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PATHOLOGY

Intracranial lipomatous hamartoma in the pontocerebellum of sheep

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ABSTRACT: *Intracranial lipomatous hamartomas are considered a non-invasive, benign lesion formed by well-differentiated adipocytes with or without capsules. A necropsy of an ewe presenting apathy, hypokinesis, anorexia, and adipsia revealed a soft, whitish, oval, pendular nodule approximately 6 mm long in the bulb region, located in the pontocerebellum. Histopathological assessments revealed a benign lesion formed mainly by well-differentiated adipocytes, fibrocytes, myelinated nervous fibers, and skeletal striated muscle, characterizing an intracranial lipomatous hamartoma. This is the first report of this condition in sheep.*
Key words: *proliferative process, lesion, encephalic, lipomatous hamartoma, cerebellar peduncle, sheep, brain.*

Hamartoma lipomatoso intracraniano pontocerebellar em ovelhas

RESUMO: *O hamartoma lipomatoso intracraniano é considerado uma lesão benigna não invasiva formada por adipócitos bem diferenciados com ou sem cápsulas. A necropsia de uma ovelha com apatia, hipocinesia, anorexia e adipsia revelou um nódulo pendular oval, macio, esbranquiçado, de aproximadamente 6 mm de comprimento na região do bulbo, localizado no pontocerebelo. A histopatologia revelou lesão proliferativa formada principalmente por adipócitos bem diferenciados, fibrócitos, fibras nervosas mielinizadas e músculo estriado esquelético caracterizando hamartoma lipomatoso intracraniano. Este é o primeiro relato da condição em ovelhas.*
Palavras-chave: *processo proliferativo, lesão, encefálico.*

The word hamartoma (from the Greek Hamartia - error, Oma - tumoral growth) (ZARBO & CLATCHEY, 1983) was established in 1904 by Eugem Albrecht to characterize tumors with abnormal growth of a set of tissues originating in a certain area, derived from any of the germ layers (ectoderm, mesoderm and endoderm) often with a predominant tissue type (KANEKO et al., 1999). It is a proliferation with benign, expansive behavior and self-limited and interrupted growth.

Intracranial lipomatous hamartomas are considered a benign, non-invasive, congenital lesion of unknown histogenesis formed, mainly, by well-differentiated adipocytes (SASAKI et al., 2012; ADKISON & SUNDBERG, 1991; BUDKA, 1974; MORGAN et al., 1984). The condition is normally detected during necropsies (BUDKA, 1974), and cases in veterinary medicine are rare. Intracranial lipomatous hamartomas have been described in humpback whales (PILLERI, 1966), pigs (TURNQUIST & MILLER, 1993), horses (ANDERSON & KING, 1988), cows, dogs, rabbits, and foxes (LUGINBÜHL, 1968), rats (BRANDER & PERENTES, 1995), mice (SASAKI et al., 2012) and ducks. Due to the scarcity of studies concerning intracranial lipomatous hamartomas in animals, this case report describes the first case of this condition in the pontocerebellum of a sheep.

A 4-year-old ewe kept as a pet animal was admitted to the Veterinary Hospital, at the North Fluminense Darcy Ribeiro State University. Clinical records included apathy and hypokinesis lasting five days. On the seventh day, the animal laid down, displaying clinical signs of tetanus (cervical stiffness,

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jaw movement restriction, limb spasticity, erect tail, trouble swallowing), anorexia, and adipsia. A clinical examination revealed a heart rate of 72 bpm, respiratory rate of 60 breaths per minute, temperature of 37ºC, prolonged lateral decubitus, and rigid limbs. An anti-tetanus serum was administered (10,000 IU, intrathecally on the 8th day, and intravenously on the 9th day). Penicillin (20 mL, intramuscularly every 24 h) acepromazine (0.105 mL, intramuscularly, every 24 h), thiamine (8 mL, intramuscularly, every 4 h), dexamethasone (0.4 mL, intramuscularly), and DMSO (4 mL, intramuscularly) were also administered. On the 9th day the animal's clinical condition worsened and it died. A necropsy revealed a soft, whitish, oval, extra parenchymal pendular nodule approximately 6 mm long on the bulb region, located on the left side of the cerebellar peduncle. Nodule fragments were removed for histopathological analyses. The tissues were fixed in buffered formalin 10% and routinely processed, cut into 5-µm sections and stained with hematoxylin-eosin (HE). The samples were then visualized and photographed under a microscope (Nikon Eclipse 80i, Kurobane Nikon Co., Ltd., Otawara, Tochigi, Japan) employing the NIS – Elements – BR software.

