Chondrosarcoma in the mammary gland of a bitch: a case report

G. Serin, A. Aydogan

Faculty of Veterinary Medicine, Adnan Menderes University, Aydin, Turkey

ABSTRACT: This report describes the clinical and histopathological findings associated with a mammary chondrosarcoma in a mongrel bitch. The tumour was located in the right caudo-abdominal mammary gland, and was 6 × 8 × 4 cm in size, weighed 200 g and was very firm to the touch. Microscopically, a well differentiated chondrosarcoma, rarely observed in canine mammary gland tumours, was diagnosed.

Keywords: chondrosarcoma; mammary gland; dog

In canine oncology, sarcomas comprise less than 5% of all mammary tumours and are much less common than carcinomas (Lana et al., 2001; Martins et al., 2002). Chondrosarcomas are malignant tumours considered to belong to the sarcoma subgroup and are characterized by the production of neoplastic chondrocytes in a fibrillary matrix (Popovitch et al., 1994). Histologically chondrosarcomas can be divided into the more common myxoid type that are usually associated with the skeleton (most commonly flat bones; Kim et al., 2007) or sinunasal region (Rodriguez et al., 2008), and the less frequently diagnosed extra skeletal chondrosarcomas (Casadei et al., 1991).

The extra skeletal forms of chondrosarcoma are extremely rare in dogs (Meuten, 2002). The cause of these tumours is not known, and they may originate from populations of primitive multipotent mesenchymal cells, which are able to differentiate into cartilage (Koch et al., 2000; Romanucci et al., 2005). Extraskeletal primary chondrosarcoma tumours are reported in the urethra bladder, heart, pericardium, tongue, kidney, liver, abdominal wall, trachea, lungs, pulmonary artery, omentum, subcutaneous and mammary tissues, larynx, intestines, and retroperitoneal space (Patnaik, 1990; Casadei et al., 1991; Albers et al., 1997; Rhind and Welsh, 1999; Martins et al., 2002; Munday and Prahl, 2002; Davis and Holt, 2003; Mellanby et al., 2003; Romanucci et al.,, 2005; Chikata et al., 2006).

Mammary chondrosarcomas are uncommon tumours in canine practice (Popovitch et al., 1994). The mean age of the dogs with extra skeletal chondrosarcomas is about 14 years. These are highly resistant to chemotherapy and radiotherapy and surgical treatment is the only option for curative treatment.

This report describes the clinical and histopathological features of a primary mammary chondrosarcoma in a bitch examined at the Animal Hospital of Adnan Menderes University.

Case report

A 13-year-old, 9 kg female spayed Mongrel dog was referred to the Clinic of Obstetrics and Reproductive Diseases, the Faculty of Veterinary Medicine at the Adnan Menderes University, presenting with masses on the right mammary gland which had been getting bigger for ten months. There was no chemotherapy session or surgery in her history.

In primary examination, her body condition and appetite were normal and body temperature was 38.8°C. No abnormalities were noted regarding her appetite, respiration and pulsation values. On physical examination of the mammary glands, a firm and painless multilobular mass localized on the right caudo-abdominal mammary gland was observed. The maximal diameter was 8 cm and the

temperature of the mass was normal. No pathological discharge from the teats or the ulcerative area was detected on the tumour. During examination of the regional lymph node, it was observed that the right inguinal lymph node was bigger than the others. Following clinic examination, radiologic examination of the pectoral cavity was performed. However, no metastatic area indicative of pulmonary metastases was observed on the ventrodorsal radiography. The clinical stage of this tumour was evaluated to be $T_3N_1M_0$ after clinical and radiological examinations.

