Anal Sac Adenocarcinoma in an Eleven Year Old Female Terrier: A Case Report

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Abstract

Case Description- An 11 year old intact female white Terrier dog weighing 10 kg with no history of illness was presented to the clinic for routine checkup. In anal sac evacuation a right perianal unilateral mass was recognized as an incidental finding.

Clinical Findings- Subsequent problems such as polyuria, polydipsia, dyschezia, tenesmus, poor appetite, and vomiting were not noted. No signs of metastasis were noted in thoracic and abdominal radiography. Biochemical profile showed elevated total calcium, but no other abnormalities were found in complete blood cell count.

Treatment and Outcome- The mass was removed surgically by a curvilinear incision and the empty space was closed with 2-0 Vicryl suture material in purse string fashion. Skin was closed with 3-0 Nylon suture material. Histopathological evaluation showed the cells had round to oval normochromic to hyperchromic nuclei, with a prominent nucleous and a small amount of eosinophilic cytoplasm.

Clinical Relevance- In recent studies in dogs with ASAC, clinical findings such as polyuria, polydipsia, weakness or lethargy related to hypercalcemia, and local irritation, tenesmus or constipation associated with iliac lymph node metastasis and enlargement were observed. But in our case there was no history of clinical signs. Most cases were neutered female dogs. Unusually, in our study, the dog has not been neutered. In one study median age at diagnosis was 9.9 years (range, 7.9 – 11.9 years).

Key words- Anal sac, Adenocarcinoma, Terrier dog

Case Description

An 11 year old intact female white Terrier dog weighing 10 kg with no history of illness was presented to the clinic for routine checkup. In anal sac evacuation a right perianal unilateral mass was recognized as an incidental finding. The mass was firm, non-pedunculated and was not painful in palpation.

Anal sac tumors are also called apocrine gland tumors. Perianal glands are modified sebaceous glands and are also known as circumanal tumors and hepatoid tumors. Commonly most of the perianal tumors are carcinoma and adenoma of the apocrine and perianal glands. Anal sac adenocarcinoma which is originated from apocrine gland epitheliums is a malignant tumor. The most common canine perianal tumors are perianal adenomas (80%). They occur more often in intact males than in intact females and are more prevalent in neutered females than in intact females. They are usually small, well circumscribed, raised and may be single or multiple; although, some are ulcerated and large. Most patients have unilateral tumors. The tumor is seen in different breeds of dogs in the age of between 5 and 12 years. The tumor is metastasized (90%) to regional lymph nodes such as iliac, sacral, and sublumbar lymph nodes, although distant metastasis may occur anywhere, but lungs, liver, and spleen are the most common sites. Paraneoplastic syndrome is accompanied with some anal sac adenocarcinomas result in persistent hypercalcemia and secondary renal failure.
Clinical Findings

Clinical findings such as polyuria, polydipsia, dyschezia, tenesmus, poor appetite, and vomiting were not noted. Vital signs included heart rate, temperature and respiratory rate were normal. No signs of metastasis were noted in thoracic and abdominal radiography. Biochemical profile showed elevated total calcium, but no other abnormalities were found in complete blood cell count (Table 1, 2).

Table 1. Complete blood count

<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
<th>Unit</th>
<th>Reference range</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC</td>
<td>9.3 ×10³/µl</td>
<td></td>
<td>5.00-17.0</td>
</tr>
<tr>
<td>Granulocyte</td>
<td>59 %</td>
<td></td>
<td>60-77</td>
</tr>
<tr>
<td>Band cell</td>
<td></td>
<td>%</td>
<td>0-3</td>
</tr>
<tr>
<td>Lymphocyte</td>
<td>36 %</td>
<td></td>
<td>12-30</td>
</tr>
<tr>
<td>Monocyte</td>
<td>5 %</td>
<td></td>
<td>3-10</td>
</tr>
<tr>
<td>Eosinophil</td>
<td></td>
<td>%</td>
<td>2-10</td>
</tr>
<tr>
<td>Basophile</td>
<td></td>
<td>%</td>
<td>0-1</td>
</tr>
<tr>
<td>RBC</td>
<td>8.8 ×10³/µl</td>
<td></td>
<td>5.5-8.5</td>
</tr>
<tr>
<td>HGB</td>
<td>19.3 g/dl</td>
<td></td>
<td>12.0-18.0</td>
</tr>
<tr>
<td>HCT</td>
<td>51.4 %</td>
<td></td>
<td>37.0-55.0</td>
</tr>
<tr>
<td>MCV</td>
<td>58 fl</td>
<td></td>
<td>60.0-77.0</td>
</tr>
<tr>
<td>MCHC</td>
<td>38 g/dl</td>
<td></td>
<td>32.0-36.0</td>
</tr>
<tr>
<td>TP</td>
<td>7.0 g/dl</td>
<td></td>
<td>5.1-7.8</td>
</tr>
</tbody>
</table>

Table 2. Biochemical profiles.

