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CASE REPORT

Congenital Giant Occipital Meningoencephalocele in A Holstein Calf Fetus

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Summary

A 6-month-old dead fetus, removed from the uterus of a 4-year-old Holstein cow, was referred to our department. A fluctuant sac, approximately 25x20x30 cm, covered with skin was observed over the occipital region of the cranium. Almost 4 liters lucid liquid was discharged from the sac. After the dissection of the soft tissue, a 1 cm diameter hole with irregular edges in connection with extracranial sac was determined on top of the occipital region of the left hemisphere in the cerebrum. The subject was diagnosed as meningoencephalocele due to the existence of prolapsed cerebellum in the sac. Also, a second channel connecting the fourth ventricle into the sac was also determined via MR images. An occipital meningoencephalocele in a 6-month-old holstein fetus was defined in this case report by pathologic-anatomic and radiological diagnosis.

Keywords: *Calf, Cranium anomaly, Meningoencephalocele*

Bir Holştayn Fetüste Görülen Konjenital Dev Oksipital Meningoensefalosel

Özet

Bu raporun materyalini; kesilen 4 yaşlı Holştayn ırkı bir sığırın uterusundan ölü olarak çıkarılan ve bölümümüze getirilen yaklaşık 6 aylık bir fetüs oluşturdu. Kraniumun oksipital bölgesinde fluktuan yapıda yaklaşık 25x20x30 cm boyutlarında deri ile kaplı bir kese gözlendi. Kese içinden yaklaşık 4 litre berrak akışkan sıvı boşaltıldı. Kafa yumuşak dokuların ayrılması sonrası beyinde sol hemisferin oksipital bölgesinin üst kısmında ekstrakranial kese ile bağlantılı kenarları düzensiz 1 cm çapında bir delik gözlendi. Kese içerisine beyinciğin prolobe olması olguya meningoensefalosel tanısını koydurdu. Ayrıca kese içerisine ventrikulus kuartusun bağlantısını sağlayan ikinci bir kanalın varlığı da MR görüntüleri ile tespit edildi. Bu raporda; 6 aylık holştayn fetüsta görülen oksipital meningoensefalosel patolojik-anatomik ve radyolojik bulgularıyla tanımlandı.

Anahtar sözcükler: *Buzağı, Kranium anomali, Meningoensefalosel*

INTRODUCTION

Cranial meningoencephalocele is a congenital anomaly and seen in domestic animals and especially in cattle [1,2]. Defects concerning crania bifida may be encountered in the form of encephalocele, meningocele or meningo-encephalocele [2,3]. Defective ossification of the skull and secondary herniation of the cerebrum is effective during morphogenesis. However, the actual defect has been considered to be related with the closure of the neural tube [2,3]. A hernia sac, made of skin without dura mater, is noteworthy in the defective region [2,4,5]. Defects have been reported to develop mostly in the frontal and occipital regions [2].

In the present report, occipital meningoencephalocele was seen in a 6-month-old holstein fetus was defined with anatomo-pathologic and radiological findings.

CASE HISTORY

A 6-month-old dead fetus, removed from the uterus of a 4-year-old Holstein cow, was referred to our department. A fluctuant sac, approximately 25x20x30 cm, covered with skin was observed over the occipital region of cranium. A systemic necropsy was performed to the fetus, samples

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were collected from each organ including extracranial sac. Collected samples passed through routine procedures and examined under light microscope.

In anatomopathological examination of the sac containing 4 liters of colorless liquid *(Fig. 1A)*. Under the oval extracranial sac on cranium, there was an irregularly edged 1.5-2 cm diameter passage at the fronto-occipital region of the cranium which was connecting the extracranial sac and upper part of the occipital region of left hemisphere *(Fig. 1B)*. Occurrence of a canal providing the connection between the sac and cavum cranii was determined when the incision was magnified and os frontale appeared *(Fig. 1C)*. Fissure longitudinal cerebri was not evident and this deep fissure which separates the hemispheres was transformed into a line form *(Fig. 1D)*. This transformation was thought to be formed by the increased intracranial pressure.

In the occipital lobe of left hemisphere, there was a 1 cm diameter canal with irregular edges connected to the extracranial sac. Its wall was covered by substantial alba *(Fig. 2A, 2B)*.

