

DİSTAL ULNAR RETAINED CARTILAGINOUS CORE “RCC” İN DOGS

Mehmet SAĞLAM¹, M. Alper ÇETİNKAYA²

¹ Department of Surgery, Faculty of Veterinary Medicine, Ankara University, Dışkapı 06110 Ankara.

² Reseach Unit Of Surgery Department, Faculty Of Medicine, Hacettepe University, Sıhhiye 06100 Ankara.

Abstract

Retained cartilaginous core (RCC) is delayed formation of bone by physis (commonly the distal ulna and lateral femoral condyles); it may be a manifestation of osteochondrosis, which in this location may cause some degree of delayed endochondral ossification. The condition occurs in large breed juvenile dogs. The history is an insidious onset of a mild lameless and valgus deviation of the carpal joint of about 10 to 20. Operative treatment is not necessary in most cases because the deviation is usually mild and corrects itself, although distal ulnar osteotomy could be considered in more severe cases. Four-lame dogs which were referred to Traumatology and Orthopaedics Clinics of Ankara University, Faculty of Veterinary Medicine, Department of Surgery, formed the material of the study. Surgical treatment was only performed in a dog that had fracture of radius and deviation at the fracture site because of RCC. Nourishment habituals were rearranged in Two-littermate dogs and no treatment was applied in an other dog because of the clients ignorance. Except the latter case, treatments were successfully resulted in all cases. In conclusion, operative treatment was not only mandatory in the situation of severe deviation, but also be used in cases with negatively effected radial fracture line and with decreasing carpal valgus deviation.

Keywords: *Distal physis, dog, RCC, ulna.*

Introduction

“Retained Cartilaginous Core” is generally a large breed dogs’ disease which causes delayed endochondral ossification.^{2,6,7,9,10} Usually, occurs in the distal ulna and the lateral condylus femoris.¹ This situation can be considered as if it's an Osteochondrosis which causes retardation of the growth in different degrees.⁷

RCC, incidents to large breed dogs and usually perceptible in 3 or 4 months age. Retardation of the epifizeal growth most frequently happens to the Danua (Great Dane) Breed dogs, but every other large dog breeds are potentially predisposed.^{6,7,9,10} RCC, symptoms start with an undetectable lameness and in carpal joints approximately 10 to 20 degrees deformity of the carpal valgus.¹ In radiography, 'Coal' named distal epifizeal line of the ulna seems as if it's extending towards to metaphysis, approximately 4 to 6 cm long 'candle flame' like shape is pathognomic to this disease.⁵⁻¹⁰

Generally, the deformity occurs so slightly that in most cases the condition recovers easily by itself. In advanced cases, the osteotomy of the distal ulna should be considered as an option.^{7,9} Even though the effects of the excessive nutrition and fast growth stays unproven, in RCC the reduced quality and quantity of nutrition that will slow down the growth of the puppy must be suggested.¹⁰

The purpose of this study is to inform our colleagues about this rare condition that's called “Retained Cartilaginous Core (RCC)” and discussing the cure options.

Material and Method

The four dogs which were the subjects of the study that were brought to the Department of Surgery in Ankara University Faculty of Veterinary Medicine.

Two of the dogs are siblings which were Danua Dogs (Great Dane) and the other two were Kangal dogs (**Table 1**).

Table 1. Breeds, ages and genders of 4 dogs that are study materials

Dog no.	Breed	Age	Gender
1	Danua	5 Months-old	Male
2	Danua	5 Months-old	Female
3	Kangal	4 Months-old	Male
4	Kangal	5 Months-old	Male

Due to the anemnsis and the clinical examinations and radiographies Retardation of the epiphiseal growth (RCC) was detected on each dog and on the first two dogs, a balanced formula with restricted quantities was suggested as a cure option.

On the 3rd dog, corrective osteotomy applied to distal of the Ulna and Radius with the plate and intramedullar pin application to stabilize and cure. On the fourth dog after the examinations and the radiographies observed for a while, despite the fact that an operation was recommended due to the progression of the bilateral deformity, the owner didn't bring the dog to the appointment so there was no information received.

Radiographic and Clinical observations lasted for 8 months for the first and the second dog, 5 months for the 3rd dog and 4 months for the 4th dog, thus, the developments were followed carefully.

Finding

Due to the anamnesis, the first one of the siblings has an abnormity on the front extremity for nearly 2 months however the other sibling is normal and they both fed with the leftover meals. Besides that, Calcium and Vitamin supplements are given to both dogs.

