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INVESTIGATIONS ON THE PREVALENCE OF PATELLAR LUXATION IN DOGS

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ABSTRACT

The aim of the present study was to determine the prevalence of patellar luxation in dogs using the patient records of the Small Animal Clinic at the Faculty of Veterinary Medicine – Stara Zagora and Avicena Veterinary Clinic – Sofia.

From the studied cohort, the Pinscher, Pomeranian, and Spitz breeds were the most frequently affected. The disease was the most rarely encountered in Bolognеses. Female dogs were more commonly affected. In cases of unilateral patellar luxation, it was significantly more common in the left than in the right hindlimb. More than half of studied dogs (56 %) weighed between 2 and 5 kg, and 23 % were within the range 5–15 kg. In 91 % of dogs from studied breeds, medial patellar luxation was observed. The occurrence of the different patellar luxation grades was as followed: grade 1: 21 %, grade 2: 43 %; grade 3: 30 % and grade 4: 6 %.

Key words: dogs, patellar luxation.

Introduction

The dislocation of the patella is a common disorder in dogs, mostly congenital, with recessive polygenic inheritance. According to Hayes et al. (1994) the prevalence of congenital luxations of the patella is 82 %.

In 75 % of cases, the dislocation is medial, and bilateral luxation is encountered in 20–52 % of cases in small breeds and about 36 % of large breeds (Roush, 1993; Piermattei et al., 1997; Harasen, 2006, 2006A).

Miniature and toy breeds of dogs are most commonly affected. The number of young dogs from large breeds affected with patellar luxation as Boxers, Huskies, Labradors, Golden Retrievers, Akita etc. is also increasing (Remedios et al., 1992; Roush, 1993; Hayes et al., 1994; Piermattei et al., 1997; L'Eplattenier et al., 2002; L'Eplattenier et al., 2002A).

Traumatic patellar luxations are less common and are associated to damage of ligaments and periarticular structures (Roush, 1993; Denny et al., 2000; LaFond et al., 2002).

According to Roush (1993), female dogs are affected 1.5 times more frequently than males, while Harasen (2006, 2006A) affirms the existence of the opposite tendency.

There is no unanimous opinion about the pathogenesis of the disease, yet it is acknowledged that it results from anatomical deviations affecting the entire hindlimb. They begin from the hips with coxa vara (reduced angle between the femoral neck and femoral shaft) and decreased anteversion (cranial deviation) of the femoral head and neck vs the femur axis. This pathology results in medial displacement of extensors and particularly, of m. quadriceps femoris (Roush, 1993). As an element of the patellar mechanism, this displacement influences the distal femoral physis, slowing down the growth on the medial side but enhancing it from the lateral side (Hulse, 1995). The ultimate effect is medial bending and rotation of the distal femur and the proximal tibia. The patella exerts a relatively higher pressure on medial bone and soft tissue structures resulting in inadequate pressure

on trochlear groove, whose depth in growing animals remains insufficient (Roush, 1993; Hulse, 1995).

Congenital patellar luxation is definitely associated with abnormal development of extremities, with displacement of the quadriceps muscle complex (quadriceps muscle + patella + patella ligament/tendon) (Prose, 1984; Denny and Butterworth, 2000).

Lateral patellar luxation is rarely encountered, it is frequent in large dog breeds and associated to strong limb deformities – coxa valga. Such type of dislocation was observed in Pomeranians (Wangdee and Torwattanachai, 2010).

Traditionally, the classification of Singleton (1969) is used for evaluation of the extent of deformity and the needed treatment. A 4-grade system for classification of canine patellar luxations is created by Putnam (1968).

Although this grading system does not always correspond to clinical signs, they are useful for monitoring of the development of disease in young asymptomatic animals or for undertaking a specific type of surgery if the patient is lame. Such animals are at risk for developing degenerative joint diseases or cranial cruciate ligament rupture (Willauer et al., 1987; Wander et al., 1999; Langenbach and Marcellin-Little, 2010). Campbell (2010) observed a concomitant craniate cruciate ligament rupture in 41 % of patients with patellar luxation, while others (Piermattei et al., 1997; Denny et al., 2000) reported that 15–20 % of chronic patellar luxations could result in CCL ruptures.

The aim of the present study was to determine the prevalence, types, grades of patellar luxation in dogs using the patient records of the Small Animal Clinic at the Faculty of Veterinary Medicine – Stara Zagora and Avicena Veterinary Clinic – Sofia for the period 2011–2014.

