

# Canine calcinosis circumscripta – retrospective studies

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### Summary

This is a study of 18 cases of canine calcinosis circumscripta (CC). The objective of the research was to present the CC cases recognized in ten years in veterinary clinics in Lublin. The following factors were analyzed: dog age, breed and sex, the anatomical location of calcium salt deposits in each dog, a potential cause of the disorder and the incidence of its remission after surgical treatment. The age of the dogs in the study varied from 6 months to 1 year (11 cases). Seven dogs were more than 2 years old. The dogs belonged to different breeds of both sexes, German Shepherd Dog prevailed (10 cases). The lesions occurred within limb joints (16 cases) and the ventral area of the tongue (2 cases). General clinic signs such as elevated body temperature and apathy were presented in one animal. In five cases local inflammation was observed. In three cases where tissue damage appeared in the affected region there occurred slight bleeding and exudates. None of the dogs had similar symptoms in the case history and none of them had surgical procedures performed in the affected region earlier. Only in one dog calcinosis circumscripta was not the only disease which occurred in that animal. In three cases lesions in the limb region occurred due to apparent physical damages. In the other cases no single cause was established. In eight cases radiographic evaluation was performed. In twelve cases the diagnosis relied on the histopathological examination of the surgically excised lesion; in one case fine needle aspiration cytology was employed. After surgery the recurrence of the disease was reported in three cases.

**Keywords:** calcinosis circumscripta, metastatic calcification, dystrophic calcification, dogs

Calcinosis circumscripta is a disorder producing tumor-like, progressive and well demarcated calcium deposits within the subcutaneous tissue. The focal mineralized lesions are most frequently located in the region of extremity joints as well as cervical and thoracic spine segments (1, 2, 7, 12, 14, 15). The other sites predisposed to develop such pathological changes, with very few references in the literature, may include the mouth, gingiva, frenulum of the tongue, salivary glands, pinna, mandible and throat region, chest (1, 2, 7, 12-14). In a single case, the pathological changes were confirmed in the jejunum (15, 16).

The disease occurs most often in large breed dogs, under two years of age, rarely in older animals, with higher incidence in German Shepherd Dogs (1, 11, 12, 15). Only one case was reported in Shi-Tzu and West Highland White Terrier Dogs (tab. 1) (6, 7). No association to animal sex was shown.

The etiology and pathogenesis of the disorder have still remained undetermined, but factors taken into account allow classifying calcinosis circumscripta into four groups: dystrophic, metastatic, idiopathic and iatrogenic calcinosis (15).

**Tab. 1. Dog breeds associated with the incidence of calcinosis circumscripta (3, 5, 6, 9, 12, 15)**

Generalized lesions	Great Dane Pointer
Post-injection lesions	Poodle
Lesions in the cheek, ear pinnae	Boston Terrier Boxer
Other dog breeds	German Shepherd Dog Rottweiler Labrador Golden Retriever Siberian Husky Saint Bernard Dog Irish Wolfhound Greyhound Doberman Pinscher Bouvier des Flandres Airedale Terrier Belgian Shepherd Dog English Springer Spaniel Shih Tzu West Highland White Terrier Jack Russel Terrier

The objective of the research was to present the calcinosis circumscripta cases recognized in the years

1997-2007 in Veterinary Clinics, Faculty of Veterinary Medicine, University of Life Sciences in Lublin.

### Material and methods

In 1997-2007 in Veterinary Clinics, 18 dogs had calcinosis circumscripta diagnosed. In all the cases the animals were presented to veterinary surgeons with solitary tumor-like lesions of various locations. The dogs were submitted to detailed clinical examinations. Eight dogs had radiological evaluation performed, in twelve dogs the lesion was histopathologically examined after its surgical excision. In one dog fine needle aspiration procedure was applied.

The following factors were analysed: dog age, breed and sex, the location of mineralized cutaneous masses in each animal as well as the recurrence of the disorder after surgical procedure.

The age of most of the dogs in the study ranged from 6 months to one year (11 cases). The other animals were two years (2 dogs), three years (3 dogs) and five years old (2 dogs). The dogs belonged to different breeds but German Shepherd Dog of both sexes prevailed (10 cases) (tab. 2).

