

# Immunohistochemical and Histopathological Findings of Chondrosarcoma in Mammary Gland of A Dog: A Case Report

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## Summary

Chondrosarcoma is a malignant tumor of chondrocytes and occurs most commonly on the flat bones and the nasal cavity. Mammary chondrosarcoma is an uncommon tumor in canine practice. The aim of present paper is to report a case of mammary chondrosarcoma in a 10-year-old German shepherd bitch. The dog with a mass in her right caudal thoracic mammary gland which grown gradually in 8 months, was referred to the veterinary teaching hospital. The mass and local lymph nodes were resected by complete mastectomy and were sent to department of veterinary pathology for histopathological examination. Macroscopically, the mass was fluctuant containing firm masses in it, totally measuring 5x4x5 cm in diameter. The cross section was yellow and there were many cavernous structures which were filled with grayish fluid. Microscopic examination revealed a mass of large mature cartilage structures with lacunae and chondrocytes and chondroblasts with new forming structures of cartilage. Immunohistochemical investigation revealed that the tumor is negative for Estrogen receptor (ER) expression. According to macroscopic and microscopic investigations chondrosarcoma was diagnosed.

**Keywords:** Chondrosarcoma, Dog, Mammary tumor, Histopathology, Immunohistochemistry

## Bir Köpeğin Meme Bezinde Gözlenen Kondrosarkoma Olgusunda İmmunohistokimyasal ve Histopatolojik İncelemeler: Olgu Sunumu

### Özet

Kondrosarkoma kondrositlerin malignant bir tümördür ve en yaygın olarak yassı kemiklerde ve nazal boşlukta oluşur. Meme kondrosarkomu köpeklerde yaygın değildir. Bu makalenin amacı 10 yaşlı dişi bir Alman çoban köpeğinde meme kondrosarkoma olgusunu tanımlamaktır. Sağ torasik meme bezinde 8 ay süresince büyüme gösteren bir kitleye sahip olan köpek Veteriner Hastanesine getirildi. Kitle ile beraber bölgesel lenf yumrusu total mastektomi ile uzaklaştırıldı ve histopatolojik incelemeler için patoloji anabilim dalına gönderildi. Makroskopik olarak kitle 5x4x5 cm boyutunda, içerisinde sert yapılar ihtiva eden fluktuan bir yapıya sahipti. Kesit yüzü sarı renkli olup içeriği grimsi sıvı ile dolu olan pekçok boşluklu yapılar içermekteydi. Mikroskopik incelemede kitlenin lakuna, kondrosit ve kondroblastlardan oluşan geniş olgun kıkırdak yapısında olduğu belirlendi. İmmunohistokimyasal incelemede kitlenin Östrojen reseptör için negative olduğu gözlemlendi. Makroskopik ve mikroskopik bulgular doğrultusunda kitle kondrosarkoma olarak tanımlandı.

**Anahtar sözcükler:** Kondrosarkoma, Köpek, Meme tümörü, Histopatoloji, İmmunohistokimya

## INTRODUCTION

Chondrosarcoma is malignant tumor of chondrocytes and the flat bones and the nasal cavity is the most common site<sup>[1]</sup>. The cause of chondrosarcoma is unknown, and probably it originates from populations of primitive

multi potent mesenchymal cells<sup>[2]</sup>. In canine oncology, sarcomas comprise less than 5% of all mammary tumors and are much less common than carcinomas<sup>[3,4]</sup>. The rate of metastasis of the tumor ranges from

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0-20.5% [1,5]. Primary chondrosarcoma has been reported in appendicular skeleton, synovium, trachea, larynx, lung, liver, subcutaneous, digit, tongue, kidney, abdominal wall, pulmonary artery, omentum, mammary gland, heart and urethra [2-4,6-11]. In veterinary literature, canine skeletal chondrosarcoma accounts for 1-13% of all chondrosarcomas [1,5]. In a retrospective study in 537 dogs with mammary gland malignant neoplasms only one case of mammary chondrosarcoma (0.18%) was reported [4].

