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CLINICAL AND PROFILACTIC ASPECTS OF CALCIUM AND PHOSPHORUS DEFICIENCY IN LARGE BREED DOGS

Macri Adrian*, Szakacs Andrei*, Daiana Sorana*

*University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Veterinary Medicine, 3-5 Calea Manastur St., 400372, Cluj-Napoca, Romania, e-mail: adrian.macri@usamvcluj.ro; andrei.szakacs@usamvcluj.ro; sorana.matei@usamvcluj.ro

Abstract

The aim of this study was to highlight the joint and growth problems encountered in the large breed dogs during the developmental period. Abnormal joint appearance and the diversion of the long bones especially, is a problem that can be easily handled at a young age and it can be solved through vitamin and mineral supplementation. The diversion of the hooks is an affection that can occur both in a mineral and vitamin deficiency, but can also be a result of some inherited genes. Our research was conducted on 8 dogs of different sex, age and breed. All of the clinical cases needed help regarding the food and the supplements in order to avoid the occurrence of rickets, panosteitis or other bone and joint problems. From the 8 cases, 4 of them were female dogs and 4 males, with ages between 4 weeks and 24 months, each case presented joint and bone modifications, more or less obvious, affecting both front and hind legs. At the biochemical test, was observed the modification of the serum calcium, which was lower than normal, in 3 cases. The clinical examination showed that each dog, during the growth period, did not receive proper food and supplements according to the age and breed, therefore they presented joint thickening, diversion of the long bones, diversion of the front and hind legs, spreading of the paws and difficulty during moving. Therefore, it is important to establish for all growing large breed puppies a mineral and vitamin treatment, for sustaining the organism and to be additional to a Super Premium food. At studied cases was observed different response in administrating the vitamin and mineral supplements, depending on breed, therefore it is required to follow the recommended scheme.

Key words: rickets, phospho-calcic deficiency, large breed dogs, growth supplements

INTRODUCTION

Nutrition-related factors maintaining health, longevity, performance and disease prevention, thus improving the quality of life. Nutrition has an important role in the growth and development of young people belonging to large breeds, and the object of this paper is to highlight the osteo-articular problems encountered in this category of dogs, resulting from poor phosphorus and calcium intake. Calcium and phosphorus are usually discussed together due to their metabolism and homeostatic mechanism (Case et al., 2011). Calcium is the main bone inorganic component, which in bone tissue is not in a static state, but is constantly mobilized and stored to ensure the need for growing bone and its maintenance.

Plasma calcium levels are strictly controlled by the homeostatic mechanism and are independent of calcium intake in the animal's diet.

Circulating calcium has an essential role in the transmission of the nerve impulse, in muscle contraction, in blood coagulation, in the activity of enzymatic systems, in maintaining the permeability of cell membranes, in their transport and in cardiac function. Phosphorus is also an important component of bones. About 85% of an organism's phosphorus is found in combination with calcium in the structure of bones and teeth. Most of the remaining residue is found in the soft tissue, along with the organic substances. Phosphorus in soft tissues has a large number of functions and is involved in almost all metabolic processes in the body. It is a constituent of cellular deoxyribonucleic acid (DNA), ribonucleic acid and some vitamin B coenzymes. The balance between calcium and phosphorus intake is important in terms of diet (DiBartola, 2012). Excess calcium forms an insoluble phosphorus complex and results in low phosphorus absorption. Similarly, high levels of phosphorus in the animal's diet may inhibit calcium absorption.

The recommended ratio of calcium and phosphorus in dog and cat food is between 1:1 and 2:1. Dietary calcium deficiency can be caused by meat-based diets, home-cooked foods that are low in calcium salts, unbalanced commercial foods, or poor-quality diets that contain excess phytates (Fascetti and Delaney, 2012). On the other hand, an increased calcium intake will cause the hyperplasia of C cells, responsible for the production of calcitonin, consequently there will be an increase in the calcitonin response and calcium absorption will be higher, even a few months after the normalization of calcium intake. In pets, phosphorus deficiency is very rare, only in extreme cases can a relative deficiency occur. Hypophosphatemia causes an imbalance in bone mineralization and radiologically there will be enlarged growth plates and a thinning of the cortex.