The histopathological analysis of the nodule located on the cerebellar peduncle revealed a benign lesion formed by well-differentiated adipocytes (Figure 1). A small amount of fibrocytes intertwined in the mass was observed more profusely at the tumor base. These fibrocytes produced thick collagen fibers that dissociated the adipocytes as lobes (Figure 1). A layer of thickened fibrous conjunctive tissue was located near the tumor base, involving and demarcating the tumor. In addition to adipocytes, intact myelinated nervous fibers were also detected, mildly degenerated at times (Figure 1), as well as skeletal striated muscle fibers spread across the tumor. Histopathological findings included the integrity of structures adjacent to the lesion, exhibiting mild compression, characterizing an intracranial lipomatous hamartoma.

The appropriate dose to be administered intrathecally is still under investigation. IT administration with the animal in a quadrupedal position was first described in 2016. (DI FILIPPO et al., 2016). This method was shown to be free of complications and easy to perform and; therefore, the administration of SA via IT with the animal in a quadrupedal position should be preferred. The removal of a CSF volume similar to the SA volume to be administered avoids a sudden and sharp increase in intracranial pressure, which could aggravate the paralysis condition (KABURA et al., 2006) and even lead to animal recumbency.

The anatomical region where the intracranial lipomatous hamartoma was detected in the present study differed from cases described in other animals. Reports on the occurrence of intracranial

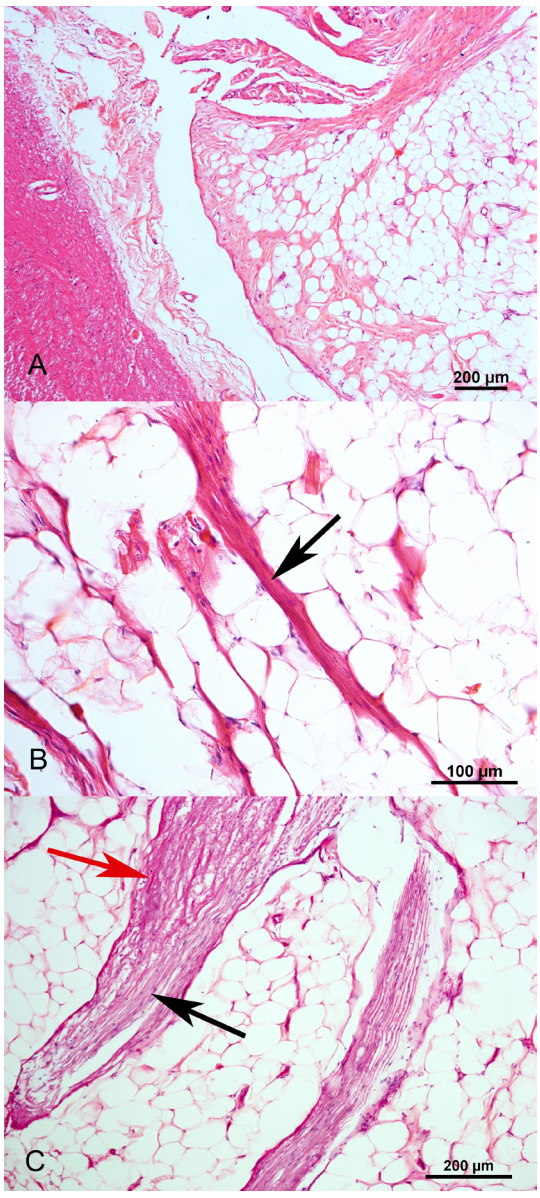

Figure 1 - (A) Normal tissue (left side) and lipomatous hamartoma with fibrous capsule (right side). (B) Skeletal striated muscle cells (arrow) immersed in adipocytes. (C) Nervous tissue inside the lesion displaying degenerated (red arrow) and normal (black arrow) fibers.

