NOTE

Undifferentiated Astrocytoma in a Cow

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ABSTRACT. Pathological examination was performed on a case of undifferentiated astrocytoma in a cow, which showed evident symptoms due to disturbances of central nervous system. The hen's egg-sized and well demarcated neoplastic tissue located in the convex part of the right parietal lobe in the cerebrum. Microscopically, the neoplastic cells were pleomorphic, fusiform or polygonal in shape and varied in size. Many cytoplasmic projections and proliferated glial fibers were noted.—Key words: undifferentiated astrocytoma.


Primary tumors of the central nervous system in animals have been considered to be quite rare [2, 4, 7]. But it is certainly not true in dogs especially of brachycephalic breeds, and they are likely to be observed as common as in man [2, 4]. Among them, glial cell tumors are relatively common and reported in dogs and cats [1, 5, 6, 8, 10, 12], but rather few in cattle [3, 11]. Recently we performed clinical and pathologic examination on a case of undifferentiated astrocytoma in a cow, which showed evident symptoms due to disturbances of central nervous system.

The cow was a seven-year-old Japanese Black. She was three months pregnant and weighed about 400 kg. Clinical signs disclosed loss of appetite, normal body temperature, tachypnea, alternating dullness and excitement, and temporary disturbance of consciousness as well as loss of eyesight. Hyperesthesia, forward forced movement, right side rotatory movement were also noted. The cow was emaciated and was slaughtered at 11 days after observation.

Autopsy revealed marked increase in volume of the cerebro-spinal fluid, and no bacteria were detected from the fluid culture. The hen's egg-sized and well demarcated tissue located in the convex part of the right parietal lobe of the cerebrum. The consistency was slightly hard and the surface of the tumor adhered to the dura mater. On the cut face, the neoplasm was yellowish gray or white in colour, and hemorrhagic as well as necrotic lesions were recognized in part. The surrounding parenchyma was markedly compressed and atrophied. The opposite cerebral hemisphere was also compressed but no metastatic lesion was detected. No obvious changes were recognized in the other organs and tissues.

Tissues including brain tumor were fixed in 10% neutral formalin solution, and embedded in paraffin for microscopic examination. Sections were stained with hematoxylin and eosin (H-E). Phosphotungstic acid hematoxylin technic (PTAH), Watanabe's silver impregnation method for nerve fibers, and Cajal's gold sublimate method for astrocytes were also adopted to selected sections. Electron microscopic examination were performed on specimens from cerebral neoplasm by
Fig. 1. Cut surface of the right cerebral hemisphere. The central area of the neoplasm is hemorrhage and necrosis. The lesion is well-demarcated from the surroundings.

Fig. 2. The border area of the neoplasm, compressed white matter (right) are seen. H-E stain, ×40.

Fig. 3. Pseudo-palisade like arrangement of the neoplastic cells. H-E stain, ×100.

Fig. 4. The neoplastic cells are located among the fine fibrillary network. Silver impregnation method, ×100.

Fig. 5. The neoplastic cells are pleomorphic, fusiform or polygonal in shape and varied in size. The nucleus contained 2 or 3 nucleoli, and was oval or polygonal in shape, having a diffuse and scanty chromatin network. H-E stain, ×400.

Fig. 6. Many cytoplasmic projections are evident at another portion of the tumor. PTAH stain, ×400.

routine procedures [9].

Microscopically, the neoplastic cells were pleomorphic, fusiform or polygonal in shape and varied in size. The nucleus contained 2 or 3 nucleoli, and was oval or polygonal in shape, having a diffuse and scanty chromatin network. Many cytoplasmic projections and proliferated glial fibers were seen by PTAH. Multinuclear cells and mitotic figures were frequently found. Vascular proliferation was noted and the neoplastic cells tended to proliferate at the perivascular areas. Necrotic or
hemorrhagic lesions and cysts of various sizes were noted in the central area of the neoplastic tissue. Pseudo-palisade arrangement was obvious around the necrotic area and the nuclei of the neoplastic cells were apparently located within a fine fibrillary network, which were revealed by silver impregnation method. Perivascular radial proliferation of the neoplastic cells were noted at the boundary surface of neoplasm that adhered to the dura mater. The cells were infiltrated into the dura mater and proliferated there. Large or small granules of calcium salts deposited in the lymph vessels, and the small arterial walls thickened by hyalinization were noted in the peripheral zone of the neoplasm. In the brain parenchyma neighbouring the tumor, a few neoplastic cells infiltrated, accompanied by vascularization, hemorrhage and necrosis. Atrophy and disappearance of the nerve cells as well as demyelination were noted. No metastatic lesions were detected in any part of the central nervous system.

Electron microscopically, the neoplastic cells were polyhedral in shape and contained oval or polygonal nuclei. Many rough surfaced endoplasmic reticulum, free ribosomes and glial fibers were observed in the cytoplasm.

From the findings obtained the tumor was diagnosed as undifferentiated astrocytoma according to Cordy’s classification [2]. It would be identical to glioblastoma that Fankhauser [4] referred. As for differential diagnosis, oligodendroglioma could be differentiated from its cellular morphology and arrangement [7]. The clinical signs of cattle affected with undifferentiated astrocytoma had been obscure, however, symptoms observed in the present case may be due to tissue damage and physical pressure induced by growth of the tumor in the cerebral hemisphere, and due to elevated cranial pressure by increase in volume of cerebro-spinal fluid.

REFERENCES

要約

ウシの未分化星状膠細胞腫の1例（短報）：佐藤 繁・石川勇志・大島寛一・宮城共済、仙台家保、岩手大——明らかの中枢神経症状を呈するウシの未分化星状膠細胞腫の1例に遭遇した。症例は黒毛和種、雌、7歳で、右側大脳半球頭頂部に限局する鶏卵大、灰白色の新生物が認められた。腫瘍細胞は多形性で、多数の細胞質突起およびグリア線維を有し、間質性あるいはこれに沿って増殖する傾向が見られた。