MORPHOMETRIC ANALYSIS OF THE FORAMEN MAGNUM IN LARGE AND GIANT DOG BREEDS

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Introduction: Foramen magnum (FM) connects cranial cavity with the vertebral canal. It is a ring formed by basiooccipital, supraoccipital and paired exooccipital bones (1). Literature provide no information about the dependence of the shape and dimensions of FM in relation to the constitutional type (body weight) of a dog.

Aim: The aim of this study was to describe morphological diversity in FM structure among large and giant dog breeds.

Material and methods: Morphological investigations were carried out on the skulls of 20 dogs belonging to the large and giant dog breeds of various age (3-18 years) and both sexes. Divison into two groups was based on individuals body weight. The “large breed” group included animals weighing 20 to 40 kg, “giant breed” group individuals above 40 kg. Dogs were of mesaticephalic (n=13) and dolichocephalic morphotype (n=7). Their heads were macerated in hot water with the use of calcined soda and then anatomically preparated. Morphometric study was performed using an electric caliper, exact to 0.01 mm. Following measurements were performed: ZyZy – skull width (the maximum distance between the bilateral zygomatic arches), AP - skull length (distance between prosthion and akrokranion points); H – height of the FM with the dorsal notch; h – height of the FM without the dorsal notch; N – height of the dorsal notch; W – width of the FM. Basing on the obtained data the following values were calculated: foramen magnum index - IOW (W/H x 100), occipital index - IPF (H/W x 100), dorsal notch index – IWD (N/H x 100) and occipital dysplasia index - ISD (N/h x 100).

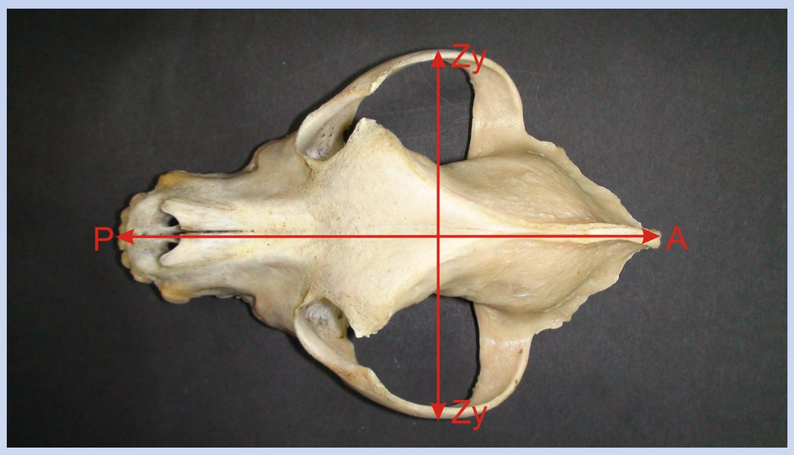

Fig.1. Cranium. ZyZy – skull width (the maximum distance between the bilateral zygomatic arches), AP - skull length (distance between prosthion and akrokranion points)

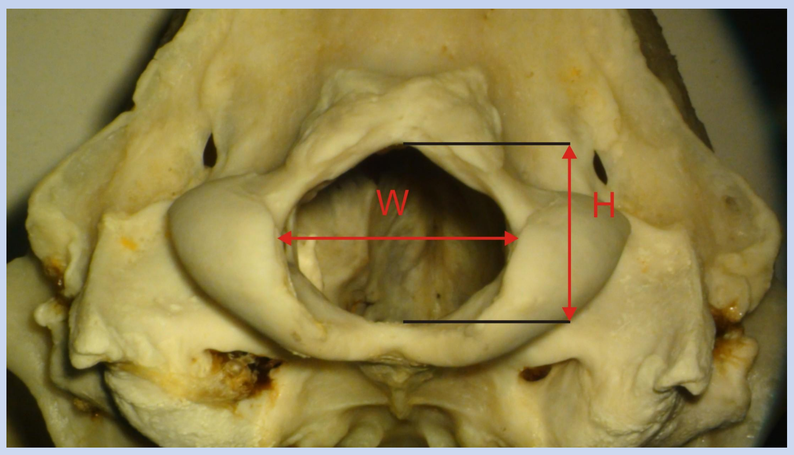

Fig.2. Foramen magnum, German Shepherd dog. H – height of the FM with the dorsal notch; W – width of the FM

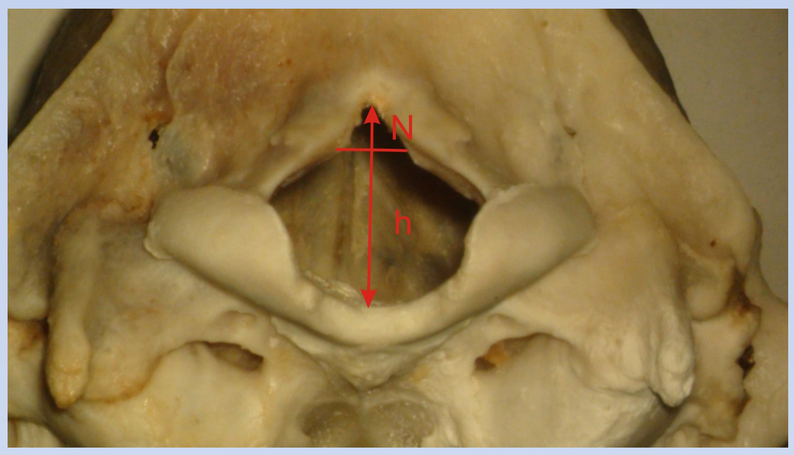

Fig.3. Foramen magnum, American Staffordshire Terrier. h – height of the FM without the dorsal notch; N – height of the dorsal notch

Results: The statistical analysis using the U Mann-Whitney test showed significant differences ($p \leq 0.05$) between male and female groups in the mean values of AP. Highly significant differences ($p \leq 0.01$) concerned only the average values of Zy-Zy. Between mesati- and dolichocephalic groups we found statistical significant differences ($p \leq 0.05$) in the Zy-Zy parameter. This means that in large and giant breed dogs morphotype is determined mainly by the width of the skull. In the study, only one individual was presented with the dorsal notch (American Staffordshire Terrier). This dog was qualified as a mesaticephalic type. It seems that the presence of occipital dysplasia in dogs of larger breeds can be considered as an occasional individual variability.

References:

1.Evans H.E, de Lahunta A.: Miller's Anatomy of the Dog, 4th edition, Saunders, 2012.