VETERINARSKI ARHIV 74 (6), 417-425, 2004

Occurrence of hip joint dysplasia in some hunting dog breeds

Valent Ledecký[1]*, Anton Ševčík[1], Martin Puzder[1], Igor Capík[1], Marian Hluchý[1], Alexandra Trbolová[1], and Alois Nečas[2]

[1]*Department of Surgery, Orthopaedics and Radiology, University of Veterinary Medicine, Košice, Slovak Republic*

[2]*Clinic for Small Animal, University of Veterinary and Pharmaceutical Sciences, Brno, Czech Republic*

LEDECKÝ, V., A. ŠEVČÍK, M. PUZDER, I. CAPÍK, M. HLUCHÝ, A. TRBOLOVÁ, A. NEČAS: Occurrence of hip joint dysplasia in some hunting dog breeds. Vet. arhiv 74, 417-425, 2004.

ABSTRACT

An analysis of the occurrence of hip joint dysplasia (HJD) was carried out on the following hunting dogs in the Slovak Republic in the period 1995-2000: Bavarian mountain hound and Hannoverian hound. During the period under investigation we examined 299 animals of both breeds - 206 bitches and 93 dogs. Whereas in 1995 we found that 38.3% were affected by HJD, by the end of the observation period the number of HJD-positive dogs decreased to 26.1% in both breeds. Analysis of the results also showed that HJD was diagnosed in 22.3% of bitches and 18.9% of dogs. The differences between positive and negative findings during the investigated period were significant ($P \leq 0.05$) when evaluated by χ^2 test. The incidence of HJD in both hunting dog breeds showed a decreasing tendency, probably as a result of selective breeding. HJD was evaluated using a 5-point gradation system, extending from A to E. However, stages D and E were not diagnosed.

Key words: dysplasia, hip joint, dog

Introduction

Hip joint dysplasia was first described by SCHNELL in 1935. At present it is considered the most frequent hereditary orthopaedic disease in dogs (BRASS, 1989) which affects the occurrence and development of hip joint arthrosis. In dogs it is characterised as a manifestation of a quantitative hereditary trait (MACKENZIE, 1985). Quantitative hereditary traits are those which change by themselves and pass from

* Contact address:
Prof. MVDr. Valent Ledecký, PhD, Department of Surgery, Otrhopaedics and Radiology, University of Veterinary Medicine, Komenského, Košice, Slovak Republic, Phone/Fax: +421 55 633 7832; E-mail: Ledecky@uvm.sk

ISSN 0372-5480
Printed in Croatia

one individual to another to a varying degree. These traits are affected by more than 2 pairs of genes and change according to factors in the outer environment. An individual hip joint phenotype observed in the respective age of the dog results from a complex interaction between the genotype and external conditions to which the dog had been exposed (LUST, 1997). CORLEY and KELLER (1989) present a variable index of heritability, ranging from 0.2 to 0.8, depending on the breed observed. On the basis of this heritability index the variability of a phenotype can be assessed and assigned to the genotype. It seems that the manifestation of a phenotype is affected by various factors in the outer environment (NEČAS and THOOMBS, 1999).

The complex genetics of hip joint dysplasia make its eradication difficult. Despite that, selective breeding programmes may contribute to decreased frequency of dysplasia and may appear beneficial (CORLEY and KELLER, 1989).

KANEENE et al. (1997) stated that despite long-lasting study of this disease opinions on the cause of dysplasia and the most effective methods of its diagnostics and prevention vary. Although a polygenic hereditary disorder is generally recognised the phenotype is not a direct indicator of the genotype and one should not assume that dogs with normal hip joint phenotype do not possess dysplasia-causing genes.

In any event, we may assume that dogs with normal hip joint phenotype possess more genes for normal joints than dogs with an occurrence of dysplasia. Accordingly, keeping dogs with phenotypically suitable hip joints should increase the proportion of normal hip joints and decrease the occurrence of dysplasia.

This concept has been supported by the results of KANEENE et al. (1997) who examined 270,978 dogs according to OFA and observed a lower incidence of dysplasia in 1992 compared to 1980. Although only 7.82% of examined dogs had in an early stage (1980) an excellent shape of the hip joint, by the end of the examination period (1992) their proportion increased to 10.64%. This increase was more significant in dogs (51%) than in bitches (27%). However, there are some limitations to these results. Not all descendants of dogs and bitches included in the breeding were evaluated. However, absolute numbers showed an increase in the number of dogs with normal hip joints.

FLÜCKINGER et al. (1995) stated that no improvement in hip joint dysplasia was observed in Switzerland over 30 years of radiographical examination of dogs. Even after this period hip joint dysplasia was diagnosed in 42% of examined dogs. LEDECKÝ et al. (1997) in their 20-year study observed that crossbreeding of

dogs with healthy hip joints or only slight dysplasia increased the proportion of dysplasia-free dogs. The frequency of medium and serious hip joint dysplasia in German shepherds also decreased.