For treatment, all glands on the right side were removed with radical mastectomy. Dissociative anaesthesia was applied with 1.1 mg/kg xylazine hydrochloride (Alfazine-Alfasan) and 10 mg/kg xetamine hydrochloride (Alfamine-Alfasan) intramuscularly after premedication with 0.04 mg/kg xtropine sulphate (Atropan-Vetas) subcutaneously. The patient was placed in dorsal recumbency, and the ventral abdomen was aseptically prepared in a standard fashion. Right gland chain numbers 1 through 5 were removed successfully. Postoperatively, antibacterial therapy was applied with 400.000 IU penicillin (Iecilline®; IE Ulagay) daily for five days and an Elizabethan collar was used until the skin sutures were removed. Following clinical and radiological examinations, no pulmonary metastasis or recurrence of tumoral tissue were detected during the two months post surgery.

The tumour was located in the right caudo-abdominal mammary gland, was 6 × 8 × 4 cm in size, weighed 200 g and was very firm to the touch. Half of the cut surface was pinkish-yellow in colour and solitary, another part of the cut surface included cavernous structures with clear yellowish serous fluid content and granular appearance (Figure 1). For histological evaluation, the tissue samples were fixed in 10% buffered formalin solution, processed routinely, 5 µm sectioned, and stained with hematoxylin and eosin (HE).

Microscopically, a well differentiated chondrosarcoma was diagnosed. The tumour had a lobular appearance and was surrounded by a fibrous capsule consisting of compact collagen fibrils. The tumour was observed with multiple chondroblasts in the lacunae. Chondrocytes of various sizes and shapes were irregularly dispersed beneath the fibrous capsule (Figure 2).

Some chondrocytes with large and hyperchromatic nuclei, prominent nucleoli and basophilic cytoplasm were observed while the remaining cells were necrotized. Mitotic figures were uncommon. In addition, no areas displaying features of epithelial or mesenchymal differentiation were seen in this tumour.

DISCUSSION

Mammary neoplasms are the second most common tumour type reported in female dogs, after skin tumours (Hellmen, 1996; Johnston et al., 2001). These tumours are classified according to the World Health Organization, who define tumours derived from epithelial cell types (e.g., adenocarcinomas), connective tissue cell types (e.g., sarcomas or lipomas), or a mixture of cell types (e.g., mixed mammary tumours) (Hampe and Misdorp, 1974). Sarcomas can be subdivided into various groups, including osteosarcomas, fibrosarcomas and chondrosarcomas (Lana et al., 2001).

In veterinary literature, canine extraskeletal chondrosarcomas account for 1% to 13% of all chond-