Material and methods

The survey was made for the period 2011-2014 and included 3,167 dogs with surgical diseases (2,909 from the Small Animal Clinic, Faculty of Veterinary Medicine, and 258 from the Avicena Veterinary Clinic). From them, 203 dogs were diagnosed with patellar luxation (172 and 31 for both clinics respectively). The patient records of 169 dogs (218 joints) were complete and they were included in the survey. The diagnosis was made after clinical exam, and in more severe cases – after radiography in mediolateral and craniocaudal views.

Patellar luxations were classified according to the affected limb (left or right), dislocation type (medial and lateral), grade (first, second third, fourth), by breed and age.

The information was obtained from patients' records and data from primary and control exams.

Results

The distribution of patellar luxations by breed is presented on Fig. 1. The most commonly affected breeds in our survey were Pinscher, Pomeranian/Spitz (26 % and 25 % respectively) whereas in Chow Chow dogs, the disease was least frequently diagnosed (1 %). Female dogs (60 %) were more commonly affected than males (40 %) (Fig. 2). When the luxation n was unilateral, it affected more commonly the left hindlimb (40 %) than its right counterpart (31%, Fig. 3). The relatively high incidence of bilaterally affected dogs should be noted (29 %). More than half of dogs (56 %) weighed between 2 and 5 kg, and the weight of one quarter (23 %) of the studied cohort was between 5 and 15 kg. Dogs referred for examination and treatment of patellar luxation were most commonly between 1 and 5 years of age (50 %), and 41 of 169 (24 %) were < 1 years of age. The

proportion of dogs older than 10 years was insignificant (2 %, Fig. 5). In studied breeds, medial dislocation of the patella was established in 91 % of cases (Fig. 6).

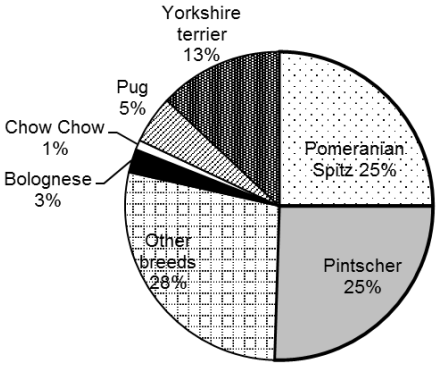

Figure 1: Distribution of dogs with patellar luxation by breeds.

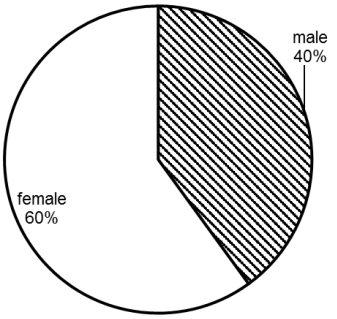

Figure 2: Distribution of dogs with patellar luxation by gender

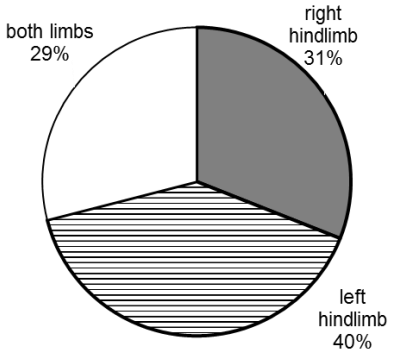

Figure 3: Distribution of dogs with patellar luxation by affected limb

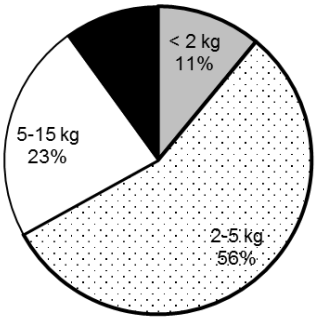

Figure 4: Distribution of dogs with patellar luxation by body weight

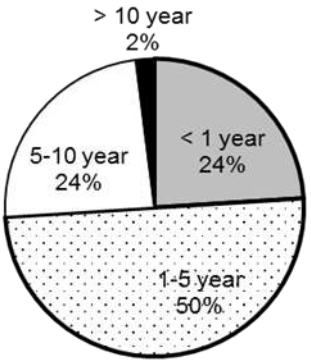

Figure 5: Distribution of dogs with patellar luxation by age.