The pathological changes developed mainly in the limb joint region: tarsal joint (5 dogs), digits (3 dogs) and elbow joint (3 dogs). Two cases showed the involvement of the metatarsal area, whereas in one case metacarpal, elbow bone and digital pawpad regions were affected. In two other cases calcinosis was diagnosed on the ventral side of the tongue (fig. 1).

The radiographic evaluation of the affected area was performed in eight dogs and exhibited the presence of irregularly saturated, oval or round-shaped shadows in the vicinity of extremity joints. The image reflected the progressive process of calcium salt deposition within soft tissues. Only in the case of West Highland White Terrier, whose tumor-like lesion dramatically enlarged during two days, a substantial cortical layer thickening of the elbow bone was detected over the calcified skin. In other animals, no deviations in the osseous system structure were noted in the vicinity of the pathological process. The mineralized foci occurred symmetrically on both upper extremities solely in the 11-month-old German Shepherd Dog mentioned above. They were located within the metacarpal pawpad area (fig. 2).

Nine patients underwent a surgical resection of the lesions immediately after they were presented to and assessed by veterinarians. The other nine dogs were observed. The moment of a more rapid progression of the lesion correlated with the occurrence of clinical signs such as lameness and painfulness and thus the final decision about a surgical procedure was imposed.

The main indication for surgery proved to be location of the calcified tissues. Small-sized pathological changes that did not involve anatomi-

Tab. 2. Characteristics of patients and their lesion location sites

Breed	Sex	Age	Lesion location
German Shepherd	Female	5 years	Tarsal joint
		5 years	Elbow joint
	Male	8 months	Metatarsus
		11 months	
	Female	2 years	Digit V
		11 months	Digital pad
	Male	1 year	Digit V
		3 years	
	Female	3 years	Tongue
		10 months	
Mid-Asian Shepherd	Male	9 months	Tarsal joint
Rottweiler	Female	1 year	Elbow joint
		2 years	
	Male	13 months	Tarsal joint
	Female	7 months	
Labrador		10 months	Metacarpus
West Highland White Terrier	Male	6 months	Elbow bone
French Bulldog		3 years	Tarsal joint

cal structures important for further functions of the organism were treated surgically. Generally, the surgery course was uneventful. The affected tissues were prepared with recommended margin so that complete excision of lesions could be performed. Although the adjacent tissues did not exhibit pathological nature, in only few cases the skin lying over the affected area showed slight discoloration, which was probably caused by the disturbed vascularization resulting from

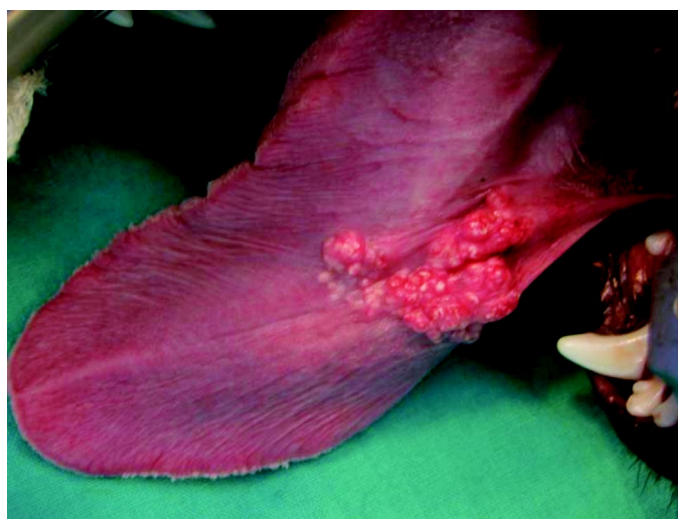


Fig. 1. Calcinosis circumscripta in the ventral area of the tongue in a 3-year-old female German Shepherd Dog

Fig. 2. Radiographic evaluation. Radiograph shows the appearance of visible irregularly saturated, oval-shaped mineralized foci forming a tumor-like lesion located in the metacarpal pawpad region in an 11-month-old female German Shepherd Dog