lipomatous hamartomas are;however, scarce in the literature, and the cerebellar peduncle is one of the areas lacking a description in veterinary medicine. This type of tumor has been characterized in the third ventricle in BALB/c mice (SASAKI et al., 2012), adjacent to the third ventricle in rats (BRANDER & PARENTES, 1995), cranioventrally in the cerebellum along the fourth ventricle of horses (ANDERSON &KING, 1988), within the right pyriform lobe (SCOTT et al., 2015) and in the cerebellar region in pigs (TURNQUIST & MILLER, 1993).

Several cases reported in humans do not exhibit clinical signs associated with lipomatous hamartoma (BUDKA, 1974). In this regard, the clinical signs observed in this report were not considered the causes of the proliferative lesion. According to BUDKA (1974), the cerebellopontine region in the cerebellar peduncle is the occurrence area in humans, similar to the present case report. In most human cases, hamartomas are mainly formed by well-differentiated adipocytes covered by a fibrous capsule throughout the mass (BUDKA, 1974). Therefore, the findings of this study are in accordance with the histomorphology characteristics of this lesion described in humans.

SASAKI et al. (2012) described mild compression in intracranial lipomatous hamartoma cases in mice. This was also noted herein; although, the structures adjacent to the lesion were histologically preserved, even though the nervous tissue inside the tumor was degenerated (ANDERSON & KING, 1988; SASAKI et al, 2012; BRANDER & PARENTES, 1995). Unlike this case and all others reported in veterinary medicine, SCOTT et al. (2015) reported a mass similar to or compatible with lipomatous hamartoma that severely expanded the right piriform lobe of a dog. Although, TURNQUIST & MILLER (1993) reported smooth muscle fibers associated with adipocytes and bone tissue with hematopoietic cells, the present case report described skeletal striated muscle fibers scattered among adipocytes. Cell composition was in accordance with other authors, who described a lesion formed mainly by well-differentiated adipocytes (BRANDER & PARENTES, 1995; ANDERSON & KING, 1988; SASAKI et al, 2012; TURNQUIST & MILLER, 1993; SCOTT et al., 2015; LUGINBÜHL et al., 1968).

As in the present case report, TURNQUIST & MILLER (1993) reported nerves and the presence of abundant fibrous tissue on the base of the tumor, forming adipose lobes within.

In contrast to SASAKI et al. (2012), who did not describe a capsule around the lesion, BRANDER & PARENTES (1995) reported this feature in part of the lipomatous mass. The lipomatous hamartoma observed herein, however, was entirely encapsulated, corroborating the reports published by ANDERSON & KING (1988) and TUNRQUIST & MILLER (1993).

Reports of intracranial lipomatous hamartoma in animals are rare. This is a congenital lesion formed mainly by adipocytes and may contain other mesenchymal tissues in smaller amounts. Besides being the first report concerning this condition in sheep, the cerebellar peduncle description is the first in veterinary medicine. Little is known about this type of lesion, either due to its rarity antemortem and postmortem neurological exam issues. Although, the observed neurological clinical signs were not correlated to the hamartoma, due to its small size and the absence of compression, the present case report is a contribution to data concerning the affected site and anatomical and histopathological characteristics of this type of lesion that may be neglected or un-diagnosed. Lipomatous hamartoma should be considered a differential diagnosis for proliferative intracranial lesions composed predominantly of adipose tissue in sheep.

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BIOETHICS AND BIOSSECURITY COMMITTEE APPROVAL

No experimentation was performed in this study.

DECLARATION OF CONFLICT OF INTEREST

The authors declare no conflict of interest. The founding sponsors had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.

AUTHORS' CONTRIBUTIONS

All authors contributed equally to the conception and writing of the manuscript. All authors critically revised the manuscript and approved of the final version.

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