LUMEN ET VIRTUS

NEPHRECTOMY IN A DOG: CASE REPORT

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ABSTRACT

Nephrectomy is the surgical removal of the kidney, which can be total, partial or radical. Thus, the present study aimed to report a case of total nephrectomy in an SRD dog with a renal cyst. A male dog, of no defined breed, 12 years and 4 months old, weighing 23,400 kg, castrated, was treated at the (HVU-UFOB). During the anamnesis, the owner reported that the animal had a tumor at the base of the penis, on physical examination the physiological parameters were normal. On specific physical examination, a firm nodule was palpated in the left lateral region of the base of the penis. The complementary tests requested were blood count, biochemical profile, nodule cytology and abdominal ultrasound. The blood count and biochemistry showed no alterations, in the cytology it was evidenced a high amount of round cells, in the abdominal ultrasonography it was noted alteration in the right kidney, with irregular contour, loss of definition of the architecture and of the corticomedullary limits due to the presence of a cystic structure with an average diameter of 8.68 cm, in view of the findings the diagnosis suggestive of a defined renal cyst, He chose to undergo nephrectomy of the right kidney. To perform the surgery, a blood count and biochemical profile were requested. The blood count showed no abnormalities. Thus, it is concluded that nephrectomy of the right kidney for the treatment of renal cysts has been shown to be an effective and beneficial approach, with no signs of recurrence.

Keywords: Renal Cyst. Nephropathy. Ultrasound Examination. Nephron.

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INTRODUCTION

Nephrectomy is the surgical removal of the kidney, recommended unilaterally, and can be total or partial. It is indicated in situations where the kidney loses the ability to perform its basic functions, such as cysts, neoplasms, trauma, hydronephrosis, infections, hemorrhages, kidney stones, abnormalities such as the kidney added to an ectopic ureter, and even parasite infestation, with emphasis on *Dioctophyma renale*, popularly known as the "giant kidney worm" (Alves, 2023; Silveira *et al.,* 2015).

Renal cysts are abnormal findings in dogs and constitute cavities lined with epithelium that is composed of fluid (Pigatto *et al*., 2011). These can originate in a primary or secondary way. Primary is related to its development congenitally during the formation of the organ or from renal dysplasia. The secondary form, on the other hand, comes from pathologies that cause degrees of obstruction of the nephron segments, resulting in fluid accumulation and cyst formation (Bravo *et al*., 2021).

The diagnosis of renal cysts can be obtained through the association of ultrasound and laboratory findings. There is no exclusive treatment for cystic nephropathy, but when there is kidney failure, unilateral nephrectomy can be performed. It is worth noting that for the practice of this procedure, adequate renal function in the contralateral kidney must be performed (Bravo *et al*., 202; Pigatto *et al*., 2011). Other treatment possibilities described are aspiration of the cyst contents or percutaneous marsupialization (Pinto Filho *et al*., 2013).

In view of the above, the present study aims to report a case of nephrectomy in a mixed breed dog (SRD) with a renal cyst, treated at the University Veterinary Hospital of the Federal University of Western Bahia (HVU-UFOB).

CASE REPORT

A male dog, SRD, neutered, 12 years and 4 months old, weighing 23,400 kg, was treated at the HVU of UFOB. During the anamnesis, the owner reported that the animal had an increase in volume at the base of the penis and had an evolution of the condition in about a month, with a considerable increase in the nodule. It was also reported that the animal was bothered by this hyperplasia. Regarding vaccination and deworming, it was informed that they were delayed.

