

NAUČNI RAD – Original Paper

HIP DYSPLASIA IN TORNJAK

DISPLAZIJA KUKOVA KOD TORNJAKA

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Kratak sadržaj – Displazija kukova je nasljedna razvojna anomalija, najčešća kod velikih pasmina pasa. Klinička potvrda ovog poremećaja zasniva se na RTG pretrazi kukova. Dvadeset bosanskih tornjaka u dobi od 9 do 36 mjeseci i tjelesne mase 35 do 42 kg pregledano je na prisustvo displazije kukova. Ocjenjivanje je izvršeno prema šest jasno definisanih radiografskih parametara metodom po Flückigeru (5). Kod devet pasa nisu nađene displastične promjene, dok su iste različitog stepena utvrđene u 11 slučajeva. Rad predstavlja detaljan opis 4 slučajeva displazije kukova različitog stepena. Ovi rezultati pokazuju prisustvo displazije kukova kod bosanskog tornjaka. Utvrđivanje učestalosti displazije kod ove autohtone pasmine zahtijeva opširniju studiju, na temelju koje će se utvrditi raširenost displazije te analizirati odnos prema ostalim pasminama pasa.

Ključne riječi: displazija kukova pasa, bosanski tornjak

Abstract – Canine hip dysplasia (CHD) is a hereditary developmental anomaly, most frequent in large dog breeds. Clinical confirmation of the disorder is based on hip X-ray imaging. Twenty Tornjak dogs aged between 9-36 months, and weighted from 35-42 kg were examined for CHD. Scoring was performed according to six clearly defined radiographic parameters by Flueckiger method (5). Dysplastic changes of various severity were observed in 11 dogs, while in 9 dogs changes were absent. The study describes 4 CHD cases of varying degrees of severity. The results indicate the presence of CHD in Bosnian Tornjak. Determining the incidence of dysplasia in this

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autochthonous breed requires a more detailed study, which will enable determination of the prevalence of dysplasia and analysis of the relationship to other dog breeds.

Key words: canine hip dysplasia, Bosnian Tornjak

Introduction

Hip dysplasia (*Dysplasia acetabuli*, *Dysplasia articuli coxae congenita*) is a term referring to a specific hereditary developmental anomaly of the coxofemoral joint, most common in dog. A suspicion of canine hip dysplasia (CHD) may be raised by clinical examination. Detection of a positive Ortolani sign confirms the presence of hip joint laxity, a feature of early dysplasia. Diagnosis of CHD is based on radiographic examination of hip joints. Specific radiographic changes have been described to characterize both joint laxity and the developing arthrosis. However, different weighing of the criteria for radiograph evaluation as well as different procedures of radiographic examination exist worldwide. Despite the fact that the Scientific Committee of the Fédération Cynologique Internationale (FCI) established criteria for CHD classification (1), evident discrepancies with regard to this issue may be still observed among many countries, particularly in Europe and the United States of America.

The early joint laxity can be documented with confidence at 4-6 months. Initial clinical signs of joint laxity may be observed in puppies under three months of age, but a total absence of joint laxity in the dysplastic hip may not be a characteristic of dysplasia in some dogs. As a dog ages, evident may be the effects of different stages of joint laxity, such as inability to stand strongly on pelvic limbs, and/or unsteadily walk, and reluctance toward regular exercising. In middle-aged and older dogs these symptoms may become more severe, when professional help is needed in making the diagnosis. The only way to objectively evaluate the presence and stage the level of arthrosis is by radiographic examination. In this way, a record of the status of the anatomical structures of hip joint as well as their relationships and severity of possible secondary changes is obtained. Many countries with experience in the evaluation of HD (hip dysplasia) apply CHD evaluation standards, which clearly describe techniques of radiographic examination and criteria for CHD grading (3).

One method of radiograph evaluation includes six clearly defined anatomical structures of hip joint that represent six radiographic parameters. By analyzing these parameters, the presence and severity of CHD have been evaluated and depending on severity of observed pathological changes, a grade from 0 to 5 has been assigned to each of the six parameters. The six parameters and grading criteria have been clearly described (Tab.1) (5).

Under the official name “Bosnian-Herzegovinian – Croatian Shepherd Dog – Tornjak“ (Tornjak), the FCI has recently accepted Bosnian shepherd dog as an autochthonous dog breed in Bosnia and Herzegovina (B&H). Tornjak is a calm dog, good

tempered toward humans, vigilantly aggressive toward other animals and invaders on home, flock or owner. It is genetically very dominant. Its body is very strong and well-proportioned, and its motion is well-balanced.

