectomia. O objetivo deste estudo é relatar um caso específico de uma cadela da raça Shih-Tzu, com nove anos de idade, que, diante de suspeitas clínicas, foi submetida a uma tomografia, revelando uma massa corticomedular no polo cranial do rim direito. Optou-se pela nefrectomia total, e o exame histopatológico confirmou o diagnóstico de carcinoma papilífero renal. Concluímos que esta patologia, pouco comum em animais domésticos, frequentemente é diagnosticada tardiamente, já em estágios metastáticos, impactando negativamente no prognóstico, tratamento e sobrevida do animal.

Palavras-chave: Neoplasia renal; Nefrectomia; Cão.

ABSTRACT

In domestic animals, the occurrence of primary renal tumors is a rare condition. These tumors are categorized based on their origin, whether epithelial, embryonic, or mesenchymal, and their histological pattern, such as papillary, tubular, or solid. Clinical signs are nonspecific, making the diagnosis challenging and often confused with other diseases. Definitive diagnosis is obtained through histopathological examination, and the preferred approach for unilateral neoplasms is nephrectomy. The aim of this study is to report a specific case of a Shih-Tzu female dog, eight years old, which, upon clinical suspicion, underwent a tomography revealing a corticomedullary mass in the cranial pole of the right kidney. Total nephrectomy was performed, and histopathological examination confirmed the diagnosis of renal papillary carcinoma. We conclude that this pathology, uncommon in domestic animals, is often diagnosed late, already in metastatic stages, negatively impacting prognosis, treatment, and the animal's survival.

Keywords: Renal neoplasia; Nephrectomy; Dog.

INTRODUCTION

In domestic animals, the occurrence of primary renal tumors is a rare condition, representing less than 1% of all neoplasms (Fossum, 2015; Newman, 2007). Among these renal neoplasms, malignant tumors predominate in 85% of cases (FOSSUM, 2015).

These tumors are classified based on their origin (epithelial, embryonic, or mesenchymal) and histological pattern (papillary, tubular, or solid) (DALECK, NARDI, 2016; STUPACK et al., 2017). Epithelial-origin tumors, such as carcinomas, adenomas, and oncocytomas, comprise about 60% of primary renal tumors (DALECK, NARDI, 2016).

While earlier studies suggested a higher occurrence of renal carcinomas in males, recent studies have not identified gender predisposition, and bilateral involvement occurs in 4 to 30% of cases without a preference for breed (FOSSUM, 2015).

Renal carcinoma, originating from tubular cells rather than embryonic nephrogenic tissue, presents vague clinical signs such as anorexia, anemia, cachexia, fever, dyspnea, lethargy, and abdominal pain, with abdominal enlargement being the sole sign in some cases (FOSSUM, 2015).

Paraneoplastic syndromes accompanying renal neoplasms like renal carcinoma involve endocrine, hematological, or metabolic alterations caused by the production of neoplastic molecules (JERICÓ, 2015).

Diagnostic methods such as radiographs and ultrasonography are useful for presumptive diagnosis, but computed tomography and magnetic resonance imaging provide higher resolution. Definitive diagnosis is obtained through histopathological examination (DALECK, NARDI, 2016).

Metastases to abdominal organs and lungs are common, occurring in approximately 69% of renal carcinoma cases (JERICÓ, 2015). Nephrectomy is recommended in patients without metastases, providing increased survival when combined with chemotherapy (FOSSUM, 2015; DALECK, NARDI, 2016).

Prognosis varies from guarded to unfavorable due to the invasive and metastatic characteristics of renal tumors, especially following surgical removal of epithelial-origin tumors (DALECK, NARDI, 2016).

This study reports a case of renal papillary carcinoma in a Shih-Tzu dog, contributing to the understanding of this rare condition in domestic animals.

CASE REPORT

Anamnesis and Physical Examination

On February 14, 2023, a nine-year-old spayed female Shih-Tzu, weighing 7.5 kg, was attended at a veterinary clinic in Uberaba, MG, originating from the same city. The owner reported vomiting and lethargy in the animal over the past few days, despite its previous state of health. The presence of ticks for at least 7 days was mentioned, along with treatment for urinary calculi using a natural diet.