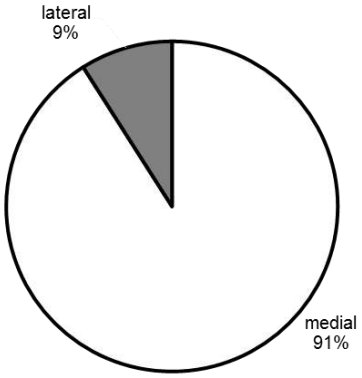

Figure 6: Distribution of dogs with patellar luxation by direction of the dislocation

The grades of observed patellar luxation cases are presented on Fig. 7. Grade II was the commonest (43 %) followed by grade III with 30 %, grade I – 21 % and grade IV – 6 %. Grades I and III were predominant in dogs between 1 and 5 years of age (40 dogs – 18.3 % and 34 dogs – 15.5 %, respectively) (Fig. 8). Grade II was the most prevalent among dogs younger than 1 year (21.6 %). The frequency of grade IV luxation was the same for these two age groups. There was a relationship between the body weight of patients and the grade of the kneecap dislocation. Grade I to III were mainly encountered in dogs weighing 2 to 5 kg, while those with body weight between 5 and 15 kg exhibited comparable percentages of all grades (Fig. 9).

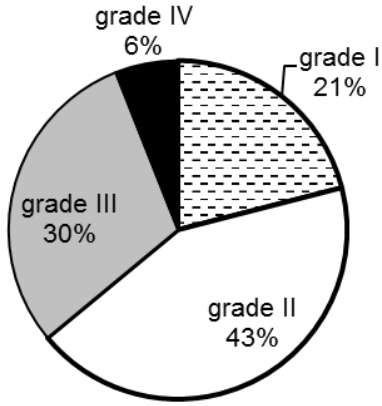

Figure 7: Distribution of joints with patellar luxation by grade of dislocation.

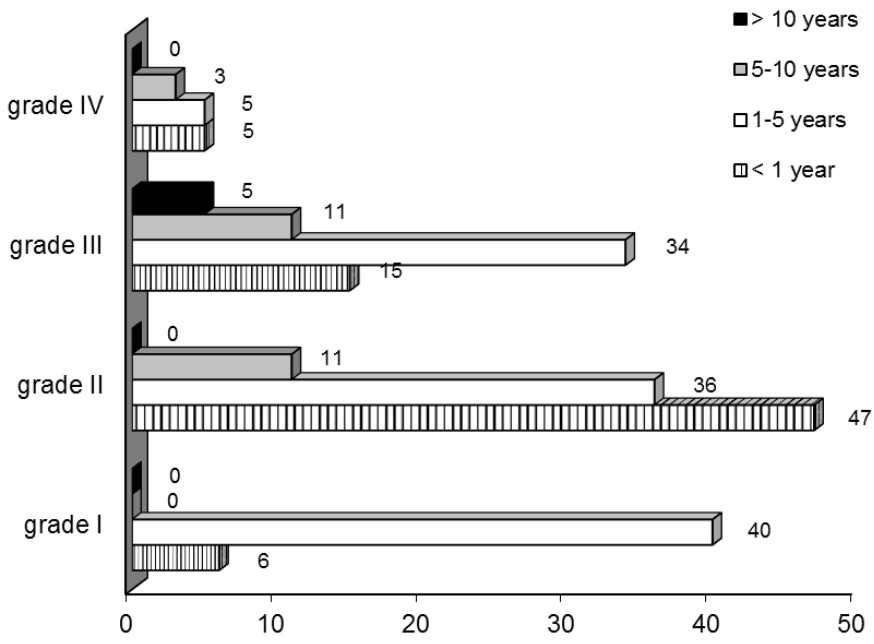

Figure 8: Relationship between patellar luxation grades and the age of dogs.