<table>
<thead>
<tr>
<th>Biochemical tests</th>
<th>Result</th>
<th>Unit</th>
<th>Reference range</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT (SGPT)</td>
<td>23 IU/L</td>
<td></td>
<td>5-100</td>
</tr>
<tr>
<td>AST (SGOT)</td>
<td>37 IU/L</td>
<td></td>
<td>5-55</td>
</tr>
<tr>
<td>ALP</td>
<td>41 IU/L</td>
<td></td>
<td>10-150</td>
</tr>
<tr>
<td>GGT</td>
<td>----- IU/L</td>
<td></td>
<td>0-10</td>
</tr>
<tr>
<td>Urea</td>
<td>50 mg/dl</td>
<td></td>
<td>15-58</td>
</tr>
<tr>
<td>Creatinine</td>
<td>1.17 mg/dl</td>
<td></td>
<td>0.4-1.8</td>
</tr>
<tr>
<td>TP(Plasma)</td>
<td>7.0 mg/dl</td>
<td></td>
<td>5.5-7.8</td>
</tr>
<tr>
<td>Albumin</td>
<td>3.5 g/dl</td>
<td></td>
<td>2.6-4.3</td>
</tr>
<tr>
<td>Globulin</td>
<td>3.5 g/dl</td>
<td></td>
<td>2.7-4.4</td>
</tr>
<tr>
<td>A/G ratio</td>
<td>1 -</td>
<td></td>
<td>0.75-1.9</td>
</tr>
<tr>
<td>Glucose</td>
<td>----- mg/dl</td>
<td></td>
<td>60-125</td>
</tr>
<tr>
<td>Total Bilirubin</td>
<td>----- mg/dl</td>
<td></td>
<td>0-0.4</td>
</tr>
<tr>
<td>Direct Bilirubin</td>
<td>----- mg/dl</td>
<td></td>
<td>0-0.1</td>
</tr>
<tr>
<td>CPK</td>
<td>----- IU/L</td>
<td></td>
<td>10-200</td>
</tr>
<tr>
<td>Calcium</td>
<td>12.1 mg/dl</td>
<td></td>
<td>7.5-11.5</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>----- mg/dl</td>
<td></td>
<td>2.1-6.3</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>174 mg/dl</td>
<td></td>
<td>112-328</td>
</tr>
<tr>
<td>Triglyceride</td>
<td>30 mg/dl</td>
<td></td>
<td>20-150</td>
</tr>
<tr>
<td>Total iron</td>
<td>109.6 µg/dl</td>
<td></td>
<td>33-147</td>
</tr>
</tbody>
</table>

Treatment and Outcome

Anesthesia was done using atropine (0.03 mg/kg SC) and promethazine (0.1 mg/kg IM) as premedication and followed by midazolam (0.25 mg/kg IV) and ketamine (5 mg/kg IV) as an induction. Isoflurane (2%) in 100% oxygen was used for maintenance of anesthesia. The mass was removed surgically by a curvilinear incision, Blunt dissection with metzenbaum scissor was used to remove the tumor mass. Afterwards, Empty space was closed with 2-0 Vicryl suture material in purse string fashion. Skin was closed with 3-0 Nylon suture material. the surgery Meloxicam 2% (0.2 mg/kg SC) once daily was administered for 5 days. For prevention of an infection at surgical site we used Cefazoline (22 mg/kg IM) twice daily for 5 days. After one month follow up there was no sign of recurrence and complications such as swelling, irritation, and wound dehiscence were not observed. Histopathological evaluation showed solid sheet and tumor cells, subdivided by thin bands of fibrous tissue. The cells had round to oval normochromic to hyperchromic nuclei, with a prominent nucleus and a small amount of eosinophilic cytoplasm. Some mitotic figures, hyperemia and hemorrhage were seen. According to these observations, this tumor is malignant, named anal gland carcinoma or adenocarcinoma (Fig.1,2,3,4).
Figure 1. Solid mass was removed surgically. The size of tumor was 3.5 cm with irregular borders.

Figure 2. Hyperemia and hemorrhage. H & E, X 200

Figure 3. Cells with oval hyperchromatic nuclei, and thin band of fibrous tissue. H & E, X 400
Clinical Relevance

In a study of 32 dogs with ASAC, the diagnosis was made as an incidental finding in 11 dogs as in our study.\(^5\) In another study; polyuria, polydipsia, weakness or lethargy related to hypercalcemia, and local irritation, tenesmus or constipation associated with iliac lymph node metastasis and enlargement were observed.\(^{1,4}\) But in our case there was no history of clinical signs. In 2 reports, 11 out of 14 and 30 out of 32 dogs with ASAC were female. In one study median age at diagnosis was 9.9 years (range, 7.9 – 11.9 years).\(^5\) In study of Javanbakht and co-workers it is mentioned that this tumor is more frequently seen in castrated male and neutered female.\(^2\) Although in study of Peter Bennett, perianal adenomas are seen most frequently in intact male dogs because of the tumor’s testosterone dependence.\(^5,3\) So, intact male dogs and neutered females are more likely predisposed to anal sac adenocarcinomas.\(^1\) Unusually in our study, the dog has not been neutered. Probably the main predisposing factor that cause tumor growth, in our case, was related to the age.