The clinical examination shows us that the first sibling has 20 degrees carpal valgus on both carpal joints, however, the other sibling has no evident deformities (Fig.1) and there is no local heat, swelling or pain detected during palpation.



Fig 1. First (Left) and second (right) sample dogs

On the 3rd example, the dog has a fractured bone on the front extremity because of a traffic accident so a bandage applied to the dog and we learned that the dog with leftover food.

During clinical examination, pain and deformity determined on the frontal extremity which was fractured. Radiography showed that there was a transversal diaphyzer fracture with no displacement on distal Radius.

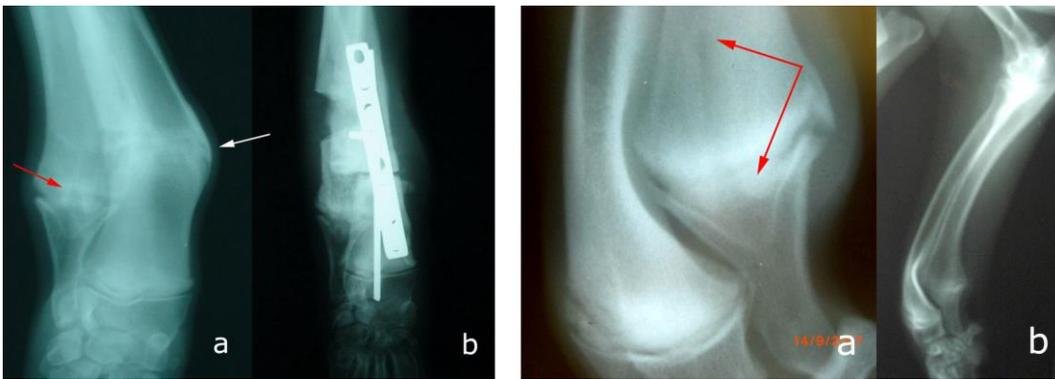


Fig 2. Pre (a) and postoperative (b) Radiography of the 3rd dog "Candle flame" like shape which is pathognomic for RCC (red arrows) and angulation of the fracture line of the radius because of the delayed growth of the Ulna(white arrow).

Fig 3. Radiography of the 4th dog while it was 5 months old (a) and 9 months old (b) "Candle flame" like shape which is pathognomic for RCC (red arrows).

On the 4th example's anamnesis, we learned the dog has a balanced formula but it was overfed with the formula and also vitamins and mineral supplements were given.

Furthermore, we learned that the deformity on both extremities caused walking abnormality which continued for nearly 2 months.

The radiography that was taken after the examinations shows us that all four dogs have retained growth of epiphysis of Ulna that has a "candle flame" like shape which is pathognomic for "Retained Cartilaginous Core (RCC)" (**Fig 2a, 3a, 4a-b**).

Nevertheless, the delayed growth, had no observable abnormalities on the physical appearance of the second dog, caused deviation of the valgus on the first and the fourth dog, but on the third dog the deformity occurred only because of the deformity on the extremity which has a unilateral fracture on the Radius and the fracture line dilated because of the pressure (**Fig 2a**). There were no other deformities detected on other extremities of the third dog.

