A case of hydrocephalus in the Przewalski's wild horse

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Abstract: A rare case of hydrocephalus in the Przewalski's wild horse was described. Some morphological observations were taken and corrosion cast of cephalic arteries was made, also bones of cranium were macerated for the purpose of further analysis. On the basis of the morphological analysis and a comparison with literature data we considered hydrocephalus of the internal type. In the examined case we found serious changes in the cephalic arteries pattern. Deformation of particular bones of the cranium was stated.

Key words: hydrocephalus, the Przewalski's wild horse

Introduction

Horses represent 17,50 % cases of malformations in domestic animals. Hydrocephalus in horses is rarely described, it doesn't exceed 3% of all stated malformation of this species (Crowe and Swereczek 1985). Hydrocephalus was already described in warm blood races of Throughbreed (Bowman 1980), in Trotter (Ojala and Ala-Huikku 1992), also in the Konik horses, a representative of Polish primitive horses (Jaworski *et al.* 2002).

Hydrocephalus is characterized by cerebrospinal fluid excess in the cranial cavity. In order to location of the cerebrospinal fluid we may have: hydrocephalus internal (when brain cavities contain cerebrospinal fluid) and hydrocephalus external (when the subarachnoid cave is filled with cerebrospinal fluid). The presence of cerebrospinal fluid excess in brain cavities and subarachnoid cave is a featured of hydrocephalus of the communicational type.

The most popular in animals is hydrocephalus internal two other cases occur rarely (Jubb *at al.* 1993).

The aim of this report is to describe a case of hydrocephalus in the Przewalski's Wild horse.

The Przewalski's Wild horse is a wild species of the *Equidae* family which was maintained through for years only in ZOOs and in closed raising. Recently the Przewalski's Wild horse was introduced to steppes of Mongolia.

Material and methods

The case concerns a 15 years old mare of the Przewalski's Wild horse 1488 ZATOKA MK 0041 (after 555 MARWELL 10 TAMAR and 888 WARSZAWA 11 WISLA) was born 25.06.1986 in the ZOO of Warsaw. The mare was horsed with stallion 1457 SPRUNG MK 0040 (after 749 MARWELL 31 ILKA and 856 SPRINGE 1 SPRINGIA) born on 30.05.1986 in Germany. Both horses were kept in the ZOO in Poznan, the mare from 1987, the stallion from 1989. Previous mare pregnancies proceeded without complications. Foals were born healthy and fully developed. Horsebirth on 21.06.2001 was solved by the Casearean section.

Arteries of the fetus head were filled with colored vinyl superchlorid solution of acetone. The next step was placing the preparation in the macerating bath at the temperature of 36°C. Casts of blood vessels and bones were obtained after the period of maceration.

The imbreed index Fx was estimated on the basis General Studbook of the Przewalski Horse (Kůs 1995). The measurements were made with use of SAS v. 9.13 (2006), INBREED procedure (statistical software).

Results

The fetus head was disproportionately big, it's circumference was significantly enlarged. The facial part of the skull was narrow and disproportionately small. The skull was soft and prone for to pressure. Cranial bones were thin with defects, filled with fibrous membrane. The zygomatic arch atrophied and orbits were narrowed. The mandible, nasal bones and frontal bones were deformed. In the temporal bone, the pyramid was separated from squamous (Fig. 1).

Hydrocephalus of internal type was found in the fetus.

Two common carotid arteries were found on the preparation. Each ramified in internal carotid artery and external carotid artery. In the cranial cavity, both internal carotid arteries

Fig. 1. A case of hydrocephalus in the Przewalski' s wild horse. Bones of cranium.
1 – incisive bone, 2 – nasal bone, 3 – mandible bone, 4 – maxilla bone, 5 – frontal bone, 6 – temporal bone, 7 – petrous part (of temporal bone), 8 – parietal bone, 9 – interparietal bone.