Velum medullare caudale was observed to have curled up and extended towards the canal connected to

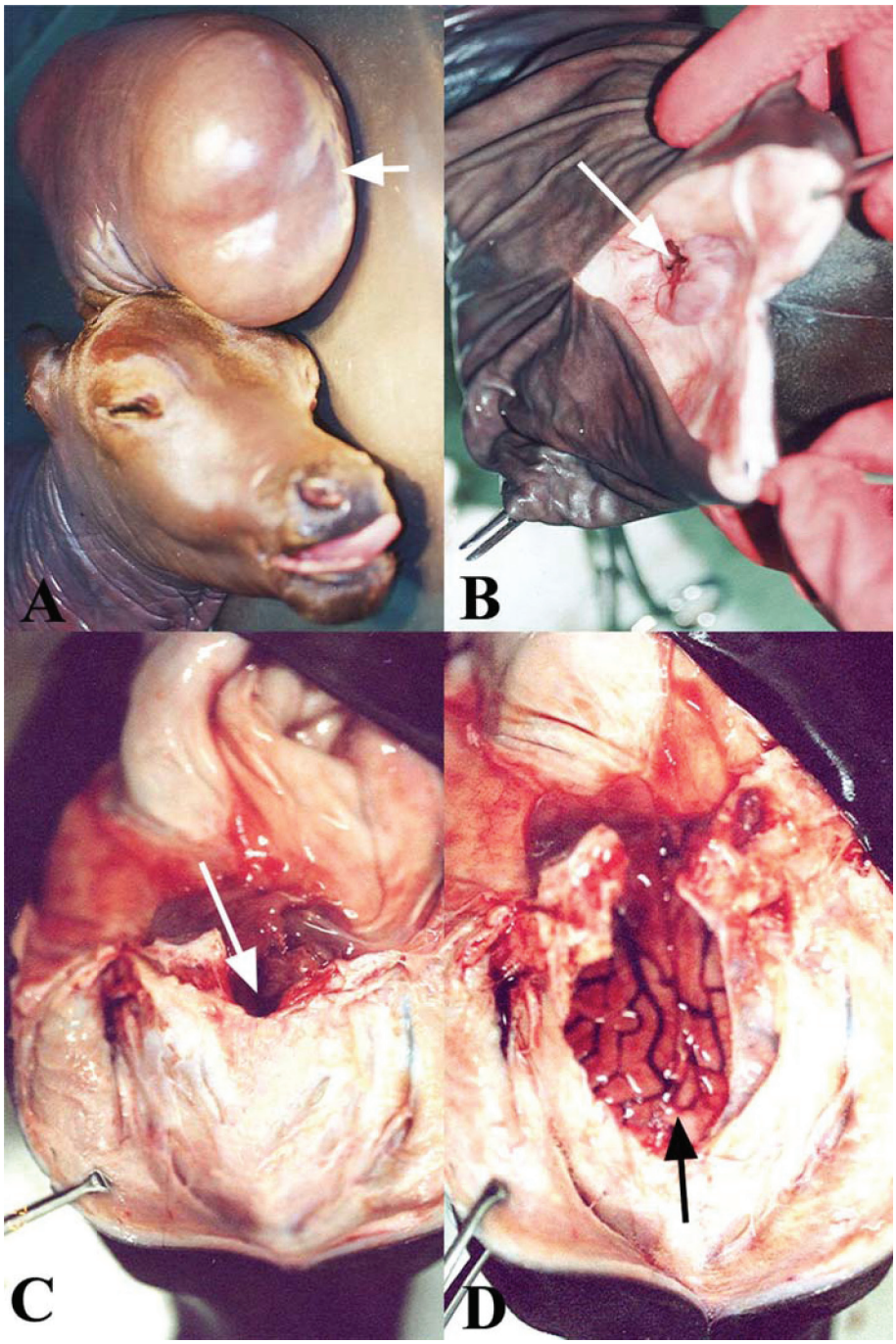

Fig 1. A- View of extracranial sac *(white arrow)*, **B-** View of the cranial attachment of the sac from the dorsal aspect *(white arrow)*, **C-** The canal between the sac and cavum cranii *(white arrow)*, **D-** Indistinct fissure longitudinalis cerebri *(black arrow)*

Şekil 1. A- Ekstrakranial kesenin görünümü *(beyaz ok)*, **B-** Kesenin kranial bağlantısının dorsalden görünümü *(beyaz ok)*, **C-** Kese ile kavum cranii arasındaki kanal *(beyaz ok)* **D-** Belirgin olmayan fissura longitudinalis cerebri *(siyah ok)*

