Case report

Transitional cell carcinoma of the renal pelvis in a dog with combined treatment with unilateral nephrectomy and carboplatin

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Abstract

A transitional cell carcinoma of the renal pelvis was diagnosed in a 10-year-old, male German shepherd that presented with a 1-month history of hematuria and weight loss. Unilateral nephrectomy and chemotherapy with carboplatin was applied, but the dog was euthanized five months after the surgery due to metastasis.

Key Words: Chemotherapy, kidney, neoplasia

Introduction

Primary renal neoplasms are relatively rare in domestic animals. Carcinomas, nephroblastomas, adenomas, and spindle cell sarcomas have all been described in dogs, horses, pig and cows (16). Malignant epithelial neoplasias of the renal parenchyma are the most common type (5), and renal pelvis neoplasias are rare comprising 7% of the total number of renal neoplasias (10).

Treatment for primary renal neoplasia principally involves surgical tumor removal (8). In the human literature, there are conflicting results regarding the use of radiotherapy and chemotherapy as surgical adjuvants (7). Carboplatin is one of the most common chemotherapeutics used in the treatment of canine neoplasias. There are no reports, however, that address the use of carboplatin as an adjuvant in the treatment of primary renal neoplasias in dogs. Furthermore, studies evaluating the effects of surgical and chemotherapeutic treatments on the survival rate of animals with renal tumors are scarce (13). The purpose of this study is to report a case of transitional cell carcinoma of the renal pelvis in a dog that underwent combined treatment with unilateral nephrectomy and carboplatin.

Case report

A 10-year-old, male German shepherd dog weighing 30 kg was admitted to the veterinary hospital at the Universidade Federal de Minas Gerais (UFMG) with a history of hematuria, anorexia, and weight loss over the previous 30 days. On clinical examination, the dog showed pain on abdominal palpation. The serum analysis showed increased levels of urea and creatinine (Table 1). A urinalysis collected by urethral probe showed hematuria and proteinuria (Table 1). On ultrasonographic examination of the abdomen, the right kidney was shown...
to be increased in size, and appeared as an irregular and hyperechoic mass. Radiographs of the thorax did not show evidence of metastatic disease. On exploratory laparotomy, the right kidney had an increased size with an irregular surface, and the ureter was dilated. Right nephrectomy and ureterectomy were performed. The left kidney and the other organs were grossly normal in appearance.

Macroscopically, the right kidney measured about 12 cm in diameter with an irregular surface. On sectioning, there was evident compression and reduction of the thickness of the renal medulla and cortex, as well as a dilated renal pelvis (Fig 1) that was filled with 250ml of serosanguineous liquid. In the hilus, a red solid mass was observed (8 cm diameter) (Fig 2). This tumor was friable, were located in the omentum, liver, serous of urinary bladder lung, parietal pleura, and pericardial sac measuring 0.2 cm to 3.5 cm in diameter, either solid or friable, were located in the omentum, liver, serous of urinary bladder lung, parietal pleura, and pericardial sac. The renal medulla disappeared and the renal cortex was very thin. Intense fibrosis and a multifocal lymphoplasmocytic inflammatory infiltrate were seen in the renal cortex. Based on the macroscopic and microscopic features, transitional cell carcinoma of the renal pelvis was diagnosed.

Three weeks after surgery, the hematologic and serum concentrations of urea and creatinine were normal (Table 1). At that time, chemotherapeutic treatment was started, which involved administration of a total of three doses of carboplatin (300mg/m², by intravenous injection, repeated every 21 days). Ten days after administration of the first dose of chemotherapy, a complete blood count, serum biochemistry and urinalysis were repeated. The serum urea and creatinine concentrations were normal, but the urinalysis showed proteinuria, hemoglobinuria and renal epithelial cell clumps. After the second chemotherapy session, leukopenia and thrombocytopenia were observed. In the same period, renal function was normal and stable; however, the urinalysis showed proteinuria, hematuria and abundant epithelial cells (Table 1). Before each chemotherapy session, abdominal ultrasonography was performed.

Up to four months after the end of chemotherapy, the animal maintained a stable clinical status, with normal appetite, micturition, and defecation. There was weight recovery, and fever and azotemia were not observed. Five months after nephrectomy, however, the animal was taken again to the Veterinary Hospital, presenting with lethargy and anorexia. Ultrasonographic examination of the abdominal cavity suggested disseminated metastases. Due to an unfavorable prognosis, the animal underwent euthanasia and necropsy.

At necropsy, several reddish white nodules, measuring 0.2 cm to 3.5 cm in diameter, either solid or friable, were located in the omentum, liver, serous of urinary bladder lung, parietal pleura, and pericardial sac (Fig 4). Fragments were collected from all organs with nodules, and also from the organs that had no macroscopic changes, such as the left kidney, adrenals, heart, mesenteric lymph nodes, inguinal lymph nodes, and

### Table 1 – Values found from the complete blood counts, renal function tests, and urinalyses before and after the treatment with nephrectomy and chemotherapy.