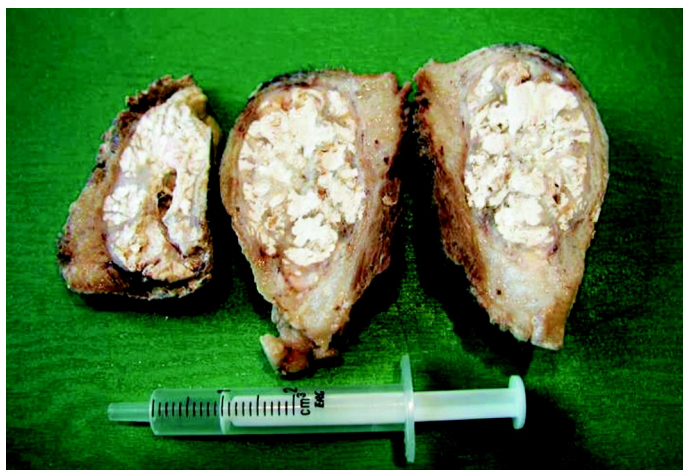


Fig. 3. Macroscopic view of calcinosis circumscripta

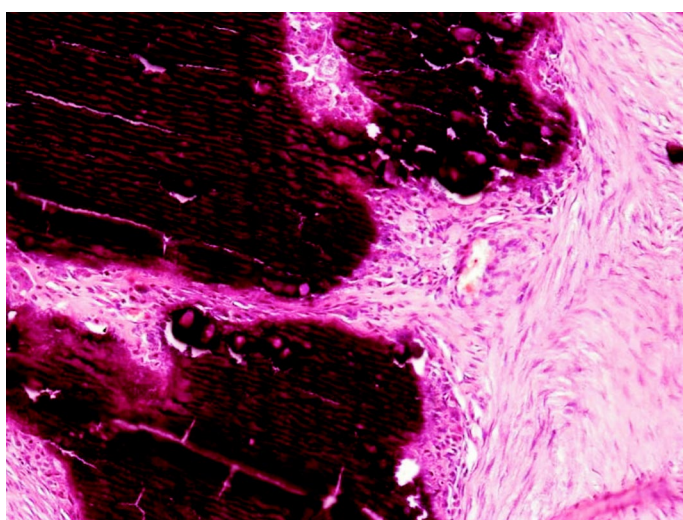


Fig. 4. Microscopic view of calcinosis circumscripta. Note the visible proliferating granulomatous inflammation in the surroundings of the calcium masses. Stain HE, magnification 100 ×

moderate pressure. The calcified masses were usually found to be hypovascularized, occasionally supplied with small-sized blood vessels or more frequently, the absence of blood vessels within their area was noted. The size of lesions excised in the early stage of treatment averaged from 0.5 to 1.5 cm. The other pathological changes were variably sized even up to 3-5 cm in diameter. The consistency of resected formations varied from semi-liquid to solid, brittle mass of oval shapes. The cut section of the aggregates had chalky calcified foci (fig. 3). During the follow-up period the patients were provided with an antibiotic cover.

The surgically removed mineralized cutaneous masses were submitted to histopathologic evaluation. The collected segments were fixed in buffered formalin, embedded in paraffin, processed to sections and stained with hematoxylin and eosin. The microscopic picture of studied lesions revealed basophilic calcified mass stained violet under hematoxylin and eosin. Quite frequently, the aggregates of calcification were surrounded by a visible inflammatory-granulomatous reaction occurring as a proliferating fibroconnective tissue (fig. 4).

Disease recurrence was reported in three cases, a short time after surgical treatment, i.e. 2 months post operation, in two dogs and a year after in one dog. The recurrent lesions were small-sized and painless. Only one animal had another surgery performed after two years.

## Results and discussion

Calcinosis circumscripta (CC) is presented in literature as a disorder affecting both humans and various species of animals. In medicine CC defines small mineralized foci formed within the subcutaneous tissue. Bigger lesions located in the connective tissue are called tumoral calcinosis, but both terms are equally applicable in veterinary medicine (1, 11, 14). However, in the literature this disorder has been identified by many names, such as cutaneous calcinosis, calcium gout, lipocalcinosis, apocrine cystic calcinosis, hip stone, Kalkgicht, which follows from the fact that the pathogenesis of this disease is not established (6, 14, 15). Therefore, considering the potential etiology of CC, different factors are taken into account, which makes it possible to classify the disorder into a few categories.

