Case Report

Mature Ovarian Teratoma in a Cynomolgus Monkey (Macaca fascicularis)

Kazuki Kawano1, Seiji Kojima1, Kimiaki Hirakawa1, Xiuying Yang1, Takao Hori1, Takumi Kuwahara1, Yoshihiro Kamimura1, Shigeru Satake1, Hiroshi Maeda1, Hiroaki Miyajima1, and Ryoichi Nagata1

1Drug Safety Research Laboratories, Toxicological Pathology Group, Shin Nippon Biomedical Laboratories, Ltd., 2438 Miyanoura, Yoshida, Kagoshima 891–1394, Japan

Abstract: An ovarian tumor was observed in a five-year-old, female cynomolgus monkey. The tumor occupied the entire left ovary, and normal ovarian tissue was not observed. The tumor was composed of endodermal, mesodermal and ectodermal cell components with well-differentiated tooth and bone formation. The present tumor was diagnosed as a mature ovarian teratoma. (J Toxicol Pathol 2003; 16: 283–285)

Key words: teratoma, ovary, cynomolgus monkey

Teratoid tumor contains two or more germ layer-derived tissues. Most teratoid tumors develop from germ cells in the gonadal gland, and often occur in the testis or ovary. It is well known that gonadal ectodermal cell-derived teratoid tumor occurs in the retroperitoneum, mediastinum, sacrococcygeal region, cranial base, pineal, and jugular regions.

Generally, ovarian teratoma develops from totipotent germ cells after somatic cell differentiation, and is defined as a tumor composed of various endodermal, mesodermal and ectodermally derived tissues1. Ovarian teratomas usually occur unilaterally and are histopathologically classified into mature (benign) and immature (malignant) ones, most being mature2,3. It has been reported that approximately 30% of all human ovarian tumors are teratomas3, and that animal ovarian teratoma has also been observed in mice at a rate of 0.008–0.23%, and also in dogs, cats, cows, and monkeys4–10. Its frequency in animals varies depending on species and strains; however, reports of ovarian teratomas are rare in monkeys and particularly rare5 in cynomolgus monkeys.

The animal was a five-year-old female cynomolgus monkey used in the lowest dose level group in a general toxicity study performed in accordance with relevant ethical codes applied in our laboratory. Tendencies toward very slight anemia and slight prolongation of activated partial thromboplastin time in hematological examination were noted in this animal; however, no abnormalities were noted in clinical signs, body weight, or urinalysis during the study.

Gross examination revealed that the left ovary was markedly swollen, almost round, approximately 2.5 cm in diameter and 9.13 g in weight. The right ovary, in which no gross lesions were noted, was approximately 0.6 cm in diameter and 0.26 g in weight. The cut surface of the left ovary showed a lobulated tumor mass with cysts. A large portion of the tumor consisted of cysts and a solid region in part. The cysts contained yellowish-brown mucus. The left ovary was fixed in 10% neutral buffered formalin, decalcified with EDTA, paraffin embedded, and 3 to 4 µm thick sections were prepared and stained with hematoxylin-eosin stain.

Histopathologically, the major component of the left ovary was occupied by differentiated bone, cartilage, and tooth (Figs. 1-a, b). In addition, muscle tissue, adipose tissue (Fig. 1-b), nerve tissue (Fig. 1-c), and dermal accessory organs including hair follicles (Fig. 1-d), sweat glands, and sebaceous glands were also noted. Occasionally, epidermis-like stratified squamous epithelium (Fig. 1-e), tracheal epithelium-like goblet cells, and luminal structure lined with simple columnar epithelium with cilia were noted (Fig. 1-f). These tissues were well-differentiated. No metastasis to other organs was found.

A retrospective study performed in this facility revealed ovarian teratoma in two animals. Goblet cells and simple columnar epithelium with cilia, or large cysts lined with keratinized stratified squamous epithelium were found in these animals in which teratomas were not, and hair was
noted in the cysts. Sebaceous glands and cartilage tissue were also noted.

Remnants of normal ovarian tissue including follicles and corpora lutea were noted. In previous cases cystic areas occupied a large portion of the cyst and were thought to be cystic ovarian teratoma, and showed morphologic features that differed from the ovarian teratoma observed in this study.
Ovarian teratoma of varying size and with smooth or somewhat lobulated surfaces is grossly observed. Benign ovarian teratoma is often formed by a large cyst containing hair, keratin, and sebaceous secretion, and teeth or bones have also been reported. As seen in the present case, not only cysts lined by epidermal epithelium in but also other tissues containing dermal accessory organs including clearly differentiated hair follicles and sebaceous glands were observed. It is known that the bone contains bone marrow, and respiratory epithelium, epithelium of the gastrointestinal mucosa, liver, spleen, smooth muscle, myocardium, skeletal muscle, and nerve tissue have also been noted histopathologically. Ovarian teratoma is classified as solid or cystic, and the majority being cystic and referred to as dermoid cysts. Dermoid cysts are benign teratoma composed of dermal tissues. These were caused by a histopathological aberration in single germ layer tissue. They are characterized by the presence of hair and matter retention including lipids, accessory glands in the dermis, and squamous epithelial cysts structurally similar to the dermis. It has been reported that benign cystic teratoma develops bilaterally in the ovaries of cows (zebu cattle). In this case, dermal tissue was noted in the component tissue; however, the cystic area was small, and many examples of multiple tissue and organogenesis other than that of dermal tissue were noted. Human ovarian teratoma is categorized according to maturity. Immature tumor tissue is defined as malignant, whereas mature tumor tissue is defined as benign. As this tumor showed macroscopic and histopathological characteristics of a mature human teratoma, and as tumors in monkey resemble those in humans, it was diagnosed as a mature teratoma of the ovary.

References