Acknowledgments

The authors would like to thank to Mr. Mohammad Ferdowsi, Veterinary Technician at Aftab Pet Clinic.

List of Abbreviations

ASAC: Anal Sac Adenocarcinoma
IM: Intra Mascular
SC: Subcutaneous
IV: Intra Venus

References

Rubber Jaw Syndrome in a Young Dog

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Abstract

Case Description- A 4-month-old male, Rottweiler dog referred to our hospital with history of lethargy, dehydration, vomiting, polyuria and polydipsia for a few days.

Clinical Findings- The physical examination revealed pale mucous membranes, flexible jaws on firm palpation (rubber jaw syndrome) and loosens most of the teeth resulting from resorption of alveolar bone. Patient showed in last days shifting lameness as well. Radiographic examination of the skull revealed general reduced bone density. The dog could eat only soft food and was underweight. Laboratory evaluation revealed non-regenerative (hypoplastic) anaemia in result of synthetize and secrete erythropoietin in the kidneys, azotaemia and hypercholesterolemia, hyperphosphatemia. Proteinuria and isosthenuria were found on the urinalysis.

Treatment and Outcome- Renal dysplasia with secondary hyperparathyroidism was diagnosed based on haematology and serum chemistry screen, radiological findings and histopathology. The dog was euthanatized with request of the owner and extremely poor prognosis.

Clinical Relevance- Hyperparathyroidism has been recognised for many years as a potentially serious complication of chronic renal failure. Chronic renal failure occurs most frequently in adult and aging dogs but is uncommon in juvenile or young dogs, in which it is often the consequence of a hereditary nephropathy. The main categories of familial nephropathies are renal dysplasia, primary glomerulopathies,polycystic kidney disease, amyloidosis, and glomerulonephritis. Renal dysplasia is defined as a disorganized renal development due to an abnormal differentiation of the parenchyma. The disease is characterised by the presence of structures that are inappropriate for the stage of development of the animal. Beside, renal osteodystrophy is a common long-term complication of end-stage renal disease that frequently described in dogs. Involvement of the jaws is common and radiographic alterations are often one of the earliest signs of chronic renal disease. However, in most cases, lesions are characterized by fibrous osteodystrophy of facial bones, affecting principally the mandible and the maxilla.

Key Words- Rubber Jaw Syndrome, Secondary hyperparathyroidism, Juvenile, Dog

Case Description

A 4-month-old male, Rottweiler dog referred to our hospital with history of lethargy, dehydration, vomiting, polyuria and polydipsia, hematochezia for a few days.

Clinical Findings

The physical examination revealed pale mucous membranes, flexible jaws on firm palpation (rubber jaw syndrome) and loosens most of the teeth resulting from resorption of alveolar bone. Patient showed in last days shifting lameness as well. Radiographic examination of the skull revealed general reduced bone density (Figure 1a &b). The dog could eat only soft food and was underweight. Laboratory evaluation revealed non-regenerative (hypoplastic) anaemia in result of synthetize and secrete erythropoietin in the kidneys, azotaemia and hypercholesterolemia, hyperphosphatemia. Mild proteinuria and isosthenuria were found on the urinalysis.

Results of some blood factors have been shown in Table 1.

Table 1. Results of some parameter in laboratory examination

<table>
<thead>
<tr>
<th>Day of Examination</th>
<th>PCV</th>
<th>Hb</th>
<th>RBC</th>
<th>Total protein</th>
<th>Albumin</th>
<th>Calcium</th>
<th>Phosphorus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16.5</td>
<td>6.0</td>
<td>2.57</td>
<td>7.2</td>
<td>2.13</td>
<td>1.83</td>
<td>14.6</td>
</tr>
<tr>
<td>2</td>
<td>17.4</td>
<td>6.4</td>
<td>2.69</td>
<td>7.0</td>
<td>2.26</td>
<td>9.13</td>
<td>13.2</td>
</tr>
<tr>
<td>3</td>
<td>14.8</td>
<td>5.0</td>
<td>2.22</td>
<td>6.6</td>
<td>2.26</td>
<td>9.48</td>
<td>19.6</td>
</tr>
<tr>
<td>4</td>
<td>15.1</td>
<td>5.3</td>
<td>2.25</td>
<td>4.5</td>
<td>2.3</td>
<td>6.2</td>
<td>17.6</td>
</tr>
</tbody>
</table>
Companion Animals (Extended Abstract)

Proceeding of the 4th International Symposium of Veterinary Surgery (ISVS)
21-23 Oct 2014, Mashhad, Iran

Treatment and Outcome

Renal dysplasia with secondary hyperparathyroidism was diagnosed based on haematology and serum chemistry screen, radiological findings and histopathology. Fluid therapy was done as a providing treatment. The dog was euthanatized with request of the owner and extremely poor prognosis.