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Reference values</th>
<th>Day of nephrectomy (day 0)</th>
<th>Before the first dose of chemotherapy</th>
<th>After the second dose of chemotherapy</th>
<th>After the third dose of chemotherapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemogram</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erythrocytes (cells/uL)</td>
<td>5.5-8.5×10⁶</td>
<td>7.4×10⁶</td>
<td>7.3×10⁶</td>
<td>7.47×10⁶</td>
<td>7.5×10⁶</td>
</tr>
<tr>
<td>Hemoglobin (g/dL)</td>
<td>12-18</td>
<td>15.0</td>
<td>13.6</td>
<td>13.4</td>
<td>12.2</td>
</tr>
<tr>
<td>Hematocrit (%)</td>
<td>37-55</td>
<td>45.0</td>
<td>44.0</td>
<td>42</td>
<td>39</td>
</tr>
<tr>
<td>Renal function</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urea (mg/dL)</td>
<td>20-56</td>
<td>206</td>
<td>40.0</td>
<td>34.0</td>
<td>25.0</td>
</tr>
<tr>
<td>Creatinine (mg/dL)</td>
<td>0.5-1.5</td>
<td>7.4</td>
<td>1.4</td>
<td>1.4</td>
<td>0.7</td>
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<tr>
<td>Urinalysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>Negative</td>
<td>+++</td>
<td>+++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Occult blood</td>
<td>Negative</td>
<td>+++</td>
<td>+++</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>Bilirubin</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Erythrocytes (cells/field)</td>
<td>&lt;5</td>
<td>uncountable</td>
<td>Negative</td>
<td>10-15</td>
<td>3</td>
</tr>
<tr>
<td>Epithelial cells</td>
<td>Negative</td>
<td>2 p/c</td>
<td>2 p/c</td>
<td>++</td>
<td>0</td>
</tr>
</tbody>
</table>

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Discussion

Primary renal tumors are uncommon in dogs, comprising 0.3 to 1.7% of canine neoplasias (11). Regarding neoplasias associated with the renal pelvis, some reports on the canine species may be found in the literature, but cases where patients were diagnosed with a renal pelvic carcinoma and then underwent some treatment are rare (8).
the side effects of carboplatin, was observed after administration of the third dose (4). There was no evidence of metastasis observed in the radiographic examination of the thoracic region, abdominal ultrasonography, and laparotomy at the time of nephrectomy. Metastases of renal pelvis tumors are rare (6, 11) and sometimes occur as an extension of the renal capsule to the serous and intestinal walls (6). In this study, five months after nephrectomy, renal pelvis tumor metastases were observed in organs within the thorax and abdominal cavities. The macroscopic and microscopic findings confirmed that the TCC in the bladder was superficial and it was located only in the serous of bladder. The mucous membrane did not show any tumor. The TCC thus did not originate in the bladder. Due to these findings, the TCC was likely primary to the renal pelvis.

Renal neoplasias may be treated after unilateral nephrectomy and ureterectomy with chemotherapy. In the case of bilateral renal involvement, neither surgery nor chemotherapy is effective (6). The clinical findings improved significantly after complete tumor removal, which may be a consequence of the fact that only one kidney was affected by the tumor.

Platinum complexes are the most common drugs used as adjuvant treatment of neoplasias, and cisplatin has been used very frequently in veterinary oncology (2). Nevertheless, cisplatin’s high toxicity to the urinary, gastrointestinal, and nervous systems has limited its use. Therefore, carboplatin, an analog of cisplatin that has reduced toxicity, has been used instead (1). In veterinary medicine, there are reports on the use of carboplatin in the treatment of osteosarcomas (9), bladder transitional cell carcinomas (4, 15), mesotheliomas (3), mesenchymomas (12), ependymomas (19), thyroid adenocarcinomas, melanomas (18), perianal adenocarcinomas (14), and mammary gland tumors (17). However, studies have demonstrated that carboplatin does not have good results in the treatment of bladder transitional cell carcinomas (4). There are no studies of this agent in the treatment of renal pelvis tumors in dogs. The literature has few studies on the survival time of dogs with transitional cell carcinoma of the renal pelvis. In a follow-up of five dogs with carcinoma of the renal pelvis after unilateral nephrectomy without chemotherapeutic treatment, the survival times observed were three months, five months, and 25 months after nephrectomy; two animals were euthanized during surgery (8). In the animal in the present study, the dose of carboplatin used was in accordance with the dose recommended in the literature (4, 14), but the effectiveness of the treatment is still unclear. Nephrectomy remains the treatment of choice for unilateral primary renal neoplasias without evidence of metastasis. For some tumors, the best therapy is the combination of surgery and chemotherapy. In this case, the association of nephrectomy and chemotherapy does not seem to have improved the animal’s survival time compared to the study of Klein et al. (1988), who evaluated the survival time after nephrectomy without adjuvant treatment. The survival time after treatment is important, but the patient’s quality of life cannot be taken for granted. In the present case, the patient maintained stable clinical findings and was without symptoms until a little more than four months after nephrectomy. Further studies on the response of these tumors to the combined treatment of nephrectomy and chemotherapy are necessary.

References