The present paper describes immunohistochemical and histopathological findings of mammary chondrosarcoma in a bitch. This is the first report of mammary chondrosarcoma in Iran, to the best knowledge of authors.

## CASE HISTORY

A 10 year-old female German shepherd dog was referred to veterinary teaching hospital at the university of Tehran with history of a mass in her right caudal thoracic mammary gland in July 2011. The mass and local lymph nodes were resected by complete mastectomy and were sent to department of veterinary pathology at the university of Tehran for histopathological examination. The mass was fixed in 10% buffered formalin, embedded in paraffin wax, sectioned at 5 µm and stained with haematoxylin and eosin (H&E) method. For immunohistochemical investigation monoclonal antibodies raised against human ER-α was used using the streptavidin-biotin-peroxidase technique. 4 µm -thick section on poly-L-lysine coated glass slide was deparaffinised in xylene and rehydrated in alcohol. Heat-induced epitope retrieval was performed by immersion in boiling citrate buffer pH 6.0 for 2 min after reaching maximum pressure in a pressure cooker. Endogenous peroxidase was quenched by immersion in 3% H<sub>2</sub>O<sub>2</sub> in methanol for 10 min. The monoclonal mouse anti-human ERα (clone 1D5; Dakocytomationman, Denmark) diluted 1:50, was used with a streptavidin - biotin - peroxidase complex technique (LSAB Peroxidase Universal kit, Dakocytomation). All further IHC

staining procedures were according to the instructions of the test kits. Then section was counterstained with Mayer's hematoxylin. For positive control human breast carcinoma was used. Negative control was obtained by omitting the primary antibody.

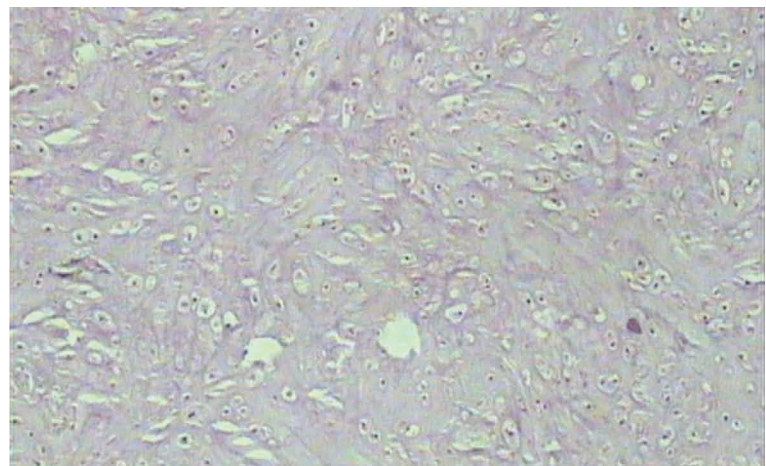
Macroscopically, the mass has a fluctuant steadiness, several parts with firm and other sites with soft consistency and measuring 5×4×5 cm in diameter. The cross section was yellow and many cavernous structures were existed which grayish fluid were filled them.

Histopathological evaluation of the tumor revealed two distinct areas; First part which was located in the center of the mass was composed of large mature cartilage structures with lacunae and chondrocytes (Fig. 1 and 2). Chondrocytes were in various sizes and shapes that indicated pleomorphism but tumoric giant cells did not shown. Some chondrocytes had large and euchromatic nuclei, prominent nucleoli and basophilic cytoplasm and others had small and dark nuclei with scant cytoplasm. In second part, which was in periphery, there were multiple new forming cartilages with chondroblastes. Mitotic figures were 0 to 2 per high- power field and also invasion to stroma was detected. IHC evaluation revealed that, this tumor was not expressed ERα (Fig. 3).