Clinical Relevance

Renal secondary hyperparathyroidism (RSHT) is a well-recognized clinical entity observed in young dogs due to an increase in the levels of the parathyroid hormone (PTH) with nonendocrine alterations in the metabolism of calcium and phosphorus. This syndrome is also referred as renal osteodystrophy, rubber jaw, renal rickets, and renal osteitis fibrosa (12). Hyperparathyroidism has been recognised for many years as a potentially serious complication of chronic renal failure (1-5). Chronic renal failure occurs most frequently in adult and aging dogs but is uncommon in juvenile or young dogs (6). The age of the diseased animals ranged from one month to 10 years but in general, the clinical evidences start being observed before the animal reaches the age of two years (11). It is often the consequence of a hereditary nephropathy. In most cases, associated lesions are frequently described in the mandible and maxilla bones but in severe cases gross detectable lesions are present in the nasal and frontal bones of the face and in the zygomatic arch (12). The main categories of familial nephropathies are renal dysplasia, primary glomerulopathies, polycystic kidney disease, amyloidosis, and glomerulonephritis. Renal dysplasia is defined as a disorganized renal development due to an abnormal differentiation of the parenchyma (8, 9). The disease is characterized by the presence of structures that are inappropriate for the stage of development of the animal (10). Beside, renal osteodystrophy is a common long-term complication of end-stage renal disease that frequently described in dogs. Involvement of the jaws is common and radiographic alterations are often one of the earliest signs of chronic renal disease. However, in most cases, lesions are characterized by fibrous osteodystrophy of facial bones, affecting principally the mandible and the maxilla (7). A frequent outcome is the development of secondary hyperparathyroidism and renal lesion, which may originate skeletal deformations (fibrous osteodystrophy) that often affects the face bones most prominently (11). Main clinical evidences are those of the chronic renal insufficiency characterized by polyuria, polydipsia, lethargy, reduced appetite, stunted growth or weight loss, and vomiting, mucous membrane pallor, uremic breath odor, and oral ulceration. Fibrous osteodystrophy or rubber jaw is occasionally observed, mainly in dogs that develop renal failure before 6 months of age. The dogs with severe renal dysplasia often have extremely small kidneys (10). The animals may also present dehydration, anemia, oral ulcerations, and halitosis (11). The causes and pathogenesis of canine renal dysplasia are unknown. Renal dysplasia is widely accepted to be the same disease entity in both Lhasa Apso and Shih Tzu dogs, but whether the other familial or sporadic forms of renal dysplasia are fundamentally the same disease or different diseases having similar adverse effects on development of the kidneys in affected dogs is uncertain. To date, evidence documenting the validity of genetic testing for renal dysplasia has not been published for any breed (10).
Acknowledgments

The authors would like to thank of private clinic for referring this patient to our hospital.

List of Abbreviations

RSHPTH: Renal secondary hyperparathyroidism

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12- Oral lesions associated with renal secondary hyperparathyroidism in an English bulldog, Selwyn Arlington Headley
Leiomyosarcoma in Small Intestine of a Bitch; a Case Report

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3 Small Animal Clinician

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Abstract

Case description- A 7-year-old female German shepherd weighting 28 kg presented with vomiting, diarrhea, lethargy, weakness and anorexia for a few weeks.

Clinical findings- Physical examination revealed mild abdominal pain due to presence of a palpable mass in abdomen. However, no evidence of metastasis was seen in thoracic radiographs, ultrasonography shown metastatic patterns and structures. Hematology indicated hypoglycemia and pathology proved the leiomyosarcoma.

Treatment and outcome- Surgery and intestinal anastomosis were suggested and the mass was removed cautiously. 2 months postoperatively signs of metastasis (cannonballs) were found in thoracic radiographs, so as the last choice euthanasia was preferred.

Clinical relevance- Leiomyosarcoma is a malignant slow-growing, locally invasive tumor of smooth muscle origin that typically is slow to metastasize. Leiomyosarcoma reportedly is the 2nd most common canine intestinal tumor and the most common intestinal sarcoma in dogs. Leiomyosarcomas commonly involve the cecum and jejunum of old dogs, with a median age of onset of 10.5 years. Leiomyosarcomas comprise approximately 20–30% of all intestinal neoplasms in the dog, and therefore are the most common sarcoma of the canine intestinal tract. Despite this frequency, intestinal leiomyosarcomas were diagnosed in less than 0.2% of 10,270 postmortem examinations on dogs. Few studies exist that describe survival data in dogs with gastrointestinal leiomyosarcoma, and even fewer reports exist that describe metastasis in these dogs.

Key words- Leiomyosarcoma, metastasis, GI tract, dog

Case description

A 7-year-old female German shepherd weighting 28 kg presented with vomiting, diarrhea, lethargy, weakness and anorexia for a few weeks.