Table 1: Radiographic criteria for canine hip dysplasia grading (5)

Tabela 1: Radiološki kriterij za ocjenu displazije kukova kod pasa (5)

| Norberg Angle (JS = Joint Space) | Relation FHC/DAE Width of Joint Space | Cranialateral Acetabular Edge (CAE) | Cranial Subchondral Acetabular Bone | Femoral Head (H) Femoral Neck(N) | Morgan-Line | Score |
|--|---|--|---|--|---|-------|
| > / =105° | FHC medial to DAE(>2mm), JS narrow | parallel to femoral head | fine, even | H: round smooth N: well demarcated | not visible | 0 |
| > / =105° with slightly widened JS, or < 105° with narrow JS | FHC medial to DAE (1.2mm), JS minimally divergent | horizontal on lateral 1/4 | Even | H: round N: poorly demarcated (cylindrical) | edged shoulder on flexed limb view | 1 |
| > / =100° | FHC superimposed on DAE, JS slightly divergent | slightly flattened, or mild exostosis | slightly thickened laterally, slightly reduced medially | H: slightly flattened N: mild exostosis | fine linear spur (up to 1 mm wide) | 2 |
| > / = 90° | FHC lateral to DAE (1-5 mm) JS moderately divergent | moderately flattened, mild exostosis, two part surface | Moderately thickened laterally, moderately reduced medially | H: moderately flattened N: mild exostoses | well defined spur (up to 3 mm wide) | 3 |
| > / = 80° | FHC lateral to DAE (6-10 mm) JS markedly divergent | markedly flattened, moderate exostosis | markedly thickened laterally, may not be present medially | H: moderately flattened N: moderate exostosis | broad irregular spur (>3 mm wide) | 4 |
| < 80° | FHC lateral to DAE (> 10mm or luxation) | DAE absent, acetabulum markedly deformed | blending with lateral pelvic rim or absent | H: severely deformed N: massive exostosis | spur incorporated in or superimposed by general exostosis | 5 |

Chest and back are well-proportioned, while croups are slightly sloped and muscular. Chest is wide and strong and prominently hairiness with the long hair making the impression of a massive breed even more than it really is. Average height at the withers of adults range between 65 and 70 cm (males) and 58-65 cm (females), while average hearth girth was estimated between 88 and 92 cm in males, and in females 73-77

cm. Average body length in males is 72-75 cm, and in females is 63-67 cm, while girth of the left metacarpus in adult males is 14-16 cm, and in adult females 11-13 cm. Average body weight is 35-50 and 28-40 kg in adult males and females, respectively.

Based on data from literature (1, 2), it is known that CHD occurs at certain frequencies in internationally recognized dog breeds. The purpose of the report is to characterize CHD in Tornjak dogs so that further study can effectively evaluate the occurrence of this disease.

Materials and Methods

For the study, 20 Tornjaks (males and females) at age from 9 months to 36 months and body weight in range from 35 to 42 kg were selected. Before radiographic examination, the dogs were clinically examined and judged to be normal. They were induced into total anesthesia, and placed in ventro-dorsal (VD) position with extended pelvic limbs (parallel and slightly medially rotated in knees). Radiographs were made with a "Siemens super X 1000" x-ray apparatus, using exposure values appropriate for size and weight of the dogs using a grid technique. RTG films with green spectrum high sensitivity folia were used to obtain a high quality radiograph.

Results

For x-ray examination, we selected only clinically suspect or clinically positive dogs. According to internationally recognized criteria for CHD classification (5, 8), we observed A grade in 9 dogs, six dogs were found to have grade C, 2 grade D, and 3 grade E. Out of 20 examined dogs in total, we selected 4 representative cases of different CHD grades.

Case 1. 24 months, female. The Norberg angles (L and R) are 105 degrees. Center of the femoral heads are medial relative to the dorsal acetabular edge. Craniolateral acetabular edges are parallel with the contour of the femoral heads. Shadows of the acetabular subchondral bone show a narrow uniform thickening. Femoral heads are round-shaped and the necks are sharply contoured. The Morgan lines are not visible. HD grade A (Fig. 1).

Case 2. 36 months, female. The Norberg angle for R is 105, and for L is 90 degrees and is influenced by pelvic obliquity. Position of the center of the left femoral head is 5 mm lateral to the dorsal acetabular edge and a subluxation is visible. Luxation of the right femoral head is hidden by obliquity of pelvic positioning. The craniolateral acetabular edge is horizontal and the acetabula are shallow. A wide unequal thickening of subchondral bone is visible in both acetabula and contact between the heads and the acetabula is minimal. Femoral heads remain round-shaped and the necks are of a cylindrical shape. The Morgan lines are not visible. HD grade C (Fig. 2).



Figure 1. HD Grade A
Slika 1. Displazija kukova stupanj A



Figure 2. HD Grade C
Slika 2. Displazija kukova stupanj C

Case 3. 8 months, female. The Norberg angles for L and R are 85 and 90 degrees, respectively. Centers of the femoral heads are lateral to the dorsal acetabular edge and the joint spaces are widened. Craniolateral edges are flattened with widened joint space. A lateral thickening of a medium degree and a medium medial reduction are visible on subchondral bone. Femoral heads are of a medium flattening and neck is cylindrically shaped. The Morgan lines were not visible. HD grade D (Fig. 3).