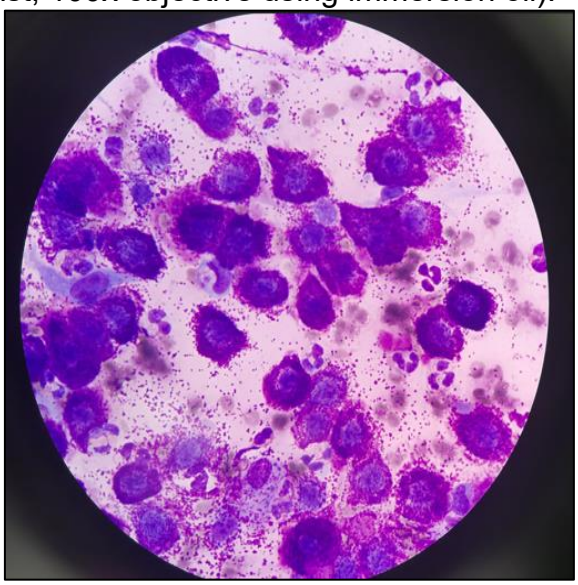
During the physical examination, normality of physiological parameters was found with regard to an adult animal: alert animal, Heart Rate (HR): 115 bpm, Respiratory Rate (RR): 27 rpm, Capillary Filling Time: 2s, mucous membranes: pink/normocolored,

temperature: 38.5°C, degree of dehydration not apparent and non-reactive lymph nodes. The abdomen was completely bulged, with no pain or discomfort on palpation.

On specific physical examination, a firm, non-adherent nodule was palpated, located in the subcutaneous tissue on the left lateral region of the base of the penis, with an approximate size of 3x4cm. The initial suspicion was neoplasia. The complementary tests requested in order to elucidate the diagnosis were blood count, biochemical profile (urea, creatinine, Alanine Aminotransferase (ALT) and Alkaline Phosphatase (ALKALINE)), cytology of the nodule and abdominal ultrasound. After the tests, it was possible to observe that no changes were presented in the blood count and biochemistry, with all parameters within the reference values.

The cytological examination was performed by the fine needle aspiration puncture (FNA) method. To this end, a needle (Injex) was introduced into the nodule, slowly aspirating the plunger and performing fan movements. The procedure was repeated 3 times at different angles. Subsequently, the material was deposited on a slide (Laborclin) that was stained with a fast panopticon (Laborclin). A high number of round cells was evidenced, arranged individually, with a varied nucleus/cytoplasmic ratio and containing intracytoplasmic granules of purple color, with great intensity of distribution, mostly hypergranular (mast cells). The nucleus was rounded, with loose chromatin. The presence of eosinophils and fibroblasts was also observed. Thus, the diagnosis suggestive of mast cell disease was defined (Figure 1).

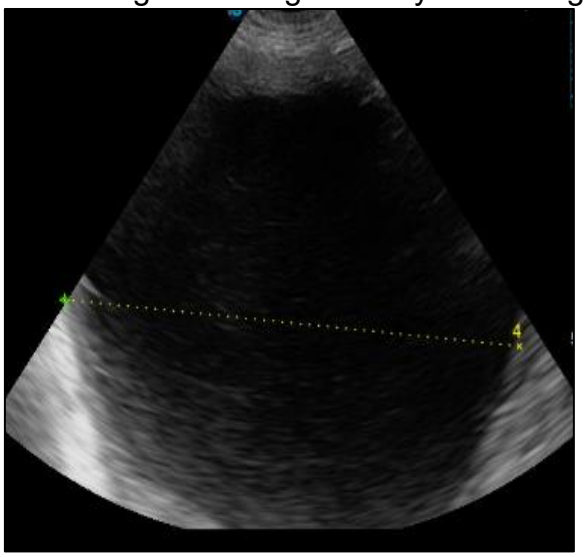
Figure 1: Round cell photomicrograph. Individualized disposition, varied nucleus/cytoplasm ratio, and presence of mostly hypergranular purple intracytoplasmic granules (mast cells) are observed (Panoptic fast, 100x objective using immersion oil).