In the clinical examination, the animal, although lethargic, exhibited normoglycemia, normodipsia, and normochesia, with up-to-date deworming and vaccination. The temperature was 38°C, adequate hydration, normal mucous membranes, capillary refill time of 2 seconds, systolic blood pressure of 250 mmHg (SBP), heart rate of 120 beats per minute (BPM), respiratory rate of 23 breaths per minute, and signs of abdominal pain were noted. The initial treatment included the prescription of Gabapentin

(7mg/kg) every 12 hours, Enalapril (0.4mg/kg) every 12 hours, and Amlodipine (0.25mg/kg) every 24 hours.

Upon the follow-up after 5 days, a stabilization of blood pressure was observed, indicating a positive response to the instituted treatment. This case emphasizes the importance of early diagnosis and treatment, underscoring the role of the veterinary clinic in managing complex clinical conditions in pets.

Complementary Exams

A complete blood count and biochemical tests (Alanine Aminotransferase - ALT, Aspartate Aminotransferase - AST, Total Proteins and Fractions, Urea, Creatinine, Total Cholesterol and Fractions, Alkaline Phosphatase, Gamma-Glutamyl Transferase - GGT, Glucose, Triglycerides) were requested, along with imaging exams (abdominal ultrasonography, echodopplercardiography, and abdominal and thoracic tomography) to investigate the presence of renal neoplasia and a possible adrenal neoplasia. The blood count showed no alterations in the red blood cell series but revealed leukocytosis in the white blood cell series (19,720 leukocytes/mm³ of blood). The biochemical tests did not show significant changes.

In the ultrasonography (Figure 1), a cranial abdominal mass adjacent to the right kidney was identified, measuring approximately 5 cm by 5 cm, with a cystic nature and mixed echogenicity. The heterogeneous anechoic content suggests potential cellularity. Additionally, a mass in the left adrenal region was identified, displaying loss of the usual shape, heterogeneous parenchyma, and mixed echogenicity, with increased dimensions. These findings indicate structural changes and suggest the need for further investigation.

The computed tomography (Figure 2) was performed with the purpose of planning the surgical procedure. The right kidney was observed in its usual location, displaying enlarged dimensions of 6.5 cm, regular contours, and altered architecture. A hypoattenuating and hypocaptating mass was identified in the corticomedullary region of the cranial pole, measuring approximately 3.5 cm by 2.5 cm in the largest axes.

Furthermore, discontinuity of the renal cortex was noted, accompanied by a subcapsular fluid collection surrounding the mentioned mass, indicative of neoplasia in the right kidney. The left adrenal remained in its usual position, presenting regular contours, heterogeneous parenchyma, and increased dimensions, measuring 2.5 cm in length by 2.3 cm in thickness at the cranial pole and 0.6 cm in thickness at the caudal pole.

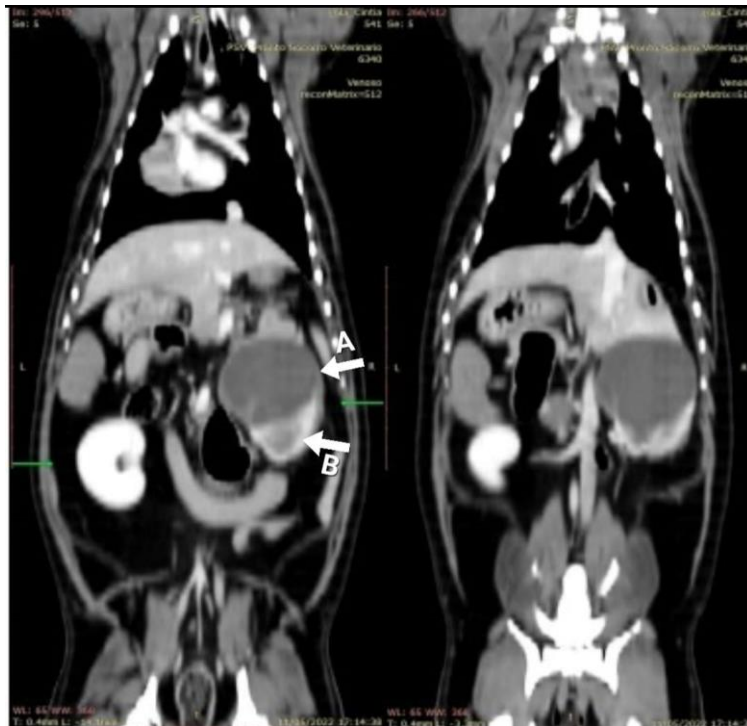
At the cranial pole of the left adrenal, a hypoattenuating and heterogeneous nodule was observed, enhancing with vascular contrast, measuring 2.0 cm by 1.5 cm in the largest axes, indicative of neoplasia in the left adrenal gland. The animal was referred to an endocrinologist for evaluation of adrenal neoplasia; however, the owner opted not to proceed with treatment at this time. In light of the owner's decision, treatment was prioritized for the renal neoplasia.