## DISCUSSION

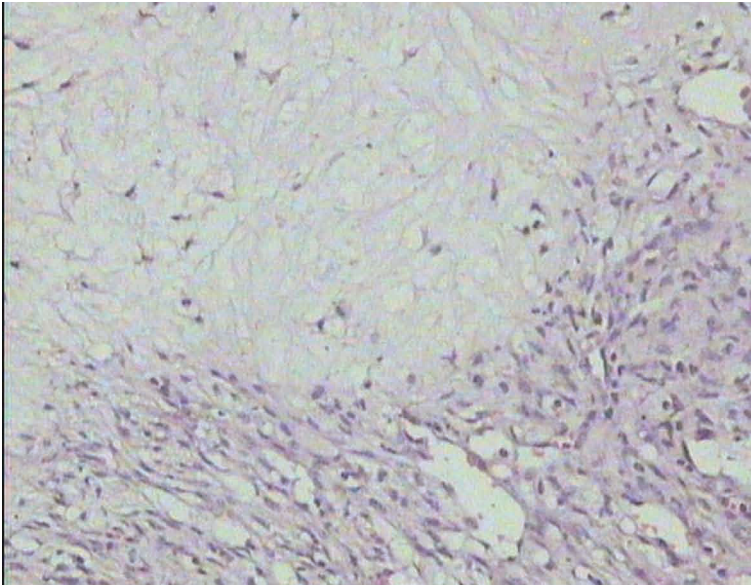
Extra skeletal osteosarcoma and chondrosarcoma are very rare in human beings and domestic animals. Extra skeletal chondrosarcoma is an anaplastic mesenchymal neoplasm that produces a cartilage matrix with no involvement of bone and periosteum. This tumor can arise from many different tissues [12]. In human, extra skeletal chondrosarcoma is more common in the extremities than in the visceral organs [13].

Chondrosarcoma in mammary gland is often multi-lobulated. The neoplastic cells at the periphery of the lobules are small with round hyperchromatic nuclei. The



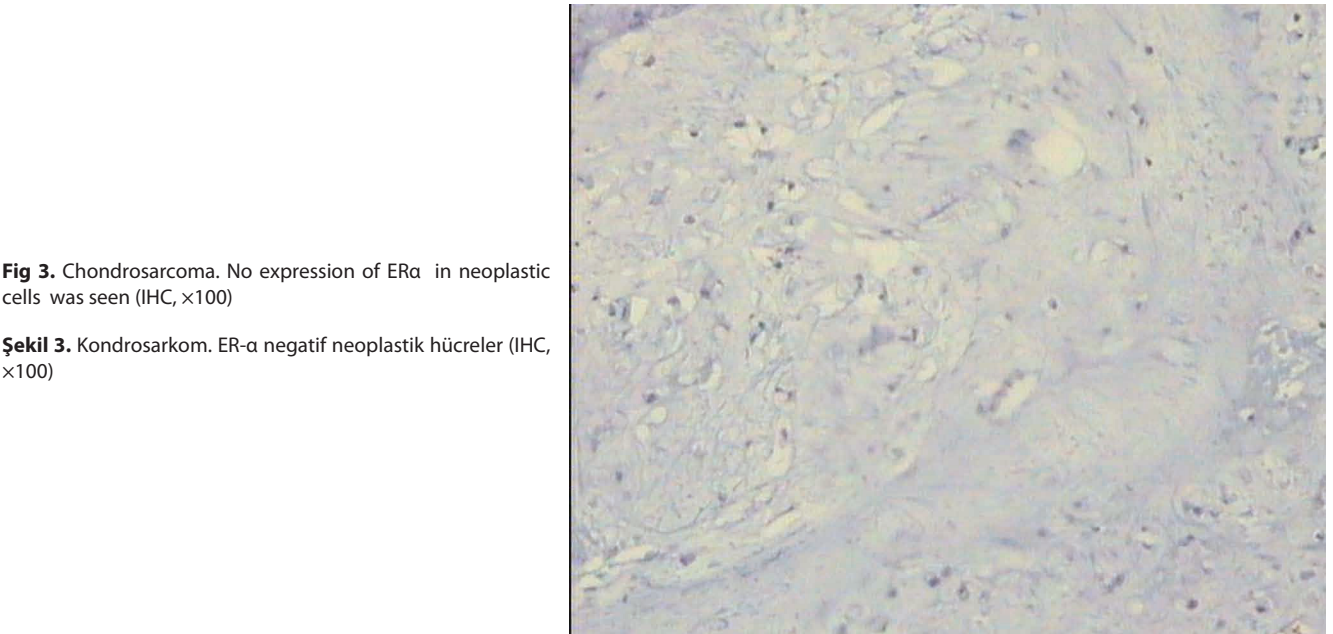
**Fig 1.** Chondrosarcoma. Note to cartilage structure with lacunae and chondrocytes (H&E, ×100)