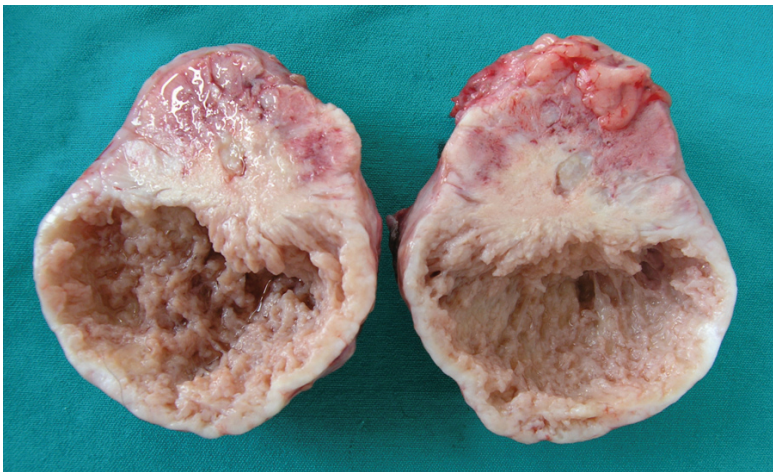

Figure 1. Cut surface of the tumour

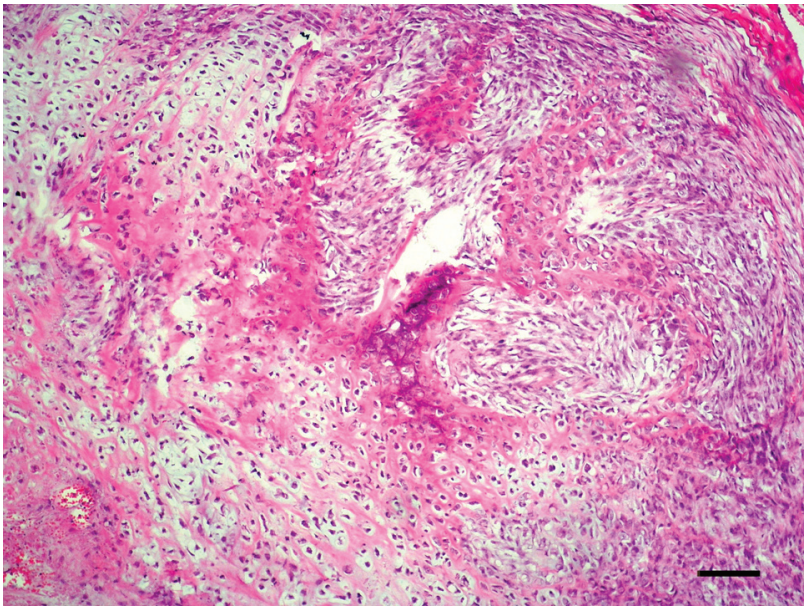

Figure 2. Chondrosarcoma. Chondrocytes of various sizes and shapes were irregularly dispersed beneath the fibrous capsule; HE, bar: 50 μm

rosarcomas (Patnaik, 1990; Popovitch et al., 1994). These tumours have been reported rarely but have been described in a range of tissues. Extraskeletal chondrosarcomas are anaplastic mesenchymal neoplasms that produce a cartilage matrix with no involvement of bone and periosteum. Matrix-producing carcinoma is a very rare breast neoplasm accounting for less than 0.1% of all human breast malignancies (Feder et al., 1999). There are limited reports of canine primary mammary chondrosarcomas in the literature. In a retrospective study of 537 dogs with mammary gland malignant neoplasms (Martins et al., 2002), only one case of mammary chondrosarcoma (0.18%) was reported.

Canine chondrosarcomas tend to grow slowly and have limited metastatic rates ranging from 0% to 20.5% (Davis and Holt, 2003). Despite this, canine mammary sarcomas are considered to have a very poor prognosis (Lana et al., 2001). Pulmonary metastasis and local invasion have not been documented comprehensively in canine mammary chondrosarcomas. Treatment of humans with extra skeletal mesenchymal chondrosarcomas currently consists of radical surgical excision of the tumour. Local recurrence and metastasis are commonly encountered with survival times ranging from 11 months to 10 years (Casaidei et al., 1991). In canine practice, different biological therapy protocols have been performed in a limited number of malignant mammary tumour cases (Brandenburg et al., 2005).

In the present case, a good short-term clinical outcome was observed after surgical treatment. Indeed, no recurrence or pulmonary metastasis of tumoral tissue was observed during the two months post surgery.

REFERENCES

Albers T.M., Alroy J., Garrod L.A., Brown D., Penninck D. (1997): Histochemical and ultrastructural characterization of primary cardiac chondrosarcoma. Veterinary Pathology, 34, 150–151.

Brandenburg U., Neumann S., Reinhart E. (2005): Post-surgical biological therapy of malignant neoplasias in the dog. Praktische Tierarzt, 86, 548–554.

Casadei R., Ricci M., Ruggieri P., Biagini R., Benassi S., Picci P., Campanacci M. (1991): Chondrosarcoma of the soft tissues: two different subgroups. Journal of Bone and Joint Surgery, 73, 162–168.

Chikata S., Nakamura S., Katayama R., Yanagisawa S., Matsuo Y., Yamane I., Takahashi K. (2006): Primary chondrosarcoma in the liver of a dog. Veterinary Pathology, 43, 1033–1036.