Figure 1- Ultrasonographic image of a nine-year-old female Shih-Tzu canine suspected of kidney neoplasia, attended on February 14, 2023, in Uberaba, MG. Noteworthy features: A - arrow pointing to the right kidney (RK). B - Arrow pointing to the mass located cranial to the right kidney (RK).



Source: Authors, 2023

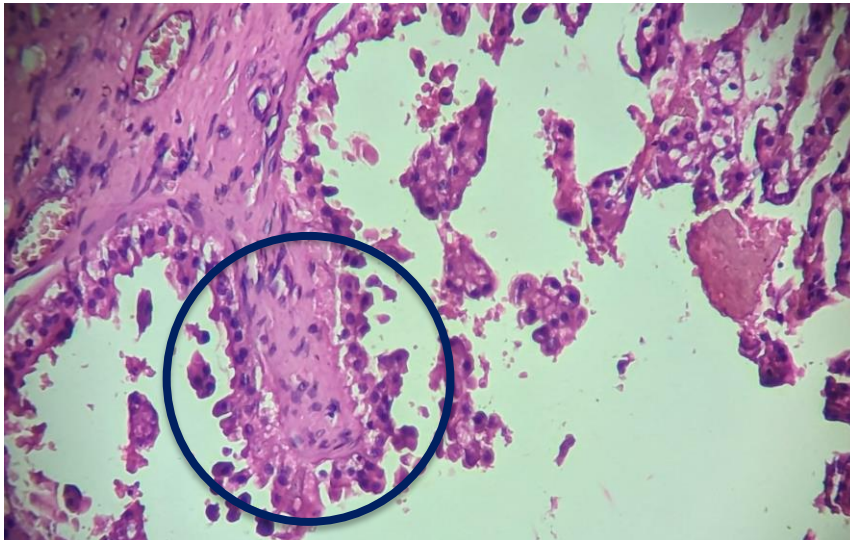
Figure 2- Tomographic image of a nine-year-old female Shih-Tzu canine with suspected kidney neoplasia, attended on February 14, 2023, in Uberaba, MG. Note: A - Arrow pointing to the mass suggestive of right renal neoplasia. B - Arrow pointing to the right kidney.



Source: Authors, 2023

Nephrectomy followed by histopathological examination was recommended for the diagnosis of the neoplasm, revealing conclusive results indicative of malignant papillary renal carcinoma with focal invasion of the renal parenchyma. The characterization included papillary arrangements, cells with moderate nuclear pleomorphism, hyperchromatic nuclei, discreet nucleoli, and wide, eosinophilic, and foamy cytoplasm. Sparse mitotic figures were observed, totaling 8 figures in 2.37 mm², with a preserved capsule, confirming the diagnosis of papillary renal carcinoma (Figure 3).

Figure 3- Photomicrograph of histopathology of a mass suggestive of right renal neoplasia in a nine-year-old female Shih-Tzu canine, attended on February 14, 2023, in Uberaba, MG. Note: Papillary arrangements, cells with moderate nuclear pleomorphism, hyperchromatic nuclei, discreet nucleoli, and wide, eosinophilic, and foamy cytoplasm. H.E. staining, magnification of 40 times.



Source: Authors, 2023

As part of the preoperative assessment, the animal underwent an echocardiogram, revealing age-appropriate alterations such as left ventricular remodeling and mild regurgitation in the mitral and pulmonary valves, along with moderate tricuspid regurgitation. However, it did not exhibit clinical symptoms or hemodynamic repercussions that required prior treatment before surgery.

Treatment (Unilateral Nephrectomy)

Morphine was administered as a pre-anesthetic medication (0.5mg/kg intramuscularly). Anesthetic induction included Ketamine Hydrochloride (1mg/kg) and Fentanyl Citrate (3mcg/kg) intravenously, along with Lidocaine Hydrochloride 2% (1.5mg/kg) and Propofol 1% (1.0mg/kg) intravenously. Endotracheal intubation was performed with a 5.5mm tube, maintaining an inspired oxygen fraction of 100%.

During maintenance, Isoflurane was used by inhalation, combined with continuous infusions of Remifentanyl (7.5mcg/kg/h), Lidocaine Hydrochloride 2% (3mg/kg/h), and Ketamine Hydrochloride (0.6mcg/kg/h) through an infusion pump.