Pathological processes that damage cutaneous tissues, impair proper blood supply and nutrient flow are likely to induce calcium deposition. These processes include, among others, connective tissue diseases, trauma, neoplasms, degeneration as well as formation of abscesses, hematomas and granulomas. This type of calcinosis is termed dystrophic and is not associated with calcium and phosphorus concentration in blood serum (6, 14, 15). The same group may include iatrogenic calcinosis mentioned while discussing the surgical procedures performed earlier as well as combined treatment with medroxy-progesterone and proligestone injections (4, 5, 9, 12, 14-16). Calcinosis incidence has been reported as a result of long-standing inflammations caused by a foreign body, among others, polydioxanone suture material, otitis externa, interdigital space inflammation, demodicosis, neoplastic and degenerative changes detected within apocrine glands as well as urate gout (6, 7, 11-16). Most calcinosis circumscripta lesions described were formed in cutaneous tissues close to the joints and over bony prominences, where tissue is especially susceptible to injury. That may support the theory of trauma being the mechanism responsible for CC lesion development. In three cases reported (17%) calcification occurred due to an apparent damage to tissues, whereas in the other reports no single cause was established. However, mechanical trauma can not be ruled out as a mechanism promoting or contributing to the formation of these pathological changes. None of the dogs had similar symptoms in the case history and none of them had surgical procedures performed in the affected region earlier. Only in one patient calcinosis circumscripta was not the only disease that occurred. A six-month-old West Highland White Terrier was presented initially to the Clinic and Department of Animal Surgery for severe deformations of the mandible region that persisted for over 2 weeks. The X-ray evaluation of the puppy's head revealed the presence of cranial mandibular osteopathy. A sub-

humeral lesion which was diagnosed as calcinosis circumscripta occurred twelve days later.

The present studies also suggest considering the genetic component of the animal owing to the fact that all the dogs with lesions recognized belonged to the group of animals susceptible to calcinosis circumscripta. The only exception was a 3-year-old French Bulldog, whose pathological change was located in the calcanean tuber region. So far this breed has not been mentioned as predisposed for calcinosis and this is the first report of this disease in the French Bulldog breed. 90% of this group was made up of large breed dogs, out of which 60% were German Shepherd Dogs that are affected by this disease most frequently. Unfortunately, no information regarding such pathological changes occurring in the affected puppies, their siblings and parents (familial incidence) was available. Still, a point mutation in the type II procollagen gene is believed to play a role in etiology of this human and animal disease and a hereditary form of the disorder is suggested to be linked to the autosomal recessive gene (12, 15). Great Dane Dogs and Pointers are most likely to develop lesions that occur in a generalized form, calcinosis universalis (7, 12). In Boxers and Boston Terriers the pathological changes involve ear pinnae and cheeks, whereas in Poodles and their crossbreeds, the focal calcifications were formed as a response to medroxy-progesterone acetate administration (3, 12, 15).

Metastatic calcification is reported in both humans and animals with mineralized foci occurring secondarily to derangements in blood serum calcium and phosphorus (9). Other potential disorders with which metastatic calcification is associated include hyperparathyroidism, milk-alkali syndrome, some diseases and neoplasms causing bone destruction and hypervitaminosis D (4-6, 10, 11, 15). In dogs it is recognized as secondary to chronic renal failure, and the animals had characteristic symmetrical mineralized foci of the digital footpad area. Symmetrically developed calcification was also found in hypertrophic osteodystrophy and idiopathic polyarthritis (2). However, in only few cases the involvement of visceral organs (stomach mucus, renal tubules, pulmonary alveolus wall) and blood vessel walls was reported (8, 11, 14).

Calcification in association with renal failure may produce the systemic symptoms typical of the primary disease, i.e. body weight loss, apathy, polyuria, polydipsia, urinary incontinence.