MATERIAL AND METHOD

The cases were represented by 8 dogs of different sexes (4 males and 4 females), ages (between 4 weeks and 24 months) and breeds. All cases presented movement difficulties, the tendency of the forelimbs of the forelimbs to deviate outwards, the fingers to spread, the growth joints to thicken, the bones to bend. All dogs needed guidance regarding food and its supplementation, to avoid the appearance of rickets, panosteitis or other osteo-articular diseases.

Among the recommended nutritional supplements, several products available on the market were used, as follows: Fortan Cafortan® for young dogs with difficulties in assimilating vitamins and minerals, reports Ca: P of 2: 1, vegetable fats, vitamins and minerals, amino acids and peptones, crude protein - 39%, crude fat 4.3%, crude fiber 1.7%, crude ash 20.7%, calcium

4.49%, phosphorus 2.2%, potassium 2%, magnesium 1%. Another product, Pet Phos Croissance Ca/P=2 Grand Chien ®, ideal for medium to large breed dogs, contains elements necessary for bone mineralization, such as calcium, phosphorus, vitamin D, iodine and manganese. The Ca/P ratio is 2. K-9 Complete Growth® has the active ingredients/tablet are as follows: Calcium carbonate 600 mg, Magnesium (chelated amino acid) 300 mg, Phosphorus 300 mg, Vitamin A acetate 750 I.U., Vitamin D3 75 I.U., Vitamin C 10 mg, Vitamin E 2 I.U. Calcitabs © - tablets with calcium and phosphorus, used for the prevention of rickets, osteomalacia, disorders of calcium metabolism. It can also be used curatively in conditions such as rickets, osteomalacia or in the treatment of bone fractures. Chemical composition: Calcium: 20.0%, Phosphorus: 6.0%, Sodium: 0.1%, milk powder, sugar, yeast.

In the case of large dogs in the breeding period, food is an important factor that, in addition to genetics and the environment in which the dog grows, influences health and ensures the proper development of the skeleton. Nowadays, the diversity of dog food is very large and constantly growing. The products are varied and are created especially according to age, waist and race.

In order to find the right food for large dogs in the breeding period, it must be taken into account that the percentage of protein is a maximum of 30%. An increased percentage of protein is not recommended, because then the body's tendency will be towards fattening, and it will be more difficult for the skeleton to support its weight.

The food of a large dog, per day, will be divided into two meals, one in the morning, one in the evening, because these huge breeds are prone to gastric torsion.

Some retailers have managed to adapt the food for the maxi category, both for Maxi Baby and for Maxi Junior. Maxi Baby is recommended for large dogs aged between 4 weeks and 5 months. The protein content is 29%. Maxi Junior has a low protein content, only 23% and is administered to dogs aged between 5 and 18 months. The advantage is that this food can be offered to dogs depending on the stage of change of dentition. In the first stage of feeding the calcium is 1.25%, and in the second it is 1.2%. In both stages, vitamin D3 is 1200 I.U. The phosphorus remains at a percentage of 0.8% for both stages of feeding. Many veterinarians recommend this food, due to its superior quality and good results.

The clinical examination consisted of static and moving inspection of the examined dogs. The inspection in static position was followed by the conformation and constitution of the dog, the parallelism of the forelegs and hind limbs, the aplomb, any change in body shape, dentition and height,

respectively the size of the animal relative to the growth chart of the examined breed. In motion, the way the dog drives his limbs was followed. When we encounter bone problems due to calcium and vitamin D deficiency, the patient may have lameness of varying degrees, difficulty and pain while traveling.

Paraclinical examination consisted in blood sampling followed by biochemical examination. The place of choice for harvesting was the cephalic vein, from the forearm region. Biochemical determinations were performed in 3 dogs and serum calcium and phosphorus were monitored. The determinations were performed by the mean of spectrophotometer Screen Master Touch UV/Vis. The reagents necessary for the dosing of the required parameters are purchased from Hospitex Italia. Calcium was determined by the colorimetric method and phosphorus by the enzymatic method, in the UV domain.