After anesthesia, a wide trichotomy was performed in the abdominal region. For antiseptic purposes, 2% chlorhexidine germicidal and 0.5% chlorhexidine alcoholic solutions were used. The incision in the abdominal midline extended from the xiphoid process to the pubis. The peritoneum over the kidney was wrapped and incised using cutting and blunt dissection, displacing intestinal loops laterally to expand the surgical field of view.

The Farabeuf retractor was employed to retract the abdominal wall and expose the right kidney. Following exposure, the organ, exhibiting increased volume and deformations, was isolated from the rest of the abdominal contents with sterile surgical compresses (Figure 4).

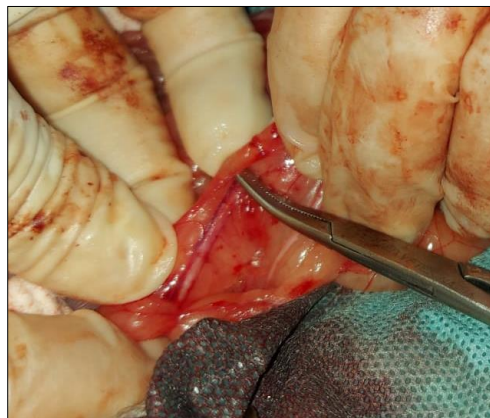
The right kidney was released from its sublumbar fixations, lifted, and medially retracted to expose the artery and renal veins on the dorsal surface of the renal hilum. All branches of the renal artery were identified, followed by a double ligation using absorbable suture Poliglecaprone 25, (Caprofil) 0, ensuring that all branches were adequately ligated. The renal vein was identified and ligated in a similar manner, using the same absorbable suture Poliglecaprone 25, (Caprofil) 0, ensuring an effective ligation. Subsequently, the identification and ligation of the right ureter were performed with the same absorbable suture Poliglecaprone 25, (Caprofil) 0, in close proximity to the urinary bladder (Figure 5).

Figure 4- Image depicting the moment of visualization of the right kidney during the right unilateral nephrectomy procedure in a nine-year-old female Shih-Tzu, attended on February 14, 2023, in Uberaba-MG, with suspected kidney neoplasia. After being isolated by sterile surgical compresses from the rest of the abdominal cavity, observe an increase in volume and deformations.



Source: Authors, 2023.

Figure 5- Image capturing the moment of visualization of the right ureter (indicated by the forceps) during the surgical procedure of right unilateral nephrectomy in a nine-year-old female Shih-Tzu canine with suspected kidney neoplasia, attended on February 14, 2023, in Uberaba, MG.

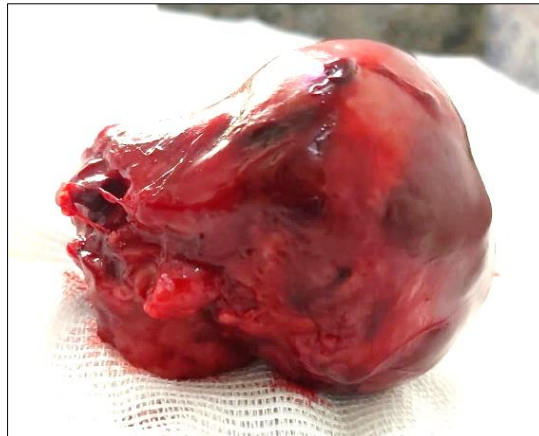


Source: Authors, 2023

The right kidney (Figure 6) and right ureter were removed, followed by a new inspection of the abdominal cavity and subsequent closure. The closure of the cavity was performed in three planes: starting with the wall musculature, Poliglecaprone 25 (Caprofyl) 2-0 was used, with a synthesis in the Sultan pattern. In the subcutaneous tissue, Poliglecaprone 25 (Caprofyl) 0 was employed, following the same previous pattern but

with a zigzag suture. Finally, in the skin, the Sultan suture pattern was used with a polyamide (Nylon) 3-0 thread.

Figure 6- Image of the right kidney (with the neoplasm after its removal from the abdominal cavity) of a nine-year-old female Shih-Tzu, suspected of kidney neoplasia, attended on February 14, 2023, in Uberaba-MG.



Source: Authors, 2023

Postoperative.