Source: Prepared by the authors, 2024

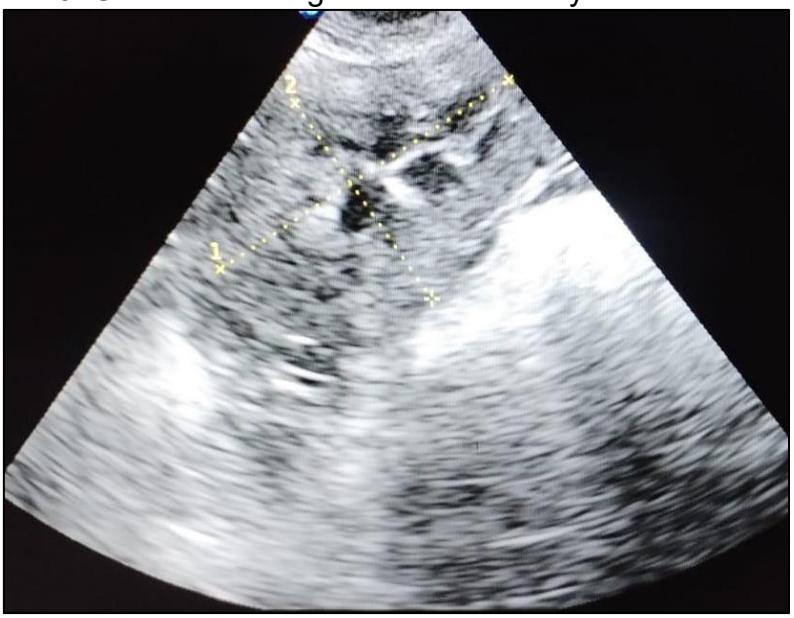
Abdominal ultrasonography showed alterations in the right kidney, with irregular contours, thin walls,homogeneous anichogenic content, loss of definition of the architecture and corticomedullary boundaries due to the presence of a cystic structure with a mean diameter of 8.68 cm. In view of the sonographic findings, the diagnosis of renal cyst was defined (Figure 2). Abdominal ultrasonography showed normal aspects for the structure (Figure 3).

Figure 2: Ultrasound image of the right kidney containing cystic content.



Source: Prepared by the authors, 2024

Figure 3. Ultrasound image of the left kidney at reassessment.



Source: Prepared by the authors, 2024

As a result, the patient was referred to the surgical sector, which chose to perform nephrectomy of the right kidney and later reassess the possible mast cell tumor. For surgery, a complete blood count and biochemical profile (urea, creatinine, ALT and AF) were

requested. After 3 months, the animal returned for the surgical procedure. The requested tests were performed and no changes were observed in the blood count. The biochemist revealed a slight increase in the urea profile with a reference value of 21.4 mg/dL to 59.92 mg/dL and a result of 77.10 mg/dL .

After a 12-hour fast, preanesthetic medication was administered with chlorpromazine hydrochloride (Chlorpromaz®, 1.1 mg/kg, intramuscularly), associated with tramadol hydrochloride (TEUTO, 2 mg/kg, intramuscularly), in the same syringe. This was followed by vascular access and infusion of lactated Ringer's solution. Wide trichotomy of the ventral abdominal region was performed.

Anesthetic induction was performed with midazolam (Dormire®, 0.3 mg/kg, intravenously) followed by dextroketamine (KETamin NP, 1 mg/kg, intravenously)[3] and propofol (PROpovan®, 4mg/kg, intravenously), the latter slowly, dose response. The animal was intubated with a No. 8 endotracheal tube. Maintenance was performed with sevoflurane (Sevocris®) diluted in oxygen in a semi-closed circuit. Enrofloxacin (Floxiclin, 5 mg/kg, intravenously)[4], dipyrone (TEUTO, 25mg/kg, intravenously), Maxicam (Meloxinew®, 0.2 mg/kg, intravenously) and atropine sulfate (ATRO FARMAC, 0.5 mg/kg, intravenously) were applied.