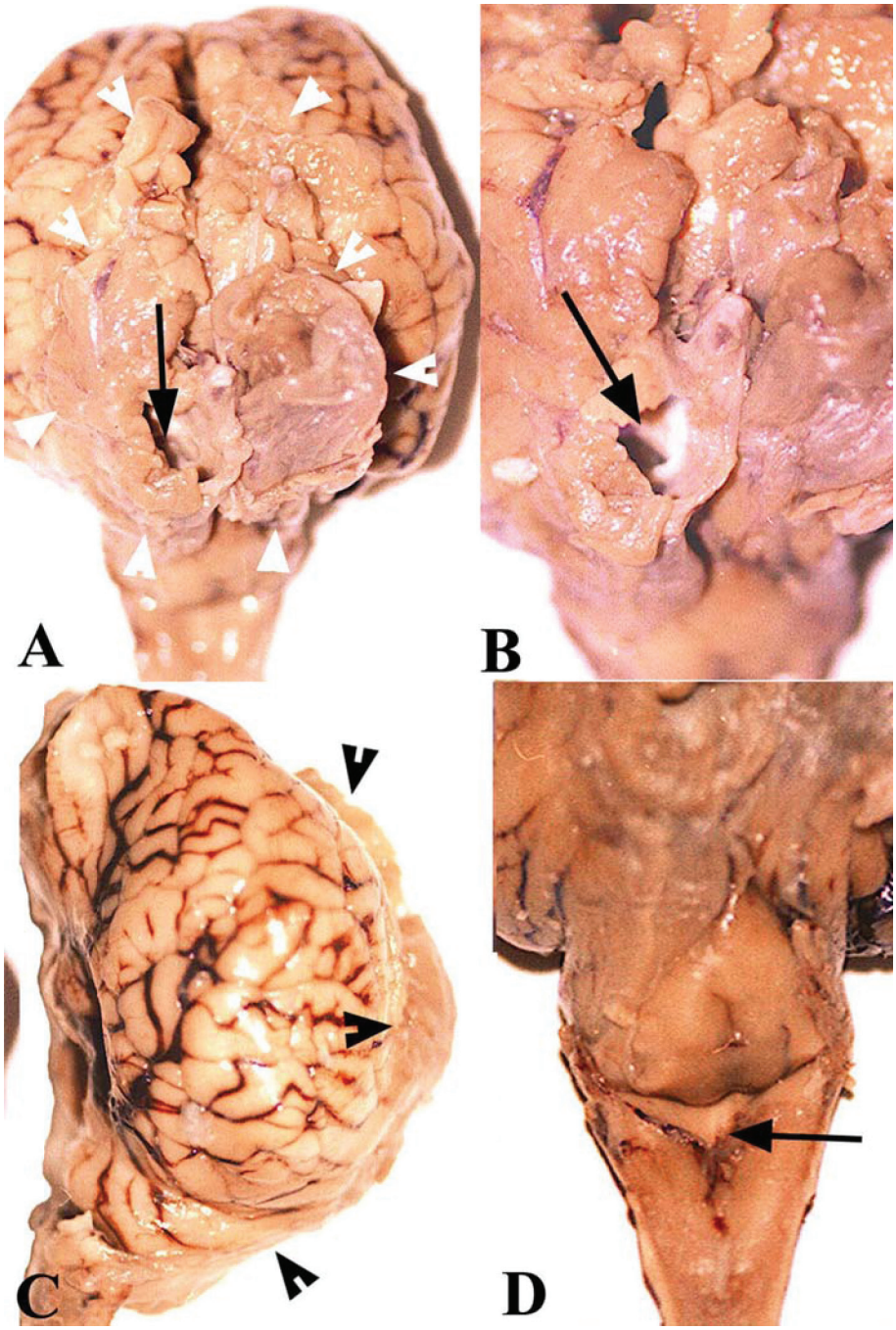

Fig 2. A- Canal formation in occipital lobe *(white arrow),* prolapsed cerebellar tissue *(white arrow heads),* **B-** Wall of the canal in the occipital lobe, composed of substantia alba *(black arrow),* **C-** View of the cerebellum different from the normal anatomic position *(black arrow heads),* **D-** View of fossa rhomboidea from the dorsal aspect *(black arrow)*

Şekil 2. A- Occipital lobdaki kanal oluşumu *(beyaz ok),* prolabe olmuş cerebellar doku *(beyaz ok başları),* **B-** Occipital lobdaki kanalın substantia alba'dan oluşan duvarı *(siyah ok),* **C-** Cerebellum'un normal anatomik pozisyondan ayrılmış görünümü *(siyah ok başları),* **D-** Fossa rhomboidea'nın dorsalden görünümü *(siyah ok)*

the sac. Fissura transversa and cerebellum could not be anatomically observed. Polus caudalis of the cerebrum cortex was observed to have been covered with a flat and large structure which had similar color and structure of cerebellum cortex *(Fig. 2A)*. In other words, the cerebellum separated from its usual anatomic position and, flattened and extended towards the frontal and upper parts *(Fig. 2C)*. Due to the difference in the structure and position of the cerebellum, fossa rhomboidal, forming the base of fourth ventricle**,** could be observed when looked at dorsally *(Fig. 2D)*.