Clinical Findings

Physical examination revealed mild abdominal pain due to presence of a palpable mass in abdomen. However, no evidence of metastasis was seen in thoracic radiographs, ultrasonography shown metastatic patterns and structures. Hematology indicated hypoglycemia and pathology proved the leiomyosarcoma (Figure 1).
**Treatment and Outcome**

Surgery and intestinal anastomosis were suggested and the mass was removed cautiously. 2 months postoperatively signs of metastasis (cannonballs) were found in thoracic radiographs (Figure 2), so as the last choice euthanasia was preferred.

**Clinical Relevance**

Leiomyosarcoma is a malignant slow-growing, locally invasive tumor of smooth muscle origin that typically is slow to metastasize. Leiomyosarcoma reportedly is the 2nd most common canine intestinal tumor and the most common intestinal sarcoma in dogs. This type of cancer doesn't have any particular breed predisposition, but usually occurs in dogs about the age of 9. Epitheliod smooth-muscle tumors, or leiomyomas, are more commonly found in the uterus, called fibroids, although there have also been cases reported at unusual sites. Leiomyosarcomas of gastrointestinal tract commonly involve the cecum and jejunum of old dogs, with a median age of onset of 10.5 years. Leiomyosarcomas comprise approximately 20–30% of all intestinal neoplasms in the dog, and therefore are the most common sarcoma of the canine intestinal tract. They are usually singular tumors, rather than multiple. Despite this frequency, intestinal leiomyosarcomas were diagnosed in less than 0.2% of 10,270 postmortem examinations on dogs. Metastatic rates of gastro-intestinal leiomyosarcomas at the time of surgery are low to moderate, ranging from 16% to 37.5%. The reported sites of metastasis in dogs include mesenteric lymph nodes, peritoneum, and liver in which the liver is the most common site of metastasis for intestinal leiomyosarcomas. Few studies exist that describe survival data in dogs with gastrointestinal leiomyosarcoma, and even fewer reports exist that describe metastasis in these dogs. Because of the rarity, clinical diagnosis of leiomyosarcomas is difficult. Diagnosis is based on palpation the tumor during the physical exam, performing an endoscopy of dog's stomach and intestines, using a special tube to view the gastrointestinal system and taking X-rays and ultrasounds of dog's abdomen, looking for changes in the thickness of the intestinal and stomach walls. The most consistent clinical signs of intestinal leiomyosarcoma include anorexia, lethargy, vomiting, weight loss, abdominal distention, and diarrhea. Microcytic hypochromic anemia, hypoglycemia, hypoproteinemia and mild leukocytosis are common in dogs with intestinal leiomyosarcoma. Surgical excision is the most commonly used treatment for intestinal leiomyosarcoma. Despite this, few reports describe the prognosis of dogs with intestinal leiomyosarcoma after surgery. Survival times range from 0 to 47 months, with an approximate median survival time of 12 months.

**Acknowledgments**

Sayna Pet Clinic and its personnel for their cooperation.

**References**

Intussusception Secondary to Parvovirus Enteritis in 3 Dogs

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Abstract

Case Description- Among the patients which referred to our hospital during one year with parvoviral gastroenteritis, intussusception was diagnosed in three dogs. First dog was two month-old, male, Great Dane, second dog was three month-old, male, crossed breed, third dog was seven month-old, female, crossed breed which referred.

Clinical Findings- In clinical examination depression, dehydration, weight loss, vomiting, dyschezia, tenesmus, rectal prolapse and haematochezia were revealed. The cause of enteritis was considered to be parvoviral gastroenteritis since canine parvoviral antigen (CPV-2) by kit (Quicking CPV Ag Rapid Test Kit, Model No. W81006, China) was detected. Abdominal radiography and abdominal ultrasonography were performed on the patients that were suspected of having intussusception. Thereafter they referred to surgery department for treatment.

Treatment and Outcome- First patient died under general anaesthesia due to severity of systemic disease. Second patient surgery was successful and he recovered completely. Third patient died one day after surgery due to systemic disease and complications.

Clinical Relevance- Intussusception is a type of intestinal obstruction that is created by the forceful invagination of one part of the intestine into the lumen of an adjacent segment and affects mainly young animals. The exact pathophysiology of the intussusception still remains unclear. It may begin as a result of a local intestinal incongruity in homogeneity (induration, acidity or sudden anatomic change in diameter) or a mechanical linkage of non-adjacent intestinal segments, which leads to a kink or a fold in the bowel wall. Intussusception has been reported to occur as a sequel to a number of conditions such as intestinal parasitism, linear foreign bodies, non-specific gastroenteritis, viral-induced enteritis (parvovirus, distemper), leptospirosis, intraluminal masses and prior abdominal surgery. Treatment of intussusception in dogs is by laparotomy and manual reduction or resection and Anastomosis of the affected intestinal segment. Intussusception associated with systemic disease (e.g. acute viral enteritis or gastroenteritis) has an increased morbidity and mortality. In this case serial report, an attempt has been made to demonstrate that acute enteritis or gastroenteritis is the most likely predisposing factor for the intestinal intussusception in young dogs. It must be noticed that it is a severe pathologic life-threatening condition if diagnosis and surgical correction was postponed.