RESULTS AND DISCUSSION

Case no. 1, the female Cane Corso, 7.5 months old, showing curvature of the bone rays, deviation of the aplomb line of the forelimbs, discomfort in movement. The fingers of the limbs, both anterior and posterior, were spread.

Case no. 2, a 2.5-month-old male Cane Corso, with the left foreleg deviated from the aplomb line.

Case no. 3, represented by a 6.5-month-old male Corso Dog, with a thickened bullet joint and the fingers of the forelimbs spread out. In this case, the biochemistry examination resulted: As serum: 5.9 mg / dl and serum P: 3.21 mg / dl.

Case no. 4 is represented by a 16-month-old Corso Dog, with no difficulty in moving, but both aplomb lines of the forelegs deviated, and the joint of the bullet, despite its age, remained slightly thickened and deflected outwards, fingers spread.

Case no. 5, a 6-week-old female Tchiorny Terrier had a deviation of the left anterior limb from the outward joint of the bullet.

Case no. 6, a 4-week-old female Tchiorny Terrier, without difficulty in movement, but with a thickened bullet joint, and the left foreleg left deflected outwards.

Case no.7, represented by a 18-month-old Argentine Dog, had the rear train modified, had difficulty moving. Biochemical results: Ca serum 11.95 mg / dl and serum P: 5.3 mg/dl. Following the cures with nutritional supplements and injectable vitamin D2 and the best quality food, the dog did not show any improvement in the appearance of the rear train, the hocks being close, in "X", and the groove chamfered.

Case no. 8 was represented by a German Dog, aged 3 months and 12 days, with the forelimbs thickened at the bullet joint, and from this joint down the limb was deflected outwards.

Following the administration of a Super Premium food, in addition to which the vitamin-mineral intake was supplemented by the administration of the vitamin complex Fortan Cafortan, within 2 months there was an improvement in the appearance of the forelimbs, straightening the aplomb line, narrowing the fingers and returning the harmonious movement, in cases numbered 5 and 6, represented by two female specimens, of the Tchiorny Terrier breed. The Tchiorny Terrier breed responds very well to the administration of Fortan Cafortan, starting with the 3rd month of life, immediately after the tooth change process begins. The administration of vitamin D3 subcutaneously, once every 21 days, starting with the 4th month of life and feeding with commercial food Happy Dog, Supreme Baby Maxi, stage 1 and 2 are the appropriate formulas to which this breed responds very well.

In the biochemical determinations performed, the modification of the monitored parameters was found, namely serum calcium and phosphorus. Serum calcium values ranged from 5.9-11.95 mg / dl, modified from normal values (9-11 mg/dl). Phosphorus was in normal values, between 3.21-5.3 mg / dl, having as reference values 2.5-6 mg / dl.

A study conducted on a group of German Dog during the growing period, which was given a food containing 3.3% calcium, revealed the curvature of the radius (Hov et al. 1994). The same experiment was performed on 3 groups of different ages (LaFond et al., 2000). Thus, a food with a calcium content of 3.3% was administered to a group from the age of 3 weeks to 6 weeks. At the age of 4 months, panosteitis was observed. The group from the age of 3-17 weeks was affected by hypophosphatemic rickets, and in the one between the ages of 6-26 weeks there was severe osteochondrosis and radius curvature.

CONCLUSIONS

Clinical examination showed that each specimen, during the growing period, which did not receive age-appropriate nutritional supplements and did not receive proper nutrition, showed changes in the joint, changes in the long bones rays, deviation of the limbs from the correct line of aplomb, finger spread, due to vitamin deficiency and difficulty in movement.

As an important and noteworthy remark, is that these dogs, of large breeds, in the breeding period, it is recommended to establish a vitamin-mineral treatment plan to support the young body and to be complementary to a Super Premium food,

A different response was observed to the administration of vitamin-mineral supplements depending on the race, requiring strict compliance with the protocol for their administration.

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