Belt like nerve tissue at both sides of velum medullare caudale starting pars dorsalis pontis which formed the posterior and peripheral walls of the canal extending to the sac was observed. Occurrence of epiphysis could not be determined macroscopically among colliculus rostralis. An independent, flattened disc like tissue which paler than the tissue around was observed at the basement of sulcus medianus lamina tecti.

Left ventriculus lateralis expanded and formed cavitations in every direction in the rostral. This ventriculus was observed to have united with the canal opening to extracranial sac in the caudal. Cavitations in the right ventriculus lateralis were only at the anterior and posterior side but not as many as those of the left one.

Fig 3. Sagittal section of the MR image. Canal connecting the left ventriculus lateralis to the extracranial sac *(white arrows)*. View of the second canal providing the connection through ventriculus quartus to extracranial sac *(white arrow heads)*

Şekil 3. MR görüntüsü sagital kesit. Sol ventriculus lateralis ile ekstrakranial keseyi bağlayan kanal *(beyaz oklar)*. Ventriculus quartus'un ekstrakranial kese ile bağlantısını sağlayan ikinci kanalın görünümü *(beyaz ok başları)*

Belt like nerve tissue determined on the walls of the canal extending to the sac was observed to be the cerebellum. The disc shaped flattened structure at the base of sulcus medianus laminae tecti were determined to be belonging to the epiphysial tissue.

Besides it was noteworthy that there was no pathological lesion other part of the brain and no pathological result was encountered in the histological examinations of tissues belonging to other systems.

Magnetic Resonance (MR) scanning of the cranium was performed using a 1.5 Tesla superconducting magnet (Philips Gyroscan Intera, Best, The Netherlands). T_2 weighted turbo spin echo (TSE) (TR/TE, 5800/110 ms) sagittal and transversal plan images were obtained. A canal in the occipital lobe of the left hemisphere was determined in the sagittal and transversal sections obtained from MR investigations. This canal with irregular edges, which has a diameter of 1 cm, was observed to have extended between the extracranial sac and ventricles laterals (*Fig. 3* and *Fig. 4*). In the sagittal MR images a second canal providing the connection between extracranial sac and fourth ventricle was determined *(Fig. 3)*.

Fig 4. Transversal section of the MR image. View of the canal between the left lateral ventriculus and the sac *(white arrows)*

Şekil 4. MR görüntüsü transversal kesit. Sol lateral ventrikül ile kese arasında uzanan kanalın görüntüsü *(beyaz oklar)*

DISCUSSION

It has been reported that defects concerning crania bifida in cattle are encountered in the form of meningocele or meningoencephalocele [1-3]. In the present report occipital meningoencephalocele in a 6-month-old Holstein fetus was defined with anatomo-pathological and radiological findings.

Meningoencephalocele has also been described in other domestic animals such as horses, cattle, pigs, dogs, lambs and cats [4,6-11]. Cranial localization is generally formed as frontal and occipital [1-3]. Meningocele may sometimes located at cervical [12], thoracic [5], lumbar [13] vertebral regions in other animals. Settlement of occipital meningoencephalocele case in the present study was in agreement with the literature data.

Etiologically congenital defects of central nervous system formed during intrauterine development depending on either genetic or environmental factors same as general congenital defects [2,11]. Hereditary meningocele and meningoencephalocele cases have been reported in researches made in pigs and cats [11]. In the present report as the mother was slaughtered, the etiology of the case could not be determined.

In the previous studies concerning meningocele, liquid might go out of a normal cavity (such as anterior fontanelle) by the effect of interior pressure induced by the increase in the cerebrospinal fluid, which caused by a defect in closing the neuronal tube [3]. In this report it

was observed that particularly left and right ventriculus lateralis were widened and cavitations formed in every direction especially on the left of the rostral. It was noteworthy that the left ventricle opened to extracranial sac via a canal in the caudal like a porencephalic defect. Increased cerebrospinal fluid herniated in the form of a sac into the anterior fontanelle, with the help of canal situated in the left ventriculus. Contrary to other studies [4,10], the prolapsed cerebellum into the sac verified that the subject was not meningocele but meningoencephalocele. Besides, a second channel providing the connection of fourth ventricle into the sac was determined with MR images [2,4,10,11]. Cerebrospinal fluid, increasingly collected in the fourth ventricle and the sac, was considered to be the most important reason of the separation of the cerebellum from its anatomical position.

In conclusion, sagittal and transversal sections obtained from tomography and magnetic resonance imaging techniques are routinely applied to human for the diagnosis of cranium anomalia, if these techniques would have been available routinely in the veterinary medicine, the diagnosis of meningocele or meningoencephalocele and differential diagnosis of other mixed cranial anomalies would be easier as presented in this report.

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