The patient remained hospitalized for 5 days for observation. During this period, tests were conducted, including a complete blood count and biochemical profile (Alanine Aminotransferase – ALT, Aspartate Aminotransferase – AST, Urea, and Creatinine). In the red blood cell series, anemia was observed with erythrocytes at 5.10 million/mm³ (reference range: 5.5 to 8.5 million/mm³), hemoglobin at 13 g/dL (reference range: 12 to 18 g/dL), and hematocrit at 36.50% (reference range: 37 to 55%). All values in the white blood cell series and biochemical tests were within the normal range.

Postoperatively, the following medications were administered: Cefazolin (25mg/kg, intravenously), Meloxicam (0.1mg/kg, subcutaneously), Dipyrone (25mg/kg, intravenously), and Tramadol (3mg/kg, subcutaneously).

The patient returned on March 8, 2023, and the owner reported that the animal was recovering well from the surgical procedure. New laboratory tests, including a

complete blood count, biochemical profile (Alanine Aminotransferase – ALT, Aspartate Aminotransferase – AST, Total Proteins and Fractions, Urea, and Creatinine), showed no significant changes.

DISCUSSION

Primary neoplasms in dogs are rare, with renal carcinoma being the most common primary neoplasm (NEWMAN, 2007; CARVALHO, BRUM 2008; JERICÓ, 2015). This report reinforces this observation by describing a case of renal carcinoma in a Shih-tzu female dog.

Animals affected by primary renal tumors, including renal carcinoma, typically have an average age of 8 years (FOSSUM, 2015). However, Daleck and Nardi (2016) suggest that these carcinomas can affect animals as young as 1 year old. Although Jericó (2015) observed a higher prevalence in male dogs, the present report did not show a sex preference, contradicting this trend. Despite renal carcinomas being more commonly diagnosed in male dogs, the subject of this report was female, indicating a lack of a clear sex preference. Its age of 9 years confirms that renal carcinomas can occur at any stage of the animal's life.

Dogs with renal tumors typically belong to large breeds (BRYAN, 2006). However, the study by Jeffrey et al. (2006) revealed occurrences in both large and small breeds, including Shih-Tzu, albeit with lower prevalence. This case corroborates this observation, emphasizing that renal tumors do not follow a specific pattern of predominant breed.

Clinical signs of renal tumors are nonspecific and can resemble other diseases, manifesting as cachexia, vomiting, anorexia, lethargy, pyrexia, polyuria, polydipsia, or abdominal pain (BYRON, 2009). In this case, the patient exhibited four of these signs, consistent with the typical clinical picture of renal carcinoma. Although hematuria is possible, its absence in this case suggests an intact renal pelvis.

Laboratory test alterations are nonspecific (MORRIS, DOBSOM 2007; JERICÓ, 2015). In this report, leukocytosis in the animal may be attributed to local inflammation

due to neoplasia and the abnormal conformation of the right kidney. According to Daleck and Nardi (2016), laboratory tests, including complete blood count and biochemical tests, are not diagnostic for renal neoplasms.

Imaging studies are crucial to confirm the presence of metastases and plan surgical interventions (MORRIS, DOBSOM 2007; FOSSUM, 2015; JERICÓ, 2015). In this report, imaging revealed a cranial mass adjacent to the right kidney indicative of renal neoplasia and another in the adrenal region, referred for endocrinological evaluation.

Renal masses typically occupy the entire renal pole (MORRIS, DOBSOM 2007). However, in this case, the mass was located only in the cranial part, preserving the capsule. These findings led to the decision for nephrectomy, followed by histopathological examination, considered the gold standard for definitive diagnosis (JERICÓ, 2015).

Bilateral involvement in renal neoplasms is rare; unilateral involvement, as observed in this case, generally does not lead to renal failure, as the unaffected kidney can compensate (FOSSUM, 2015).

For cases without metastases, as described, and with unilateral renal carcinoma, nephrectomy is indicated as treatment (VAIL, THAMM, LIPTAK, 2007; FOSSUM, 2015). The prognosis varies from reserved to unfavorable due to the metastatic and invasive nature of renal tumors (DALECK, NARDI 2016). However, animals with epithelial tumors undergoing nephrectomy can have a survival of up to 5 years (FOSSUM, 2015), as observed in this case.

Definitive diagnosis is obtained through histopathological examination (JERICÓ, 2015). In this case, renal carcinoma was confirmed as a papillary pattern, considered rare with limited studies. Although the tubular pattern is more common, cases may exhibit all three patterns (DALECK, NARDI 2016). The eosinophilic cytoplasm observed in this report is a characteristic described in the literature.