Up until now no reports have been published on the occurrence of dysplasia in hunting dog breeds. On the basis of a decision made by the Slovak Kynologic Club for hounds, in 1995 we commenced radiographical screening of hip joints in Bavarian mountain hounds and Hannoverian hounds. These are breeds of medium size and weight. In the present study we report on the occurrence of hip joint dysplasia during the past six-year period.

Materials and methods

Radiographical examination focusing on hip joint dysplasia was carried out on two breeds of hunting dogs, the Bavarian mountain hound and the Hannoverian hound, on the basis of the requirements of the Slovak Club for hounds. Radiographical examination of hip joints was carried out during the period 1995-2000. Radiographs were taken by veterinarians at veterinary clinics in individual regions and were evaluated centrally by a professional at the Clinic of Surgery, Orthopaedics and Roentgenology. Examined dogs were older than 12 months. The radiographs were evaluated using a 5-point gradation system, A - E, where A was assigned to negative findings, B to a transitional state, while C to E indicated positive cases. From the point of view of breeding, the B grade means transition between negative and slight dysplasia of dogs and bitches used for breeding. The evaluation of radiographs was based on six criteria, namely, Norberg's angle, width of articular fissure, craniolateral acetabulum edge, subchondral bone line at the craniolateral edge of acetabulum, shape of femoral head, presence of osteophytes and Morgan's line. Each criterion was evaluated using a 0-5 point gradation scale according to the magnitude of the pathological process in a radiograph. Each joint was assigned certain number of points which determined the dysplasia grade as follows:

0-2 points	grade A - no dysplasia
3-6 points	grade B - transitional form of dysplasia
7-12 points	grade C - slight form of dysplasia
13-18 points	grade D - medium dysplasia
>18 points	grade E - severe dysplasia

The resulting grade of dysplasia for a dog was determined according to the joint with the highest number of points. The dogs were radiographed in ventrodorsal position with extended pelvic limbs after sedation with Xylazine (Rometar inj. a.u.v. Spofa) at a dose of 2 $mg.kg^{-1}$ body weight, i.m. (Premedication: Atropini sulfatas, 0.05 $mg.kg^{-1}$ i.m.- Atropin Biotika inj., individually Diazepam 1 $mg.kg^{-1}$ i.m., Apaurin inj.)

Altogether, 299 dogs were examined: 206 females and 93 males. With regard to breed, 272 were Bavarian mountain hounds and 27 Hannoverian hounds.

The first objective of our study was to evaluate the incidence of hip joint dysplasia in two breeds of hunting dog, the Bavarian mountain hound and the Hannoverian hound in Slovakia in the period 1995-2000. We also compared the incidence of hip joint dysplasia in male and female dogs. The second objective was to evaluate the incidence of hip joint dysplasia in comparison with other dog breeds due to the fact that the available literature is deficient in information about hip joint dysplasia in hunting dogs belonging to the medium weight category.

Results

Table 1 summarises the results of incidence of HJD in Bavarian mountain hounds and Hannoverian hounds in the period 1995-2000. Altogether, 299 dogs of both hunting breeds were examined in this period. No HJD was detected in 61.7-80.6% of dogs. The mean proportion of negative males and females over the entire period of investigation was 73.9%. Table 1 also shows the occurrence of HJD according to grades. The B grade dysplasia in both sexes ranged from 14.9% in 1997 to 34% in 1995. This grade was assigned to the hip joints with some of the evaluated parameters outside physiological limits but with an absence of even slight dysplasia. Nevertheless, this was considered a positive result. The C grade was assigned to 2.6-7.7% of investigated animals. The mean occurrence of hip joint dysplasia therefore reached only 4.4%. Grades D and E were not diagnosed.

Table 2 shows the results of HJD in males. The investigated group comprised 93 dogs. The mean occurrence of dysplasia in the evaluated period (Grades B and C together) was 25.8%. Results obtained in the group of bitches are presented in Table 3, with mean incidence of dysplasia reaching 26.2%. Occurrence of dysplasia in the investigated breeds was indpendent of sex.

The ratio of examined males and females was 31:69 and corresponds to the mutual proportion of breeding animals kept by breeders.

