

RADIOGRAPHIC FINDINGS IN JOINT DISEASE IN THREE BROWN BEARS

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ABSTRACT

Radiographic examinations were performed on the hip, knee and elbow joints of three brown bears. The study was conducted in the Dancing Bear Park, in the town of Belitsa, Bulgaria. All tested bears were limping and had abnormal gait. All X-rays indicated osteoarthritis and degenerative changes. A correlation between the X-ray findings and the level of lameness was established.

Key words: osteoarthritis, X-ray examination, lameness, joint, hip, bear.

Introduction

Adult animals often suffer by impaired musculoskeletal system (2, 3, 4, 5, 10, 11). Degenerative lesions of the skeleton are a significant animal pathology in zoos. Kitchener (2004) reports 96% of skeletal pathology in the skeletons of 27 bears 15 years of age. The symptoms of arthroses and spondyloarthropathies include stiffness, difficulty getting up and moving, and lameness. Jérôme Föllmi von Genf-Stadt, GE (2005) reports similar findings. Jérôme Föllmi von Genf-Stadt conducted X-ray studies in four brown bears and one polar bear with low degree of lameness and a brown bear with a significant degree of lameness. In the bear with the significant degree of lameness, osteoarthritis of the two elbow joints was observed. The author proves that there is no correlation between established radiographic arthrosis changes of the joints and the clinical manifestations of the same.

The goal of the study is to establish whether there is a correlation between the clinical manifestation of degenerative joint diseases in three brown bears in the Dancing Bear Park, in the town of Belitsa, Bulgaria and the established radiographic changes.

Material and methods

The survey was conducted in 2016 at Dancing Bear Park, in the town of Belitsa, Bulgaria during the regular annual medical check.

X-ray examinations of three bears, Misho 28 year of age, Boyka at 8 years of age and Gosho at 30 years of age, with varying degrees of lameness of the hip, elbow and knee joints, were performed.

The X-rays were performed after administration of general anesthesia with an ORINGE 10040HF 100 KV, 40 mA, 0.32-100 mAs. The reading of the X-rays was done using CR140, Kodak.

Anesthesia: (according to Aminkov et al, 2017). Premedication included a mixture of tiletamine HCl and zolazepam HCl (Zoletil 100® Virbac, France) at 1 mg/kg, medetomidine HCl (Sedin®, Vet Farma, Spain) 0.003 mg/kg (3mcg/kg) and butorphanol tartrate Butomidor®, Richter-harma AG) 0.05 mg/kg (50 mcg/kg). The premedication was injected intramuscularly with an injection gun (DAN-INJECT ApS Sellerup Skovvej 116 DK-7080 Borkop - Denmark) and a 3 ml

syringe. 18G catheters (Neotec Medical Industries Ltd. Singapore) were introduced into vena cephalica antebrachii and vena saphena medialis. Anesthesia was administered intravenously by using 2 mg/kg Ketamine HCl bolus (Ketaminol®, Intervet-Holand) into vena cephalica antebrachii and 2 mg/kg Propofol (2,6-disopropylphenol) (Norofol® Norbrook, Northern Ireland) Introduced into the vena saphena medialis due to incompatibility of the two substances. Anesthesia was maintained using CRI of NaCl 0.9% (10 ml/kg/h) + ketamine HCl 0.8 mg/kg/h Propofol CRI 0.04 mg/kg/ min. All animals were intubated and ventilated with pure oxygen 5–6 L/min.

Results

Radiographic examinations of the hip, elbow and knee joints of three bears with varying degrees of lameness, were performed.

Lameness: We identified varying degrees of lameness in the three bears, which were correlated with the observed radiographic changes of the joints. Misho has difficulties getting up and keeping his balance, and shows lameness in his chest and pelvic limbs. Boyka demonstrates lameness in the right pelvic limb when walking rapidly. Four years ago Boyka was transferred from the zoo in Rouse with a diagnosis of right hip joint luxation and operated in the Dancing Bear Park in Belitsa. Gosho, 30 years of age, is walking rigidly but does not limp.

Radiographic findings: The changes detectable on the X-rays correlate with the observed clinical symptoms. In the bear Boyka, there is arthritis in the right hip joint. Osteophytes are present in the cranial and caudal ends (Fig. 1). The most pronounced radiographic changes are observed in the bear Gosho with arthritis. There is elbow joint incongruence, subchondral sclerosis and periosteal reaction in the joint capsule (Fig.2). In the knee joint, there are enthesophytes in the proximal and distal parts of the patella; periosteal reaction in the proximal part of the femur trochlea; thickening of the adipose tissue beneath the anterior cruciate ligament and sclerosis of the tibial plateau (Fig. 3). In the bear Misho, there is periosteal reaction in the proximal part of the femur trochlea, mineral deposits in the soft tissues and distally in the tibia. There is slight elbow joint incongruence without periosteal enlargements (Fig.4). In knee joint there is presence of periosteal reaction proximally at the trochlea and mineral deposits in the soft tissues distally at the condyles (Fig. 5).



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5

Discussion

The generic term arthritis means inflammation of the joint and stands for more than 100 different types of arthritis that can affect joints, surrounding tissues and other connective tissues such as tendons and ligaments. Secondary osteoarthropathies can be caused by various causes such as traumas, metabolic disorders, immune-mediated arthritis and others (Kealy J. K., Mc Allister H., 2000).

Degenerative joint diseases are well studied in humans, horses and dogs. The observed by us radiographic changes in the knee joint of the brown bear are similar to those in the found in the rupture of the cranial cruciate ligament in the dog. The osteoarthritic changes in the elbow joint of the brown bear are similar to those of dysplasia of the dog – sclerosis of the subchondral bone and incongruence of the same joint (Jack S. W., Thacker H. L., 1985; Kirberger R. M., Fourie S. L., 1998).

The development of degenerative joint diseases in the bears in the Dancing Bear Park is caused by their diet. Prior to their arrival in the park, the bears were sparingly fed and made stand on their rear limbs while ‘dancing’ which is not characteristic for the species. Insufficient food intake can contribute to the development of skeletal disorders such as osteochondrosis which are well documented in the dog and pig, and to subsequent development of (Slatter D., 2003; Straw B. E., D’allaire S., Mengeling W. L., 1999).

After their arrival in the park, the bears started to eat sufficiently based on the season. This way, the bears’ gained weight. Excessive weight, in turn, may cause degenerative joint diseases usually found in zoo animals (Aminkov B., Mehandzhiyski N., Zlateva-Panayotova N., Aminkov K., Marinov G., 2017; Jérôme Föllmi von Genf-Stadt, 2005).

Conclusion

Based on the results obtained, we established relationship between the radiological findings and clinical manifestation of degenerative joint diseases in the brown bear.

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