With the patient in the supine position, antisepsis was performed with 2% alcohol chlorhexidine, and sterile field cloths were placed. A skin and subcutaneous incision was made in the preumbilical region, identifying the linea alba and by divulsion, an incision was made in the ventral midline giving access to the abdominal cavity. After incision ofthe retroperitoneum in the caudal pole of the kidney, with a combination of blunt and cutting dissection, the latter was released. The kidney was elevated medially for hilum dissection and identification of the artery, renal vein, and ureter (Figure 4).

Figure 3: Photographic image of the right kidney during nephrectomy. Note retroperitoneal dissection.



Source: Prepared by the authors, 2024

Double ligation of the renal artery was performed with polyglactin 910, 3-0 (Injex) wire, close to the abdominal aorta. The same maneuver followed with the renal vein. Subsequently, the ureter was dissected by blunt divulsion until it was inserted into the bladder. Next, the region was clamped with Kelly hemostats (Injex) and ligation with polyglactin 910, 2-0 (Injex) suture. After the section, the kidney and its ureter were removed (Figure 5).

Figure 4: Photographic image of the right kidney after nephrectomy



Source: Prepared by the authors, 2024.

Celeryorrhaphy was performed with nylon 0 (Injex), standard x, followed by reduction of dead space and intradermal space with polyglactin 910 thread, 2-0 (Injex) and dermorrhaphy with nylon 0 thread , with Wolf pattern.

In the postoperative period, maxicam (Meloxinew ®, 0.1 mg/kg, orally, every 24 hours, for 2 days), dipyrone monohydrate (TEUTO 1 drop/kg, orally, every 8 hours, for 5 days) and tramadol hydrochloride (TEUTO, 2mg/kg, every 8 hours, 3 days) were prescribed. The use of a protective collar was requested until the return and cleaning of the surgical wound with saline solution. Fifteen days after surgery, the stitches were removed, the healing was adequate and the doctor was discharged, and periodic follow-up visits were requested every 6 months or if clinical symptoms manifested.

In the macroscopic evaluation of the kidney, the longitudinal section identified a cystic structure with a mean diameter of 8.68 cm, in addition to the preservation of a small cortical and medullary portion of the kidney (Figure 6).

Figure 6: Photographic image of the right kidney after macroscopic evaluation at longitudinal section, demonstrating a bulging site due to the presence of the cystic cavity.



Source: Prepared by the authors, 2024.

Approximately 135 days after surgery, the animal returned to the HVU for reevaluation, and complementary tests of blood count, biochemical profile (urea, creatinine, ALT and total proteins), abdominal ultrasonography and urinalysis were requested. In the anamnesis, the owner reported that the animal was fine and that she did not have any complaints. In addition, no changes were observed during the physical examination. In the blood count, he presented leukopenia, with a reference value of 6.0 to 17.0 and a result of 4.5 and neutrophilia with a shift to the left, in the biochemical test there was a slight increase in the reference total protein profile from 5.4 mg/dL to 7.1 mg/dL and a result of 12.79 mg/dL. Urinalysis showed sedimentoscopy and squamous cells, and squamous cell (squamous cell), and physical evaluation showed no alteration, and serum biochemical examination identified a slight alteration in the value of total proteins.

DISCUSSION

According to Bravo *et al*., 2021 The most common diagnostic methods for identifying cysts in the renal parenchyma are ultrasonography and excretory urography. In agreement, Rocha (2012) affirms the relevance of the ultrasound examination and describes that the alterations that can be observed are renal irregularity with the presence of increased echogenicity of the cortex and medullary, in addition to loss in corticomedullary definition.

It should be noted that the patient was taken to the HVU of UFOB due to hyperplastic enlargement at the base of the penis, in which through the performance of the ultrasound examination, abnormalities were observed in the architecture of the right kidney, in which he

presented irregular contour and loss of the corticomedullary limits, characteristic of renal cysts, which demonstrates the importance of performing complementary exams, and specifically, ultrasonography as a diagnostic method for detecting a series of pathologies, such as kidney cysts (Balda et al., 2022; Bravo *et al*., 2021).