The laboratory examinations performed revealed increased blood urea nitrogen (BUN) and creatinine concentrations as well as a marked rise in the serum calcium/phosphorus product, elevated blood serum sodium level and metabolic acidosis development. The ultrasonographic evaluation exhibited kidneys with thin cortices. A cure of the underlying disorder may induce the complete remission of the lesions in the footpad pulp (9). Only one case of a dog, an 11-month-

-old German Shepherd, reported in the paper had proliferative and painful lesions in the metacarpal digital pawpad region. Additionally, substantial enamel defects in all the teeth were established. The patient had no clinical signs associated with renal failure. In this case laboratory examinations, including blood calcium and phosphorus level, were performed. They did not reveal any departures from normal. Ultrasonographic examination was not carried out in this case.

General clinical signs such as elevated body temperature and apathy were presented in one animal. The dog developed a marked edema of the extremity distal to the lesion (medial aspect of tarsal joint), which may arise from pressure on the blood vessels running by. In five cases (28%) additional inflammation was produced and these animals showed pain and anxiety at clinical examination.

In the group of thirteen dogs (72%) palpable lesions proved to be painless, strongly connected with the tissue and hardly movable. The overlying skin remained unchanged and movable. In three cases (17%) only where tissue damage appeared in the affected region, there occurred slight bleeding or exudates.

The diagnosis of calcinosis circumscripta relies on clinical signs, radiographic findings and histologic examination. A surgical resection of the lesions is likely to produce a cure. The recurrence of the pathological process is reported only occasionally. As the specific cause for CC development is still unknown, upon the occurrence of generalized mineralized depositions an animal should be examined for the presence of an underlying disease process.

## References

1. Barr F. J., Kirberger R. M.: BSAVA Manual of Canine and Feline Musculoskeletal Imaging. BSAVA, Gloucester 2006, 5.
2. Bettini G., Morini M., Campagna F., Preziosi R.: True git: the tale of a subcutaneous mass in a dog. *Vet. Clin. Path.* 2005, 34, 73-75.
3. Ginel P. I., Lopez R., Rivas R., Perez J., Mozos E.: A further case of medroxy-progesterone acetate associated with calcinosis circumscripta in the dog. *Vet. Sci.* 1994, 57, 44-45.
4. Houszka M., Ratajczak K., Salem H.: Calcinosis tumoralis i calcinosis circumscripta u psów. *Medycyna Wet.* 1978, 3, 146-149.
5. Jeong W., Noh D., Kwon O., Williams B., Park S., Lee M., Do S., Chung J., Lee G., You H., Jeong K.: Calcinosis circumscripta on lingual muscles and dermis in a dog. *J. Vet. Med. Sci.* 2004, 66, 433-435.
6. Joffe D. J.: Calcinosis circumscripta in the footpad of a dog. *Can. Vet. J.* 1996, 37, 161-162.
7. Jubb K. V. F., Kennedy P. C., Palmer N.: Pathology of Domestic Animals. Academic Press, San Diego 1993, 14-15.
8. Kaebel J. K., McAllister H.: Diagnostic Radiology and Ultrasonography of the Dog and Cat. Elsevier Inc., St. Louis 2005, 477-480.
9. Komori S., Washizu M.: Metastatic calcinosis circumscripta treated with an oral charcoal absorbent in a dog. *J. Vet. Med. Sci.* 2001, 63, 913-916.
10. Marchiori D. M.: Radiologia kliniczna. Czelej, Lublin 1999, 387-392.
11. Morgan J. P.: Radiology of Veterinary Orthopedics. Venture Press, California 1999, 284-290.
12. Movassaghi A. R.: Calcinosis circumscripta in the salivary gland of a dog. *Vet. Rec.* 1999, 144, 52.
13. O'Brien C., Wilkie J.: Calcinosis circumscripta following an injection of progesterone in a Burmese cat. *Aust. Vet. J.* 2001, 79, 187-189.
14. Risuio L. de, Olby N. J.: Tumoral calcinosis of the thoracic spine: a case report and literature review. *Vet. Neurol. Neurosurg. J.* 2000, 2, 1-14.
15. Tafti A. K., Hanna P., Bourque A. C.: Calcinosis circumscripta in the dog: a retrospective pathological study. *J. Vet. Med.* 2005, 52, 13-17.
16. Wilotek P., Toczek W., Śmiech A., Szczepaniak M.: Zwapnienia skóry u psów – przyczyny i patogenezę. *Życie Wet.* 2007, 9, 742-745.

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