Tumor cells can cause hematological, metabolic, or endocrine changes, known as paraneoplastic syndromes (JERICÓ 2015). However, this animal did not present changes compatible with this syndrome.

Chemotherapy combined with nephrectomy has been associated with increased survival (DALECK, NARDI 2016), although Bryan (2006) disputes this benefit. The mitotic index, as indicated by Edmondson (2015), is considered a good prognostic indicator, with a mitotic index of up to 10 figures in 10 fields associated with a favorable prognosis. In the reported case, the mitotic index of 8 figures suggests a favorable prognosis, supported by the absence of metastases and clinical stability to date.

CONCLUSIONS

It is concluded that this pathology is an uncommon occurrence in domestic animals. Due to clinical signs that often resemble other pathologies, the diagnosis of renal carcinoma is commonly delayed, often occurring when metastases are already present, negatively impacting the prognosis, treatment, and survival of the animal. It was also observed that histopathological examination plays a crucial role in the definitive diagnosis, being essential to classify the histological pattern, in this case identified as papillary, a rare pattern with limited information in the literature. Early diagnosis, appropriate treatment, and assessment of the mitotic index are essential to promote prolonged survival, resulting in a more favorable prognosis and better quality of life for the animal.

REFERENCES

Bryan JN, Henry CJ, Turnquist SE, Tyler JW, Rizzo AS et al. Primary renal neoplasia of dogs. **J Vet Intern Med.** 2006; 20:1155-60.

Byron JK, Chew DJ, McLoughlin MA. Urinary incontinence: treatment with injectable.

CARVALHO M.B. & Brum A.M. 2008. Neoplasias do sistema urinário, p.385- 398. In: Daleck C.R., De Nardi A.B. & Rodaski S. (Eds), **Oncologia em Cães e Gatos**. Roca, São Paulo.

DALECK, Carlos; NARDI, Andriago. Neoplasias do sistema urinário: Neoplasias renais. In: BONFADA, Adamas et al. **Oncologia em cães e gatos**. 2. ed. Rio de Janeiro: Roca, 2016. cap. 37, p. 675-697.

Edmondson, E. F., Hess, A. M., & Powers, B. E. (2015). Prognostic Significance of Histologic Features in Canine Renal Cell Carcinomas: 70 Nephrectomies. **Veterinary Pathology**, 52(2), 260–268.

FOSSUM, Theresa. Cirurgia do Rim e do Ureter: Neoplasia renal e ureteral. In: DEWEY, Curtis et al. **Cirurgia de pequenos animais**. 4. ed. Rio de Janeiro: Elsevier, 2015. cap. 25, p. 705-733.

Meuten D.J. 2002. Tumors of the urinary system, p.509-546. In: Meuten D.J. (Ed.), **Tumors in Domestic Animals**. 4th ed. Iowa State Press, Ames.

Morris, J., & Dobson, J. (2007). Trato urinário. In J. Morris & J. Dobson (Eds.), **Oncologia em pequenos animais** (pp. 155–165). Roca, Brasil.

Newman S.J. 2012. The urinary system. In: Zachary J.F. & McGavin M.D. (Eds). **Pathologic Basis of Veterinary Disease**. 5th edn. St. Louis: Elsevier, pp.643-645.

NEWMAN, J.S; CONFER, W.A; PANCIERA, J.R. Sistema urinário. In: MCGAVIN, D.M; ZACHARY, F.J. **Bases da patologia em veterinária**. Rio de Janeiro: Elsevier, cap. 11, p. 613- 692, 2009.

Stupak, E. C., Mariani, O. M., Rezende, L. R., Barros, J. C., Magalhães, L. F., Alexandre, N. A., Costa, M. L., Carvalho, L. L., Magalhães, G. M., & Calazans, S. G. (2017). Carcinoma renal sólido em cadela: relato de caso. **I Simpósio de Oncogeriatrics Em Pequenos Animais/ 16(5)**.

Ubukata, R., & Lucas, R. R. (2015). Neoplasias do sistema urinário rins e bexiga. In M. M. Jerico, J. P. Andrade Neto, & M. M. Kogika (Eds.), **Tratado de medicina interna de cães e gatos** (pp. 1493– 1498). Roca, Brasil.

VAIL, David; THAMM, Douglas; LIPTAK, Julius. Tumors of The Urinary System: Canine Renal Tumors. In: AMSELLEM, Pierre et al. **Withrow and macewen's Small Clinical Oncology**. 6. ed. St. Louis: Elsevier, 2007. cap. 30, p. 645-654.