According to Ramos; Marini (2014) urea measurement is not a specific method to evaluate renal alterations, however, it has considerable sensitivity for primary renal alterations, presenting itself as an important marker for these conditions. Thus, according to the alteration in serum urea levels observed in this patient, it is suggested that it is associated with the renal cyst present, due to a probable condition of renal dysfunction.

It has been described that middle-aged to elderly animals are predisposed to the occurrence of this pathology and also to the increase in the diameter of the cyst (Breshears *et al*., 2018; Balda, 2022; Breshears, 2018), which corroborates the report in question since the animal was 12 years old, thus being considered elderly and had a medium-sized cyst of about 8.68 cm. The pathology can also affect, without distinction, males and females, as well as a variety of breeds (Balda, 2022).

Pinto Filho *et al*., (2013) mention that renal cysts can be formed in any part of the nephron and the collecting duct system, with hereditary or acquired causes. In addition, their size is variable and they can be large and in smaller quantity or smaller and multiple sizes. In view of the size and degree of expansion of the cyst reported, renal impairment was observed, which still presented remnants of parenchyma.

According to Park *et al*., (2019) most of the kidney cysts found are benign and do not present clinical signs, and the finding is accidental. This information coincides with the present study, since the renal cyst was discovered occasionally during the evaluation due to the complaint and suspicion of another disease, without any direct relationship with regard to symptoms. On the other hand, Pinto Filho *et al*., 2013 state that nonspecific clinical signs can be observed in cases that already have renal involvement, such as abdominal distension, due to increased renal volume, emesis, anorexia, polydipsia, polyuria, and weight loss. Although the abdomen was completely bulging in the patient in the report, the animal did not present pain or discomfort during palpation.

Although the renal cyst was eventually found, the indication and performance of surgery proved to be extremely important and urgent, due to its size and the possibility of rupture that would cause hemorrhage and probable death of the animal. Thus, it is important to emphasize that although the literature often indicates that a surgical procedure is not necessary, each patient must be evaluated individually as well as the availability of technical resources in the region served (Park, 2019).

According to Rocha (2018), nephrectomy can be performed partially or totally. Partial nephrectomy is performed only in cases of trauma with the presence of hemorrhage from one of the renal poles. However, total nephrectomy is performed in cases of kidney tumors, severe hydronephrosis, extensive kidney trauma, kidney transplantation, and pyelonephritis. In some studies, for kidney cyst removal, techniques such as laparoscopic resection and subcapsular omentalization of the kidney are performed, which, despite having considerable effectiveness, require more complex and expensive devices, making it impossible to perform the practice in places with less apparatus (Andrade *et al.,* 2018).

Thus, it is noteworthy that nephrectomy for the resolution of this case was essential, in view of the size of the renal cyst, and a condition that suggests organ dysfunction. It should be noted that although nephrectomy has not been previously reported as a therapeutic indication in cases of renal cysts, it is known that when there is total renal impairment, the indication is for removal of the organ, as long as the contralateral patient is performing its physiological functions properly (Bravo *et al*., 202; Pigatto *et al*., 2011).

Regarding post-surgical therapy, an anti-inflammatory drug based on meloxicam and dipyrone was used to seek analgesic action. According to Souza *et al*., (2018) the non-steroidal anti-inflammatory drugs of choice for post-surgical treatment of dogs are ketoprofen, carprofen, flunixin meglumine and meloxicam. Therefore, the anti-inflammatory therapy used in the report is consistent with the literature.

After the animal's return, it was possible to observe that it was healthy and there were no signs of recurrence of the cyst in the opposite kidney. The fact that it is not a treatment reported in the literature demonstrates the importance of describing the technique used for the pathology in question as a way to disseminate knowledge.

Therefore, based on the clinicopathological and sonographic findings reported in this study, it is concluded that nephrectomy of the right kidney for the treatment of renal cysts proved to be an effective and beneficial approach, with no signs of recurrence. In addition, it was extremely important for the preservation of the life of this animal.

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