Key Words- Intussusception, Parvoviral gastroenteritis, Dog

Case Description

First dog was 2 month-old, male, Great Dane, second dog was 3 month-old, male, crossed breed, third dog was 7 month-old, female, crossed breed which referred.

Clinical Findings

Clinical signs in dogs with intussusceptions are usually the result of partial intestinal obstruction, bacterial overgrowth, ischaemia or infarction of the intussusceptum and localised peritonitis. Hence, dogs may vomit, have diarrhoea (sometimes haemorrhagic) and show signs of depression or abdominal pain (6,7,8,9). All patients were referred with anorexia, lethargy, vomiting and diarrhoea. In clinical examination dehydration, weight loss, dyschezia, tenesmus, rectal prolapse and haematochezia was. The cause of enteritis was considered to be parvoviral gastroenteritis since canine parvoviral antigen (CPV-2) by kit (Quicking CPV Ag Rapid Test Kit, Model No. W81006, China) was detected. Abdominal radiography and abdominal ultrasonography were performed on dogs that were suspected of having ileocecal intussusceptions.

Factors that may adversely affect ultrasound image quality in animals with intussusceptions (or other intestinal lesions) include poor transduced skin contact, refractive and reflective edge artefacts arising from adjacent structures, gas in other parts of the intestinal tract and gas trapped within the lesion(5). In most instances, the ultrasonographic appearance of an intussusception is a series of concentric rings (in a transverse image) or parallel lines (in a longitudinal image) that reflect the folded layers of intestinal wall that make up the lesion(5). The typical appearance of an intussusception in transverse images has given rise to descriptive terms such as the ‘target sign’ or ‘bull’s-eye sign’(10,11,12) (Fig.1). Advantages of ultrasonography compared to barium enema for diagnosis of intussusception include lack of ionizing radiation with the technique and no need for anaesthesia. It is also less time-consuming and enables examination of adjacent structures, such as lymph nodes, that are not usually visible radiographically (5).
Figure 1. Ultrasound images of the intestines of the dog case 3. As can be seen series of concentric rings that reflect the folded layers of intestinal wall make up ‘target sign’ or ‘bull’s-eye sign’.

Treatment and Outcome

For intensive caring, they were hospitalized and for severe vomiting, antiemetic drug such as ondansetrone administered every 8 hour, and thereafter they referred to surgery department. Pre-operatively all dogs received Lactated Ringer's solution supplemented with KCl (20 mEq/l) and a combination of ceftriaxone with amikacin intravenously. Unfortunately, First patient died under general anaesthesia due to severity of systemic disease. In second patient a warm sterile saline solution was applied to lavage the exposed mucosa and the prolapse was gently reduced following the application of a lubricant to its surface. A purse-string suture was placed in the anus under routine surgery and resection and anastomosis of the affected intestinal segments was carried out. His surgery was successful and he recovered completely. In third patient because the rectal prolapse was not severe only resection and anastomosis of the affected intestinal segments was performed, but she died one day after surgery due to systemic disease and complications.

Clinical Relevance

Intussusception is a type of intestinal obstruction that is created by the forceful invagination of one part of the intestine into the lumen of an adjacent segment and affects mainly young animals (1). Intestinal intussusception is the most common form of intussusception seen in dogs(8). The most frequent site is the ileoceccolic junction, but intussusception may occur at any area along the intestinal tract(6,7,8,9,13). Intestinal intussusceptions may be single or multiple and normograde or retrograde and frequently involve a large percentage of the intestine(6,7,8,9,13). The exact pathophysiology of the intussusception still remains unclear. It may begin as a result of a local intestinal incongruity in homogeneity (induration, acidity or sudden anatomic change in diameter) or a mechanical linkage of non-adjacent intestinal segments, which leads to a kink or a fold in the bowel wall (1). Intussusception has been reported to occur as a sequela to a number of conditions such as intestinal parasitism, linear foreign bodies, non-specific gastroenteritis, viral-induced enteritis (parvovirus, distemper), leptospirosis, intraluminal masses and prior abdominal surgery (2). Intussusception associated with systemic disease (e.g. acute viral enteritis or gastroenteritis) has an increased morbidity and mortality (3). All of the dogs with intussusceptions were juvenile, this is in agreement with the findings of others(4,5). All intussusceptions included in this study were associated with acute enteritis or gastroenteritis and no other factors were found to be implicated. Acute enteritis or gastroenteritis seems to be the predominant predisposing factor for intussusception in this hospital. Treatment of intussusception in dogs is by laparotomy and manual reduction or resection and anastomosis of the affected intestinal segment. Intussusception associated with systemic disease (e.g. acute viral enteritis or gastroenteritis) has an increased morbidity and mortality (3). CPV remains a significant worldwide canine pathogen. In experimentally affected dogs, mortality without treatment has been reported as high as 91%. However, with prompt recognition of dogs infected with CPV-2, and aggressive in-hospital supportive therapy of severely affected puppies, survival rates may approach 80–95% (15).
Treatment consists of either surgically 'sliding' the telescoping portion of the intestine apart, or complete surgical removal of the intussusception. The size of the intussusception, amount of damage to the tissues, and the length of time the animal has had the condition will dictate which procedure is used. There is a surgical procedure called 'enteroplication' in which the loops of intestine are attached to one another and thus reduces the incidence of recurrence in some pets. Rate of intussusception recurrence and likelihood that a second surgical procedure would be required were not significantly different between dogs that underwent enteroplication and dogs that did not (14).