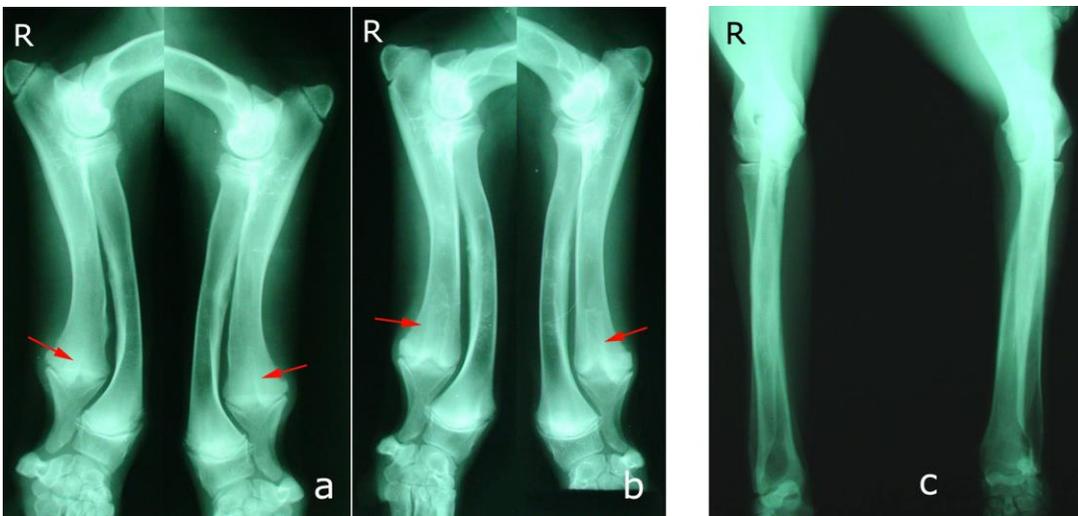


Fig 4. Radiography of the 1st (a) and the 2nd (b) dogs while they were 5 months old "Candle flame" like shape which is pathognomic for RCC (red arrows) Radiography of the 1st dog while it was 13 months old (c).

Radiographic and Clinical observations lasted for 8 months for the first and the second dog, 5 months for the 3rd dog and 4 months for the 4th dog.

The "Candle flame" like shape in the radiography of the first dog has disappeared after 8 months. The deformity recovered and the physical appearance turned back to normal (**Fig 5a**). The 2nd dog had no observable deformities in any period of the disease nevertheless the "Candle flame" like shape in the radiography of this dog has disappeared after 10 months.

The radiography of the first and the second dog which was taken while they were 13 months old shows no RCC symptoms (**Fig 4c,5b**). On the third dog, the deformity has recovered (Fig.2b) with the operation and after 5 months there were no signs of disease (**Fig 5c**). On the fourth dog, an arrangement on the diet suggested because the deformity was not on an advanced level. After 1.5 months, two appointments were made for an operation due to aggravated deformity (**Fig 3b**) of the carpal valgus but the owner didn't come.

Discussion and Conclusion

The studies show that RCC usually occurs in Large Breed dogs especially while they were around 3-4 months old, and every large breed dog was predisposed but it was most commonly on the Danua (Greate Dane) Breed.^{6,7,9,10} The Kangal Breed which is a large dog breed that is endemic to Turkey because of that there are not much research results in the foreign literature but they are also predisposed to developmental diseases like RCC and this study shows that the Kangal dogs might be predisposed to RCC. Therewithal, the two dogs out of four were Danua Dogs which were identified in the literature data the other two dogs were Kangal Dogs.



Fig 5. First (right) and the second (right) dogs while they were 8 months old (a) and 13 months old (b) and the postoperative appearance of the fourth dog (c).

RCC, symptoms start with an undetectable lameness and in carpal joints approximately 10 to 20 degrees deformity of the carpal valgus.^{1,4,6,7,10} The second dog diagnosed coincidentally by the radiography that was taken because of the doubt that its sibling has RCC so it might have too and the first and the fourth dogs are diagnosed with the deformation of the valgus.

On the third dog, the fracture of the Radius that is already present has dilated unilaterally due to the disease.

When all the cases considered, we conclude that RCC not always occurs with an obvious deformity as if it was in the second dog.

Even though, in the studies there are no proof¹⁰ that the over feeding and fast growth has certain effects on RCC, but one research shows that RCC can occur if a Danua dog gets over fed with a formula which is rich in calsiium³. The treatment on this puppy must be feeding with a formula that is reduced in quantity and quanlity which will slow down the growth.^{3,9} Due to the anamnesis, the patients were being fed with an unbalanced formula, therefore, using the formula in certain quality with certain amounts and quantities were suggested as if it was effective on the first and the second dogs so the treatment is generally slowing and the deviation was recovered by fixing only the diet. Due to the literature data, the deviation was usually so small that in most cases it was not required an operation. But on advanced deviations osteotomy of the distal Ulna must be considered.^{7,9}

The third dog had an operation in order to fix the deviation and an operation suggested for the fourth dog.

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In our study, on the fourth dog after the examinations and the radiographies observed for a while, despite the fact that an operation was recommended due to the progression of the bilateral deformity, the owner didn't bring the dog to the appointment. so there was no information received.

Only the third dog has been operated in order to the deviation of the fracture line can cause the deformity of the fracture line which is rare and must be considered as an option in situations like this.

In conclusion, RCC is generally slowing down the growth of the puppy but the literature shows us that this can heal in time.

The early closure of the epiphysis plate must be differentiated from RCC in order to be able to operate In RCC, due to the literature data, generally conservative treatment by regulating the diet of the animal will be enough and this study proves it ones again.

However, there is still a chance that the permanent deviation can occur so routine examinations should be done and operation must be considered in case if it's necessary.

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