

SOME ASPECTS REGARDING PHOSPHOCALCIC DISMETABOLIA AT THE DOG

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Abstract

During 2007-2008 paraclinical tests were used to investigate some aspects regarding the etiopathogenesis and diagnosis of phosphocalcic dismetabolia at the dog. Five cases were selected out of 3: two of them with juvenile osteomalacia, one with osteomalacia, one with bone tumour and one with hypocalcemic tetany. The results showed variations of calcemia, phosphotemia, phosphatasemia and magnesiamia. The cases with juvenile osteomalacia and osteomalacia show a hypophosphatemia, hypomagesemia and hyperphosphatasemia. In the bone tumour there is a hypercalcemia with decrease of phosphatemia, magnesemia and phosphatasemia. The results obtained after administering vitamin D show the complexity of phosphocalcic dismetabolia etiopathogenesis.

Key words: phosphocalcic dismetabolia, calcemia, phosphatemia, vitamin D

MATERIAL AND METHOD

Five cases were investigated clinically and paraclinically, all represented by dogs of different races and different ages, which were presented at the vet clinic for diagnosis and treatment.

The result of the clinical examination showed the suspicion of a phosphocalcic disfunction. The paraclinical tests will establish some aspects regarding the etiopathogenesis of these disturbances.

The suspicion of bone chemodystrophy was based on general clinical signals represented by aplomb changes, consistency changes at the level of the bones, sensitivity changes at the osteoarticular level, excitability changes etc.

The 5 cases were selected out of 31 cases of phosphocalcic failure diagnosed in the clinic during 2007 – 2008.

The selection was focused on catching the most frequent phosphocalcic unbalances (juvenile osteomalacia, renal osteodystrophy, hypocalcemic tetany, tumour processes) and based on this it was also focused on showing

the variety of etiopathogenetic aspects which are also the objectives of this research.

The paraclinical examination was focused on confirming the existence of some phosphocalcic metabolism disturbances and it comprised: radiologic examination and blood biochemical examination.

RESULTS AND DISCUSSIONS

The five cases which were submitted to clinical and paraclinical investigations were selected out of 31 cases of phosphocalcic unbalance disturbances which were diagnosed during 2 years (2007-2008) in the veterinary clinic (tables 1 and 2).

The statistic analysis regarding the frequency of diagnosing phosphocalcic disturbances at the dog shows that these disturbances have a relatively small percentage (5.07%) out of the total number of cases the clinic had during 2007-2008.

Among the phosphocalcemic disturbances the juvenile osteomalacia is the most frequently diagnosed (67.74%).

Table 1
 Statistic situation of the phosphocalcic malfunctions diagnosed for the total number of cases the clinic had during 2007-2008

Year	Total no of cases	Total no of cases with phosphocalcic malfunctions	From which:	
			Juvenile osteomalacia	Other phosphocalcic malfunctions
2007	599	14 (2.33%)	10 (71.42%)	4(0.66%)
2008	620	17 (2.74%)	11 (64.70%)	6 (0.96%)

Table 2
 The values of the blood constants in the 5 cases investigated

No	Specification	UM	Case 1	Case 2	Case 3	Case 4	Case 5
1.	Calcemia	mg/dl	8.0	10.0	13.2	8.8	10.2
2.	Phosphatemia	mg/dl	2.3	2.1	2.6	2.8	5.0
3.	Magnesemia	mg/dl	2.5	2.0	2.7	1.8	2.4
4.	Alkaline phosphatasis	UI/L	200.7	200.1	98.5	190.1	110

Out of the two cases, two are with juvenile osteomalacia (cases 2 and 4), one with osteomalacia (case 1), one with a tumour process (case 3) and one with hypocalcemic tetany (case 5).

In the cases with juvenile osteomalacia, the values of total calcium, 10mg/dl and 8.8mg/dl, were between the normal variation limits. The normal values of calcemia at the dog are between 8.7-11.7mg/dl. (5)

Generally, in juvenile osteomalacia, total calcemia is not modified but for certain periods of time. During the periods when calcemia decreases, tonicoclonic accesses may appear and they are not caused so much by calcium failure but more by acid-basis balance disturbance, which stops the calcium ionization and its usage by the neuro-muscular system. (2, 4).