The most common complications following treatment of intussusception are recurrence, dehiscence of the intestinal anastomosis, ileus, intestinal obstruction, peritonitis, and short bowel syndrome (6,7,8,9,13).

The prognosis for intussusception is fair, with reported recovery rates of 35 to 74 per cent (6,7,9).

A model of intussusception formation has been developed in mice by the intraperitoneal injection of lipopolysaccharide (16). This model has been used to evaluate the role of inflammatory mediators such as prostaglandins, nitric oxide, and tumor necrosis factor in the formation of intussusceptions. Elucidation of the roles of these mediators and other agents (e.g., opioids) in the formation of intussusceptions may lead to the ability to prevent the recurrence of intussusceptions in dogs by pharmacologic intervention (17).

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The Comparison of Intraosseous and Intravenous Anesthesia (Thiopental-Na) in Pigeon

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Abstract

Objective-The comparison of intraosseous and intravenous injection in birds.
Design-Original study
Animals-52 pigeon
Procedures-The study was done with cross method. First all birds were divided to two groups randomly. Group A taked 20mg/kg Thiopental-Na by intraosseous route and group B taked intravenously. After one week that needs for Washing out of drug, group A received 20 mg/kg Thiopental-Na by intravenous route and group B received intraosseously. Heart rate (HR), respiratory rate (RR) and cloacal temperature (CT) were taken before (0 min) and 1, 5, 10, 20 and 30 min after anesthetic drug administration. After injection, number of efforts for injecting, duration to onset the anesthesia and different stages of anesthesia was checked. Returning from anesthesia in two groups was written out and compared.

Results-Statistical assessment showed anesthesiaonset in method of intravenous injection was significantly less than method of intraosseousinjection (p=0.003), and RR in two groups was different in 1 min after drug administration (P=0.036). There was not statistically difference in other minutes for RR, HR and CT in two groups (P>0.05). Statistical analysis showed that there were no significant differences in terms of number of efforts for anaesthetizing in both methods of intravenous and intraosseous as well as anesthesia stage in both methods in different minutes (p>0.05). Also no significant alterations were recorded for recovery time for both groups.

Conclusion and Clinical Relevance-Intraosseous injection in birds is comparable with intravenous route.

Key words- Intraosseous injection, Anesthesia, Pigeon

Introduction

Many avian practitioners routinely perform a variety of surgical procedures, including exploratory surgery, fracture repair and surgical sexing (23). To safely restrain and anaesthetize a wide range of bird species is essential for the avian practice (10,13). Avian anaesthetic and surgical techniques have progressed greatly in the last decade. The choice of anaesthesia and administration is often as important for success as the surgical procedure itself (15). General anaesthesia in various avian species may be produced by administration of either inhalant or parenteral injectable agents (1,6). Inhalation anaesthesia is preferred for birds but requires expensive equipment. The use of an injectable in comparison with an inhalant anaesthetic agent may have the advantage of increased speed of induction of anaesthesia, the need for minimal equipment and low cost (5). There are various methods to inject in which intraosseous injection has been paid attention. Intraosseous access to the peripheral circulation is an efficient approach for intravascular fluid therapy and anaesthesia in birds and it provides a rapid, stable and accessible route for fluid therapy (8). Intraosseous catheters can be placed in the proximal ulna or the cranial tibiotarsus (17). Barbiturates are of injecting anesthetics. Thiopental is a Barbiturate and its function is by increasing the inhibitory performance of GABA in the brain. Thiopental has the solubility in lipid along with a rapid and shorter onset during functioning compared to other Barbiturates (16). The use of parenteral anaesthetics for diagnostic or surgical procedures in birds has become important in veterinary practice because of their increasing popularity as pets. The purpose of this study was comparsion of intraosseous and intravenous anesthesia in birds.