Table 1. Evaluation of hip joint dysplasia in Bavarian mountain hound and Hannoverian hound for the period 1995-2000 from Slovakia

Year	Number of dogs	Grade A		Grade B		Grade C	
		Number	%	Number	%	Number	%
1995	47	29	61.7	16	34.0	2	4.3
1996	39	27	69.2	9	23.1	3	7.7
1997	67	54	80.6	10	14.9	3	4.5
1998	56	41	73.2	13	23.2	2	3.6
1999	38	30	79.0	7	18.4	1	2.6
2000	52	40	76.9	10	19.2	2	3.9
Total	299	221	7.9	65	21.7	13	4.4

Table 2. Evaluation of hip joint dysplasia in Bavarian mountain hound and Hannoverian hound (dogs) from Slovakia for the period 1995-2000

Year	Number of dogs	Grade A		Grade B		Grade C	
		Number	%	Number	%	Number	%
1995	16	10	62.5	5	31.3	1	6.2
1996	10	7	70.0	1	10.0	2	20.0
1997	22	54	80.6	10	14.9	3	4.5
1998	56	17	77.3	4	18.2	1	4.5
1999	14	10	71.4	3	21.4	1	7.2
2000	21	16	76.2	4	19.0	1	4.8
Total	93	69	74.2	18	19.4	6	6.4

Table 3. Evaluation of hip joint dysplasia in Bavarian mountain hound and Hannoverian hound (bitches), from Slovakia for the period 1995-2000

Year	Number of dogs	Grade A		Grade B		Grade C	
		Number	%	Number	%	Number	%
1995	31	19	61.3	11	35.5	1	3.2
1996	29	20	69.0	8	27.6	1	3.4
1997	45	37	82.2	6	13.3	2	4.5
1998	42	31	73.8	10	23.8	1	2.4
1999	28	21	75.0	6	21.5	1	3.5
2000	31	24	77.4	6	19.4	1	3.2
Total	206	152	73.8	47	22.8	7	3.4

The separate evaluation of HJD according to breed could not be carried out due to unbalanced sets of animals. The hunting use, breeding conditions and close relationship of both breeds allowed us to present a joint evaluation of Bavarian mountain hounds and Hannoverian hounds.

Discussion

The literature provides a description of hip joint dysplasia mainly for the larger and heavier breeds, which are more affected by this problem. These are mostly breeds such as German shepherd, Rottweiler, retriever, and similar. We have found no information on the incidence of HJD in hunting dogs. The evaluated Bavarian mountain hounds and Hannoverian hounds are dogs of medium weight category. These breeds are very popular in Slovakia because the level of their offspring is very high. They are suitable for hunting work in the field as they are able to cope with severe conditions, are undemanding and their intellect is rather high.

Following the example of similar clubs in Germany, the Slovak Club for Bavarian mountain hounds and Hannoverian hounds decided to commence radiographical examination of the hip joints of these breeds. The aim was clear - to decrease the incidence of any disease that can affect the exterior quality and performance of these dogs, which are used in game hunting. Hip joint dysplasia is

one such disease. In our opinion, from the point of view of the selective programme of HJD eradication, the six-year period appears relatively short. The aim of this paper is to draw attention to the incidence of HJD in breeds of dog other than those that are typically affected by hip joint dysplasia.

Our results were obtained under standard conditions, accepting a 5-point gradation system of HJD evaluation, with grade A representing a negative case and grade B a state that indicates non-physiological formation of the hip joint, but only to a slight degree.

According to our statement, the B grade was considered transitional and indicated conditional positive for hip joint dysplasia. This is to express that the shape of the hip joint does not fulfil the six different evaluation criteria selected on an osseous basis.

The incidence of hip joint dysplasia in hunting dogs is lower than that in German shepherds, published by LEDECKÝ et al. (1997), which reached almost 40% in comparison with 26.1% positive hunting dogs investigated in the present study.

The proportion of dogs negative to HJD differed over the period of our investigation, but the decrease was not linear, as was reported by KANEENE et al. (1997) in German shepherds, retrievers and Rottweilers. This may be due to the fact that the use in breeding of dogs and bitches with hip joint dysplasia could occur, although rarely, during the evaluation period (1995-2000). Since the beginning of 2001 only animals with excellent hip joint phenotype were permitted to be used for breeding in both investigated breeds. This means that the effectiveness of eradication of hip joint dysplasia through radiographical examination can be manifested only in the subsequent period. Another factor that could affect results to a considerable degree was the examination of dogs and bitches at different ages.

From the point of view of predisposition of sexes to higher incidence of hip joint dysplasia we failed to observe any relationship. This observation has been supported by many other authors (HENCRISCON et al., 1966; REISER et al., 1964; LARSON and CORLEY, 1971; PRIESTER and MULVIHILL, 1972), with the exception of SWENSON et al. (1997) who observed higher incidence of hip joint dysplasia in bitches of German shepherds, golden retrievers and Bern sheep-dogs, but who failed to detect such a relationship in Labradors, Retrievers, Rottweilers and Newfoundland dogs. MORGAN et al. (2000) explained higher incidence of HJD in bitches of all breeds by the possible direct effect of genes on sexual chromosomes. Differing incidence of HJD

according to sexes could be explained by the direct influence of genes on sexual chromosomes or direct influence of gene encoded sex traits on sex chromosomes (SWENSON et al. 1997). This author adds that in breeds with higher susceptibility to HJD, higher expression of genes for this disease is probable.