Figure 3. HD Grade D
Slika 3. Displazija kukova stupanj D



Figure 4. HD Grade E
Slika 4. Displazija kukova stupanj E

Case 4. 5 months, male. The Norberg angles for L and R are 80 degrees. Centers of the femoral heads are located more than 10 mm lateral to the dorsal acetabular edges and subluxation of both femoral heads is evident. The acetabula are flattened and the craniolateral acetabular edges are flattened. Unlike on the medial side, a prominent

flattening of subchondral bone is visible on the lateral side. Femoral heads are of a medium flattening. HD grade E (Fig. 4).

These preliminary results show occurrence of CHD in Tornjak. To fully investigate occurrence of CHD in this autochthonous dog breed a wider and more detailed study is required to estimate CHD prevalence in Tornjak and to compare results with other dog breeds.

Discussion

The general appearance of the Tornjak including proportions has been described. In particular, breed characteristic includes a strong and parallel hindquarters standing upright with the stifle well bent and the upper thigh being broad, strong, and well muscled. The Tornjak is a trotter with a strong drive from the hindquarters.

The Tornjaks are one of many clearly separated sheepdogs that originally were spread over the entire mountain meadows and also the dogs that inhabited hill country the valleys in which there was nomadic cattle raising. The first function of these dogs was herd protection. The Croatian word Tornjak is derived from the word “tor”, which is an enclosed space for sheep and suggested the dogs were always with the stock both night and day. Sources often mentioned by cinologists suggest the presence of similar dogs in the Dinara mountains and to the southeast of these mountains already at the time of the Romans where they were also used for guarding purposes and for fighting (7). The oldest written document describing the Tornjak is from the year 1062 from the bishop’s archives in Djakovo and the same reference was repeated in 1374 (Djakovo’s bishop Peter Horvat) and 1752 (Djakovo’s Canonikus Petar Lukic), all describing dogs who inhabited hill country under the ordnance of the bishop of Djakovo. The population originated spontaneously as the result of migrations, wars, and trade routes with a mixture with local populations. This mixture adapted itself for centuries to the natural surroundings changing to the needs of the dog (6).

Following a spontaneous loss of members in the early part of the 20 century, endeavors were made to retain the form of the breed. The breed continued to head for extinction as the extensive sheep breeding declined until the last place of refuge was in Bosnia and Herzegovina, and only in the Croatian mountains was sheep-breeding remained in its original form. In the last 40 years, some dog-lovers began to search both the literature as well as any source of information that could be used in the re-establishment of the breed, which best corresponded to the old writings about this breed.

While hip dysplasia is present throughout the world, its presence in this breed may be unique and offers certain possibilities in coming to a better understanding of the disease. The blood lines used in breeding today’s Tornjak are directly connected to early working dogs used for sheep herding. Since the breed was always considered a separate breed, it can be suggested that the amount of outcrossing was minimal. It was necessary to maintain a healthy working animal and yet today we find dysplasia in the offspring of

these original herding dogs. The extent of the population that is affected is not known. While other breeds have been encouraged to mature early, this breed does not achieve maturity based on body weight until around 2.5 years. Reports suggest that early maturation along with increasing body weight both have been responsible for the increase in the frequency of dysplasia. In addition, the widespread availability of high energy commercially prepared dog foods has been suggested to play a role in the increase in dysplasia (hills) (4). In the Tornjak, the diet today is generally locally prepared.

While the study is incomplete, it is noted that the dogs included in the preliminary study show joint laxity as is seen in dysplasia in most breeds, but minimal secondary bone changes indicative of developing arthrosis.

It appears unique to expect that those interested in the reestablishment of the Tornjak today would select dogs with a strong and parallel back that is upright with standing who can be a working dog and, at the same time, select dogs with hip dysplasia.

Conclusion

Based on our preliminary results and having in mind that Tornjak is an autochthonous breed in BiH, and that several Tornjak breeding centers have been established, it is very important to emphasize and alert that genetic malformation of hip dysplasia is present in this breed. A direct consequence of eventual negligence of this phenomenon and of unselective breeding would result in wide spreading and prevailing of CHD in Tornjak. In many other states, particularly in EU countries, strict and detailed criteria on breeding of autochthonous dog breeds have been established. In addition, to participate in any respectable international dog show a certificate on quality of dog breeding is required. Thus, we recommend a need of systematic research and investigation of CHD from current veterinary medicine, BiH Kennel Association and Tornjak breeding club.

In addition, it is thought that much can be learned from a study of this rather special breed as to the development of dysplasia in a slowly maturing breed, which generally uses a unique diet prepared by owners/breeders, and has a long history of being a working dog.

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