Materials and Methods

Animals

Fifty two healthy pigeons were purchased. They were kept in separated cages in a stress-free and clean environment with room temperature. In addition, they received a certain amount of water and food on a daily basis. Vital signs and any other damages were investigated before anesthesia.
Anesthesia and Pain Management (Extended Abstract)

Study protocol

The study was done with cross method. First all birds were divided to two groups randomly. Group A taked 20mg/kg Thiopental-Na by intraosseous route and group B taked intravenously. After one week that needs for Washing out of drug, group A recived 20 mg/kg Thiopental-Na by intravenous route and group B recived intraosseously. Each group was considered for its control in this method. In method of intravenous injecting, Thiopental in to pigeon swing vein was done using insulin syringes after tying the pigeon by hands. In the method of intraosseous, anesthetics was injected in upper part of Tibia (space between Lateral condyle bone and Medial condyle bone) using insulin syringes with angle of 90 degrees. Before starting anesthesia in the time of zero, number of heart beats, number of breathes, and cloacal temperature of pigeons were measured. After injection, number of efforts for injecting and duration to onset the anesthesia was checked. Number of heart beats, number of breathes, and cloacal temperature of pigeons were measured during anesthesia in various timings of 1, 5, 10, 20, and 30 minutes. The number of heart beats was measured in the space of left ribs by stethoscope as well as number of breathes by number of sternum movement. Body temperature was measured by thermometer through cloaca. Returning from anesthesia in two groups was written out and compared. Different stages of anesthesia for each pigeon were investigated based on following factors and according to various reflexes such as reflex of tapping on the table, wing-flapping reflex, finger-tightening reflex, and reflex of balance.

Stages of anesthesia

1: Ability to stand and severe reaction to pain. 2: Inability to stand, medium reaction to pain (pigeon gathered his legs while tightening). 3: Confined to ground in backward direction, extremely weak reactions to pain.

Statistical analysis

Statistical method of ANOVA Repeated Measures was used to compare data averages in various timings since data relevant to the number of breathes, number of heart beats, and body temperature of pigeon in various timings were measured. Also different Variance of intraosseous and intravenous groups were analysed with paired t test (P-Value=0.05). Software of IBM® PASW/SPSS® Statistics 18.0 – 2009 was used.

Results

Statistical assessment showed anesthesia onset in method of intravenous injection was significantly less than method of intraosseous injection (p=0.003) and RR in two groups was different in 1 min after drug administration (P-Value=0.036). There was not statistically difference (P-Value>0.05) in other minutes for RR, HR and CT in two groups (Fig.1). Statistical analysis showed that there were no significant differences in terms of number of efforts for anaesthetizing (Table.1) in both methods of intravenous and intraosseous as well as anesthesia stage in both methods in different timings (p>0.05). Also no significant alterations were recorded for recovery time for both groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>Average(S)</th>
<th>Standard deviation</th>
<th>Minimum</th>
<th>Maximum</th>
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<tr>
<td>Intravenous</td>
<td>1.35</td>
<td>0.629</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Intraosseous</td>
<td>1.42</td>
<td>0.758</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 1- Average and Standard deviation number of efforts for injecting in two groups intravenous and intraosseous
Figure 1. Alterations in respiratory rate (A), heart rate (B) and cloacal temperature (C) in pigeons subjected to intraosseous (20 mg/kg) and intravenous (20 mg/kg) Thiopental-Na administration.
Discussion

Obtained results, after implementing anaesthetizing by both methods and determining application and effect of each of them on anesthesia process, pointed out that injection by intraosseous method is as effective as intravenous one. Injection by intraosseous method was first used in 1934 for human and its usage had increased by 1940\(^{(4)}\). Intraosseous drug administration has been reported in man \(^{(12)}\), dogs \(^{(15)}\) and birds \(^{(17)}\). No systematic reaction to injection by intraosseous method was observed in this study. Additionally, a noticeable difference between measured parameters such as heartbeats, body temperature, various stages of anesthesia, returning interval from anesthesia, and number of efforts for injection by intravenous and intraosseous methods was not seen. The only significant statistical difference between these methods was number of pigeons’ breathes one minute after injection. Anesthesia onset in the method of intravenous is less than intraosseous method.

Ronning \(^{(11)}\) in a study in 1993 compared injection of hypertonic saline and complete blood by two mentioned methods on 18 Hindi pigs. Results revealed that intraosseous method was as effective as intravenous one by increasing pressure. Daniel \(^{(3)}\) compared intravenous and intraosseous injections among 25 cancer patients. No significant differences in terms of statistics between two groups regarding all pharmacodynamic factors and parameters were found and intraosseous injection is as effective as intravenous injection. In the Sarrafzadeh-Rezaei study \(^{(14)}\), efficiency of induction of anesthesia by a standard intravenous route and an intraosseous route was compared. Their results showed that the intraosseous injection of thiopental is a rapid, simple, safe and effective alternative option for induction of general anesthesia in rabbits. In comparison of intravenous and intraosseous injection of Methylen-Blue in rabbits \(^{(7)}\), intraosseous injection has the same efficacy as the intravenous injection.

Results of the current study and conducted studies indicate that intraosseous injection of Thiopental-Na in pigeon is an elective, simple, and effective method for conveying public anesthesia and it can be replaced for intravenous in critical conditions when accessibility to peripheral vessels is not possible.

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