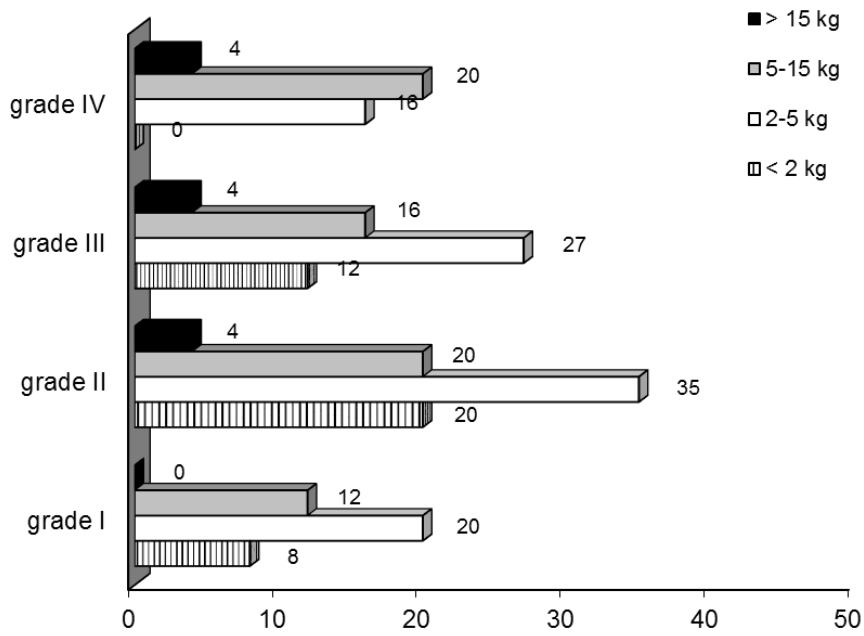

Figure 9: Relationship between patellar luxation grades and the body weight of dogs.

Discussion

The patellar luxation is a very common orthopaedic problem in dogs. Most patients are of small breeds – Mini Poodle, Yorkshire terrier, Pomeranian, Chihuahua, Pekingese etc. The number of young dogs from large breeds affected with patellar luxation as Boxers, Huskies, Labradors, Golden Retrievers, Akita etc. is also increasing (Remedios et al., 1992; Roush, 1993; Hayes et al., 1994; Piermattei et al., 1997; L'Eplattenier et al., 2002; L'Eplattenier et al., 2002A). In our survey, Pinschers and Pomeranians were most commonly affected, while Chow Chows – least frequently. The proportion of Yorkshire terriers with patellar luxation was also substantial. About Pekingeses, our results were different from previously reported data. Patellar luxation in large dog breeds was seen only occasionally.

Most luxations are congenital, but the mode of inheritance is not specified. There are, however, traumatic luxations, when the lateral part of the knee joint and the respective retinaculum are injured (Roush, 1993; Denny et al., 2000; LaFond et al., 2002). According to Hayes et al. (1994) 82 % of patellar dislocation are congenital. In our study, there was no history of trauma in patients' records, so we presume that all cases were congenital.

Female dogs are affected 1.5 times more commonly than males (Roush, 1993) although Harasen (2006, 2006A) reported the opposite tendency. In our clinical survey, the ratio of affected females to males was 1.5 as reported by the former researcher. There is not a plausible explanation about gender predilection to the disease (Roush, 1993; Harasen, 2006).

It was reported that the prevalence of bilateral patellar luxations ranged from 20 to 52 % in small breeds and about 36 % in large dogs (Roush, 1993; Piermattei et al., 1997; Harasen, 2006, 2006A). In this study, 29 % of cases were with bilateral luxation. The broad reported ranges were

probably due to the fact that many of grade I luxations remained unknown. The available literature does not provide information which hindlimb was more commonly affected in unilateral cases; in our patients, the frequency of luxations of the left hindlimb was 1.3 times higher.

Beyond any doubt, medial patellar luxation is considerably more frequently seen – in 75–80 % of cases according to the different reports. We established an even higher occurrence of medial luxation (91 %). This could be attributed to the fact, that large breeds where lateral patellar luxations prevail, are very rarely examined for this problem.

It is generally acknowledged that patellar luxation is a problem of juvenile (developing) skeleton. Congenital anatomical abnormalities resulting in altered angle of the femoral neck with the diaphysis in the axial plane or traumatic factors change the patellar mechanism (Roush, 1993) displacing the tension and compression forces in lateral or medial direction. This results in varus or valgus of the distal femur and proximal tibia and shallow trochlear groove (Roush, 1993; Hulse, 1995). Such deformities were observed in all dogs with patellar luxation grade III and IV and even in some cases with grade II.

Conclusions

1. Small dog breeds were predominant among the patients with patellar luxation in both clinics.
2. The left hindlimb was 1.5 times more frequently affected with patellar luxation that the right hindlimb.
3. Dogs with patellar luxation weighed most commonly from 2 to 5 kg – this was valid for luxations grade I, II and III. Grade IV luxations were the most prevalent in dogs weighing 5–15 kg.
4. Patellar luxation was most commonly diagnoses between 1 and 5 years of age. Within this age group, grade I dislocations were predominant, while in dogs < 1 years of age, grade II luxation was the most frequent.

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