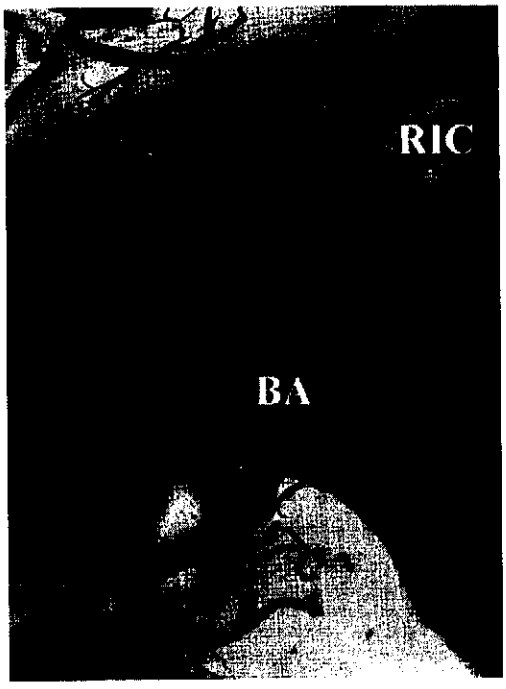

Fig. 2. A case of hydrocephalus in the Przewalski's wild horse. Some of basal brain arteries. BA – basilar artery, RIC – right internal carotid artery

were joined with each other and with the basilar artery. The arterial circle of the brain was not created.

The Przewalski's horse foal estimated imbreed index Fx = 13,48% and aproximetly his father's imbreeds (1457 Sprung) Fx= 13,89% and his mother's (1488 Zatoka) Fx= 25,00 %. Average rate of imbreed for analysed population of 70 horses was 12,58%, stallions were imbredeed at average level of Fx = 8,46 %, mares at average level of Fx = 15,66%. The highest Fx stated at average representative was 48,44%. The foal's parents relationship was at the level of 26,97%.

Discussion

On the basis of morphological features and comparing with literature (Bowman 1980; Crowe and Swereczek 1985; Jaworski *et al.* 2002; Madej *et al.* 2000; Żuliński 1983) the analyzed case of hydrocephalus in Przewalski's Wild horse was classified as hydrocephalus internal.

Morphological deformations, which in consequence influence the functioning of internal organs are the effect of malformation in the prenatal period. These malformations in term of their order intensity are described as teratoma or distortion. Reasons of these malformations in order to different authors have genetic or environmental background (Jubb *et al.* 1993).

Congenital hydrocephalus in domestic animals according to some authors is inherited through an autosomal recessive gene, although the role in its origin may be played by viral infections of fetus and dietary factors (Bester *et al.* 1976, Jubb *et al.* 1993).

Cases of hydrocephalus internal in American trotter were reported (Ojala and Ala-Huikku 1992). Authors found 7 cases of hydrocephalus internal within 239 foals of the analyzed stallion. Additional confirmation of the genetic background of hydrocephalus in the described cases was the fact that also sisters of the analyzed stallion were miscarrying foals with hydrocephalus. Congenital hydrocephalus internal in Throughbreed was described by Bowman (1980).

The estimated in our study imbreed index of Przewalski's horse foal with hydrocephalus was Fx = 13,5 %?. This index was similar to obtained in other study described by Jaworski *et al.* (2002) in Konik horse Fx = 15,1%.

The corrosion cast of cerebral arteries enabled observation of vascular system supplying head and brain area. Arteries of the head in investigated foal with hydrocephalus differed from arterial pattern described in Przewalski's Wild horse and other *Equidae* (Frąckowiak and Giejdasz 1998; Frąckowiak 2003).

Described case of hydrocephalus in Przewalski's Wild horse appeared in wild horse species which survived in ZOOs and other closed raisings.

Acknowledgments. We would like to thank to dr Jan Śmiełowski for rending the "General Stodbook Przewalski Horse" accessible.

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