Phosphatemia shows the most important and characteristic changes in juvenile osteomalacia. In the cases under discussion the inorganic phosphorus decreases from 2.9-6.2 mg/dl, that is between the normal variation limits at the dog, down to 2.1mg/dl and 2.8 mg/dl.

As specialty literature shows (1, 3, 4), in carenial juvenile osteomalacia and in the vitamin D – resistent one there is a hypophosphatemia, especially if the value of phosphatemia is compared to the physiologic one of the young dogs, which is superior to the one of adult dogs.

Generally hypophosphatemias are usually associated to variations of calcemia and they are visible both under certain pathologic conditions and as a result of anti-acids excessive usage.

The values of seric magnesium were of 2.0mg/dl and 1.8mg/dl. These values are between the normal variation limits 1.7-2.7 mg/dl

In juvenile osteomalacia the alkalines increase especially once with the disease onset. In the cases under discussion the values of alkaline phosphatasis, 200.1UI/l and 190.1UI/l, were much over the superior physiologic limit, 100.7mg/dl.

In the case with osteomalacia there are decreases in the values of calcemia (8mg/dl), phosphatemia (2.3mg/dl) and increase of phosphatesemia (207UI/l).

It is well known that hypocalcemias accompany several dimineralized osteopathies. They can be consequence of a poor contribution, of some excessive digestive or renal eliminations or increase of phosphatemia. Nevertheless the most frequent cause is hypoparathyroidism. *Hypophosphatemias* are usually associated to variations of calcemia and they are visible both under pathologic conditions and as a consequence of anti-acids excessive usage (2, 4).

In the case with bone tumour the value of calcemia (13.2mg/dl) exceeds the superior

physiologic limit (11.8mg/dl); the values of phosphatemia 2.6 mg/dl and phosphatasemia (98.5UI/l) are around the inferior variation limits.

The osteolysis intensification with generation of hypocalcemia is frequent in *malignant bone neoplasias* or bone metastases of other neoplasias (carcinoma, especially mammary and bronchic, malignant lymphoma, acute leukemias etc). They determine hypercalcemias through the stimulation of osteolysis; the stimulation is the consequence of the direct neoplastic invasion of the bone (2).

In the case with hypocalcemic tetany all the values of the biochemical indicators studied were between the normal limits. The clinical expression was the result of changes at the ionic level, as a consequence of a respiratory alkalosis on the background of hyperventilation.

The result analysis shows that the notions of osteomalacia and juvenile osteomalacia include a series of etiopathogenetic situations characterized by disturbances of the phosphocalcic metabolism, which have an impact on the osteoid's mineralization. Both in the cases with juvenile osteomalacia and in those with osteomalacia there is a shortage of phosphates and a slight decrease of the calcemia's values. The fact that vitamin D administration highly contributed to the improvement of the installed disfunctions

draws the attention towards the importance of this metabolite in the phosphocalcic balance at the investigated dogs.

CONCLUSIONS

1. In four of the investigated cases there was a change in the processes of osteogenesis and osteolysis with bone demineralization.

2. Hypophosphatemia, hypophosphatasemia and relative hypocalcemia oriented the etiopathogenesis of the cases with phosphocalcic dismetabolism.

3. The radiologic examination offered information on the disfunctions at the bone balance level.

REFERENCES

Journal articles

- [1] Condrea M., Ana Chelaru, - Researches on Modifications of Phosphocalcic Metabolism at Layer Hens. *Lucr.st. USAMV Iasi, Zoot*, vol. 43-44, 620-621, 2000-2001.
- [3] Hagiu N., Beschea-Chiriac S., Hrițcu Diana Lumunița - Unele modificări biochimice sanguine la tineretul canin cu dismetabolie fosfocalcică. *Lucr șt UAMV Iași*, 40, 118-122, 1997

Books

- [2] Cucuianu M., Rus HG, Niculescu D, Vonica - *Biochimie, aplicații biochimice*, Ed. Dacia Cluj Napoca, 1991
- [4] Saragea M.- *Tratat de Fiziopatologie*, vol. II, III. Editura Academiei, 1987, 1994.
- [5] *The Merck Veterinary Manual - Eighton Edition*, 1998