**Şekil 1.** Kondrosarkom. Lakuna ve kondrosit ile karakterize kıkırdak yapısı (H &E, ×100)



**Fig 2.** Chondrosarcoma. Note to cartilage structure with chondrocytes in center of slide and new formation of cartilage with chondroblasts in peripheral part (H&E, ×100)

**Şekil 2.** Kondrosarkom. merkezde kondrosit ve ve periferde kondroblastlardan oluşan kıkırdak yapısı (H & E, ×100)



**Fig 3.** Chondrosarcoma. No expression of ERα in neoplastic cells was seen (IHC, ×100)

**Şekil 3.** Kondrosarkom. ER-α negatif neoplastik hücreler (IHC, ×100)

nuclear outline is often irregular, and nucleoli are prominent [14]. The mentioned histopathologic characteristics are in agreement with this case. According to the literature, number of mitoses and basophilic chondroid matrix are variable and are more common in less well-differentiated neoplasm. In this case, there were rare mitotic figures. Also the chondroid matrixes were in both forms, mature and immature, so this case was accounted for moderately differentiated.

Previous studies demonstrated, nearly all histologically normal canine mammary tissues contain ER as well as PR and ER expression remains high in canine dysplasia and benign tumors, with significant decreases in carcinomas [15]. In the present study immunohistochemical evaluation demonstrated that ER-α, was not expressed in chondrosarcoma.

ER-positive human breast tumors are associated with an improved prognosis, but studies with long-term follow-up have suggested that ER-positive tumors, despite having a slower growth rate, do not have a lower metastatic potential. Lack of ERα expression in the primary tumor was associated with the presence of histologically proven lymph node metastases [16]. But in present case no evidence of lymphatic metastasis was existed. Negative staining was not likely to be attributed to an experimental artifact because ERα immunoreactivity was seen in nonmalignant epithelial nuclei present in the same specimen.

Although a board age range is reported, the most common in middle aged to older dogs, the mean age of affected animals varying from 5.9 to 8.7 years [17]. The mean age of the dogs with extra skeletal chondrosarcomas is about 14 years [5].

Canine mammary sarcomas are considered to have a very poor prognosis. Chondrosarcoma in bitches tends to grow slowly and has limited metastatic rate [8]. In the few reports of metastatic chondrosarcomas, the lung is the most common site, with metastasis occurring 3 weeks to 17 months after surgical excision [8]. In another study of canine chondrosarcoma case series, local recurrence existed in 23% of cases, with a mean recurrence time of 143 days. The incidence of local recurrence was higher when complete surgical excision was not possible [8]. In a report of Serin and Aydogan [2], for treatment of mammary chondrosarcoma in dog, no recurrence or pulmonary metastasis of tumoral tissue was observed during the two months postsurgery. Post surgery assessment was not possible because there were not any information about the clinical status of this case.

According to immunohistopathologic and histopathologic characteristics, canine mammary chondrosarcoma was diagnosed. This case appeared to be the first reported case of chondrosarcoma in mammary gland of in a dog in Iran.

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