Davis G.J., Holt D. (2003): Two chondrosarcomas in the urethra of a German shepherd dog. Journal of Small Animal Practice, 44, 169–171.

Feder J.M., De Paredes E.S., Hogge J.P., Wilken J.J. (1999): Unusual breast lesions: radiologic and pathologic correlation. Radiographics, 19, 11–26.

Hampe J.F., Misdorp W. (1974): Tumors and dyspalasias of the mammary gland. Bulletin of the World Health Organization, 50, 114.

Hellmen E. (1996): The pathogenesis of canine mammary tumors. Cancer Journal, 9, 282–286.

Johnston S.D., Kustritz M.V.R., Olson P.N.S. (2001): Disorders the mammary glands of the bitch, 246–247. In: Johnston S.D., Kustritz M.V.R., Olson P.N.S. (eds.): Canine and Feline Theriogenology. W.B. Saunders, Philadelphia. 592 pp.

Kim H., Nakaichi M., Itamoto K., Yasuho T. (2007): Primary chondrosarcoma in the skull of a dog. Journal of Veterinary Science, 8, 99–101.

Koch B.B., Karnell L.H., Hoffman H.T., Apostolakis L. W., Robinson R.A., Zhen W., Menck H.R. (2000): National cancer database report on chondrosarcoma of the head and neck. Head Neck, 22, 408–425.

Lana S.E., Rutteman G.R., MacEwen E.G., Withrow S.J. (2001): Tumors of the mammary gland, 357. In: Withrow S.J., MacEwen E.G. (eds.): Small Animal Clinical Oncology. W.B. Saunders, Philadelphia, 864 pp.

Martins F., Tamaso E., Guerra J.L. (2002): Retrospective review and systematic study of mammary tumors in dogs and characteristics of the extracellular matrix. Brazilian Journal of Research Animal Science, 39, 38–42.

Mellanby R.J., Holloway A., Woodger N., Baines E., Ristic J., Herrtage M.E. (2003): Primary chondrosarcoma in the pulmonary artery in a cat. Veterinary Radiology and Ultrasound, 44, 315–321.

Meuten D. (2002): Tumors in Domestic Animals. Iowa State Press, Iowa. 788 pp.

Munday J.S., Prahl A. (2002): Retroperitoneal extraskeletal mesenchymal chondrosarcoma in a dog. Journal of Veterinary Diagnostic Investigation, 14, 498–500.

Patnaik A.K. (1990): Canine extraskeletal osteosarcoma and chondrosarcoma. A clinicopathologic study of 14 cases. Veterinary Pathology, 27, 46–55.

Popovitch C.A., Weinstein M.J., Goldsxhmidt M.H., Shofer F.S. (1994): Chondrosarcoma: a retrospective study of 97 dogs (1987–1990). Journal of the American Animal Hospital Association, 30, 81–85.

Rhind S.M., Welsh E. (1999): Mesenchymal chondrosarcoma in a young German shepherd dog. Journal of Small Animal Practice, 40, 443–445.

Rodriguez A.R., Amaya J.O., Cancimansi J.N. (2008): Sinunasal mesenchymal chondrosarcoma grade 3 and mammary gland carcinosarcoma of canines. Clinical and Histopathology Study. International Journal of Morphology, 26, 861–875.

Romanucci M., Bongiovanni L., Petrizzi L., Della Salda L. (2005): Cutaneous extraskeletal mesenchymal chondrosarcoma in a cat. Veterinary Dermatology, 16, 121–124.

Received: 2009–10–08
Accepted after corrections: 2009–11–10

Corresponding Author:

Gunes Serin, DVM, Ph.D., Adnan Menderes University, Faculty of Veterinary Medicine, Department of Obstetrics and Gynaecology, 09016 Isikli, Aydin, Turkey
Tel. +90 256 247 07 00-119, Fax +90 256 247 07 20, E-mail: guneserin@yahoo.com