Metastatic Calcinosis Circumscripta Treated with an Oral Charcoal Absorbent in a Dog

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ABSTRACT. A five-year-old West Highland white terrier dog was admitted to the teaching hospital of Nippon Veterinary and Animal Science University due to swelling and pain of the foot pads. Examinations revealed that the dog had renal failure and calcinosis circumscripta on its foot pads. The diagnosis was metastatic calcinosis circumscripta secondary to renal failure. An oral charcoal absorbent (Kremezin®) was used to treat this condition. Following this treatment, a significant decrease in the Ca × P value (the serum calcium level × the serum phosphorus level) was observed, and the dog’s condition improved dramatically. This case suggests that charcoal absorbent (Kremezin®) may be useful for treating metastatic calcinosis circumscripta in dogs.

KEY WORDS: calcinosis circumscripta, charcoal absorbent, renal failure.
foot pads were treated with an antiseptic solution, and the chronic renal failure with an oral charcoal adsorbent (Kremezin®; Kureha Chemical Industry Co., Tokyo; 2 caps PO TID) and a prescription diet (canine k/d®; Hill’s Pet Nutrition, Inc.). After about 5 weeks of this treatment, the serum BUN levels had dropped and Ca × P decreased from 85.8 to 41.8. The swelling of the foot pads diminished over time, and after 15 weeks of treatment, they appeared to be normal (Fig. 1-b).

The cause of the calcinosis circumscripta remains unknown. However, this disease can originate from calcification of traumatized tissue, collagen abnormalities, a release of alkaline-phosphatase from damaged tissues, or an increase in tissue pH [3, 9, 16, 21]. In humans, it has been reported that the incidence of this disease increases when the Ca × P value is more than 50 [14] or 70 [15]. A study in our laboratory showed that Ca × P in normal dogs is 42.45 ± 5.89 mg/dl. In this dog, Ca × P was 85.8. During the treatment with Kremezin® and canine k/d®, Ca × P decreased to 41.8, and the condition of this dog was well controlled. In this case, chronic renal failure resulted in long-lasting abnormal calcium and phosphate levels that stimulated parathormone and accelerated the deossification of osteoclasts. Deossification beyond this level can cause both osteodystrophy and metastatic calcification.

Table 1. Changes in serum blood urea nitrogen, creatinine, calcium and phosphorus contents and calcium times phosphate product level in the serum after administration of oral charcoal adsorbent

<table>
<thead>
<tr>
<th>weeks after treatment</th>
<th>0</th>
<th>5</th>
<th>9</th>
<th>15</th>
</tr>
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<tbody>
<tr>
<td>BUN (mg/dl)</td>
<td>82.8</td>
<td>47.9</td>
<td>53.6</td>
<td>48.2</td>
</tr>
<tr>
<td>Crea (mg/dl)</td>
<td>3.9</td>
<td>3.4</td>
<td>3.2</td>
<td>3.1</td>
</tr>
<tr>
<td>Ca (mg/dl)</td>
<td>13.0</td>
<td>9.9</td>
<td>9.7</td>
<td>9.5</td>
</tr>
<tr>
<td>P (mg/dl)</td>
<td>6.6</td>
<td>6.5</td>
<td>6.9</td>
<td>4.4</td>
</tr>
<tr>
<td>Ca × P</td>
<td>85.8</td>
<td>64.3</td>
<td>66.9</td>
<td>41.8</td>
</tr>
</tbody>
</table>


Fig. 1-a. A swollen foot pad of the diseased dog at the first examination. The pad was partially protruded and a chalky white material was seen in the skin dehiscence of the protrusion. 1-b. The pad returned to normal without swelling or pain after treatment.

Fig. 2. An X-ray photograph of the foreleg at the first examination. The deposition of calcareous-appearing substances was observed in the soft tissue of the pad.
The metabolic disorders underlying metastatic calcinosis circumscripta should be corrected to resolve the problems of calcification. For this purpose, a ketogenic diet and some drugs such as ammonium chloride, disodium phosphate, magnesium hydroxide and aluminum hydroxide antacids have been tested [10, 11]. The dog in the present case was treated with Kremezin® and canine k/d®. As a result of this treatment, Ca×P decreased and the foot pad lesions improved significantly. Very few reports concerning the effects of Kremezin® on serum calcium or phosphate levels are available. However, Nimura et al. found that when renal function is impaired, Kremezin® helps the body maintain the excretion of phosphate into urine and prevents an increase in serum phosphate concentrations [12, 13]. These data were obtained from experiments on rats as a model for renal failure. In addition, Takemura et al. showed the effect of Kremezin® on serum calcium and phosphate levels in cats [22]. No published studies, however, have investigated the influence of Kremezin® on the blood calcium and phosphate levels in dogs, although our laboratory studies (unpublished data) have indicated that Kremezin® promotes the movement of serum calcium and phosphate levels toward normal when used continually.

These clinical observations and preliminary experiment support the hypothesis that treating metastatic calcinosis circumscripta with Kremezin® and a prescription diet may be useful. Unfortunately, we are unable to explain why the swollen pads returned to a normal appearance. It is possible that foreign material will be excreted from the tissue and, if a new deposition is prevented, the tissue may be restored. Thus, we believe this will be a valuable choice for the treatment of metastatic calcinosis circumscripta.

We would like to thank Naruo Hara DVM, PhD for analyzing the material in the swollen foot pads, and Tadashi Kajiwara DVM, for the management of this animal patient.

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Fig. 3. A photograph of bones of the skull at the first examination. Osteoporosis-like changes were evident.

Fig. 4-a. A tissue photograph of the pad with calcinosis. Amorphous substances were subcutaneously deposited, forming cysts in the pad. These cysts were divided in places by connective tissue fibers (arrows). HE stain. × 40.

Fig. 4-b. Giant cells (arrows) were observed at the boundary between the cystic regions shown in 4-a and the normal tissue. HE stain. × 200.

Fig. 4-c. Magnification of the septum of the cyst shown in 4-a. HE stain. × 200.
REFERENCES