Our study presents a review of hip joint phenotype in Bavarian mountain hound and Hannoverian hound breeds. We plan to observe further the development of HJD also with regard to the fact that, starting from 2001, only dogs and bitches graded A or B could be registered for breeding. Additionally, an effort has been made by Club management to use for breeding only those individuals with excellent phenotype of the hip joint.

References

BRASS, W. (1989): Hip dysplasia in dogs. J. Small Anim. Pract. 30, 166-170.

CORLEY, E. A., G. G. KELLER (1989): Hip Dysplasia: a Guide for Dog Breeders and Owners. 2nd ed. Columbia, Orthopedic Foundation for Animals.

FLÜCKINGER, M., J. LANG, H. BINDER, A. BUSATO, J. BOOS (1995): Die Bekämpfung der Hüftgelenksdysplasie in der Schweiz. Ein Rűckblick auf die vergangenen 24 Jahre. Schweiz. Arch. Tierh. 137, 243-250.

HENCRICSON, B., I. NORBERG, S. E. OLLSON (1966): On the etiology and pathogenesis of hip dysplasia: a comparative review. J. Small. Anim. Pract. 7, 673-688.

KANEENE, J. B., V. V. MOSTOCKY, G. A. PADGETT (1997): Retrospective cohort study of changes in hip joint phenotype of dogs in the United States. JAVMA 211, 1542-1544.

LARSON, J. S., E. A. CORLEY (1971): Radiographic evalutions in canine hip dysplasia: a control program. JAVMA 159, 989-994.

LUST, G. (1997): An overview of the pathogenesis of canine hip dysplasia. JAVMA 210, 1443-1445.

LEDECKÝ, V., A. ŠEVČÍK, I. CAPÍK, A. TRBOLOVÁ (1997): Analysis of hip joint dysplasia development in dogs. Vet. Med. -Czech 42, 1-4.

MACKENZIE, S. A. (1985): Why heritability estimates differ. Can. Pract. 12, 19-22.

MORGAN, J. P., A. WIND, A. P. DAVIDSON (2000): Hereditary Bone and Joint Diseases in the Dog. Schlütersche. Hannover. pp. 313

NEČAS, A., J. B. TOOMBS (1999): Dysplazie kyčelního kloubu u psů. Veterinární a Farmaceutická Univerzita. Brno. pp. 79

PRIESTER, W. A., J. J. MULVIHILL (1972): Canine hip dysplasia: relative risk by sex, breed and comparative aspects. JAVMA 160, 735-739.

REISER, W. H., D. COHEN, S. LINDQUIST, J. MANSON, S. CHEN (1964): Influence of early rapid growth and weight garn on hip dysplasia in German Shepherd Dog. JAVMA 145, 661-668.

SWENSON, L., L. AUDELL, A. HEDHAMMAR (1997): Prevalence and inheritance of and selection for hip dysplasia in seven breeds of dogs in Sweden and benefit: cost analysis of a screening and control program. JAVMA 210, 207-214.

Received: 11 February 2004
Accepted: 8 November 2004

LEDECKÝ, V., A. ŠEVČÍK, M. PUZDER, I. CAPÍK, M. HLUCHÝ, A. TRBOLOVÁ, A. NEČAS: Pojavnost displazije bedrenog zgloba u nekih pasmina lovačkih pasa. Vet. arhiv 74, 417-425, 2004.

SAŽETAK

Analiza pojavnosti displazije bedrenog zgloba u lovačkih pasa pasmina bavarski krvosljednik i hanoveranski krvosljednik provedena je u Republici Slovačkoj u razdoblju od 1995. do 2000. U tom je razdoblju bilo pretraženo 299 životinja obih pasmina i to 206 ženki i 93 mužjaka. Za razliku od 1995. kada je bilo ustanovljeno 38,3% pretraženih pasa s displazijom bedrenog zgloba, na kraju promatranog razdoblja broj pozitivnih smanjio se na 26,1% u obje pasmine. Displazija je bila dokazana u 22,3% ženki i 18,9% mužjaka. Razlika između pozitivnih i negativnih nalaza u pretraživanom razdoblju bila je statistički značajna ($P \leq 0,05$) određeno χ^2 testom. Smanjenje pojavnosti displazije bedrenog zgloba u promatranih pasmina pasa vjerojatno je rezultat odabira. Prosudba je bila provedena na osnovi pet stupnjeva označenih od A do E. Displazija stupnja D i E nije bila ustanovljena.

Ključne riječi: displazija, bedreni zglob, pas