Journal of Animal and Veterinary Advances 9 (10): 1472-1475, 2010
ISSN: 1680-5593

Case Report of Malignant Mammary Neoplasia in Mexican Gray Wolf (*Canis lupus baileyi*)

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Abstract: We report the presence, excision and diagnosis of malignant mammary neoplasia from a 14 years old female Mexican gray wolf (*Canis lupus baileyi*). Through auscultation we observed and palpated three neoplasia in the mammary gland. We also noted anorexia, lethargy in the animal with rigidity and lameness in the posterior end of the body. We surgically removed the tumors and took samples for histopathological studies which revealed a mixed mammary tumor composed of infiltrating ductal carcinoma with centers of mucinous, epidermoid and chondrosarcoma (chondrosarcoma carcinoma).

Key words: Malignant mammary neoplasm, mammary carcinoma, Mexican gray wolf, tumor, anorexia, lameness

INTRODUCTION

The Mexican gray wolf (*Canis lupus baileyi*) is an endangered species and recovery efforts involve captive populations which currently number approximately 300 individuals distributed throughout 42 zoos and 6 natural areas in the United States and Mexico. One of these natural areas, the Michilía Biosphere Reserve is home to 23 captive wolves: 10 males and 13 females (Siminski, 2005) that are held in three exclusions of one-half hectare each. Each enclosure is fenced and is equipped with security features that prevent escape. The reserve covers 420 km^2 of the southeastern part of the state of Durango, Mexico in the counties of Suchil and Mezquital. The altitude ranges from 7.216-9.348 feet above sea level and the area extends between 23°30' and 23°25' North latitude and 104°21' and 104°15' West longitude (Galindo and Weber, 1998).

One of the greatest worries of institutions dedicated to the preservation and recovery of the Mexican gray wolf is sickness that compromises the wolves health and may lead to death. Thus, preventative medicine programs are essential to the success of any captive breeding program. As such, the wolves in the Michilia Biosphere Reserve are attended year-round with their care including immunizations and de-parasitizing. Nonetheless, it is important to note that their lives and diet in an enclosure are considerably different from what they would be in the wild. Wolves are occasionally wounded from fights with other individuals and older animals sometimes develop tumors in regions of their bodies that must be analyzed and at times removed from the body.

Although, tumors in mammary glands of domestic carnivores are well documented, their occurrence is rare in wild animals and information on the latter is scarce (Janovsky and Steineck, 1999). We report the presence, excision and diagnosis of malignant mammary neoplasia from a captive female Mexican gray wolf (registration number 160; Siminski and Spevak, 2007) in the Michilia Biosphere Reserve.

CASE REPORT

The inflammation of the mammary gland of wolf #160 was discovered during routine checks. The growth rapidly increased in size and symptoms of anorexia, lethargy, along with lameness and rigidity in the posterior end of the body were soon evident.

Auscultation and palpation revealed three neoplasia in the mammary glands located between the third pectoral nipple and the first left lateral inguinal nipple; to the side of the third left pectoral nipple and between the third pectoral nipple and the first right inguinal nipple (Fig. 1).

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Fig. 1: Location of tumors in mammary glands

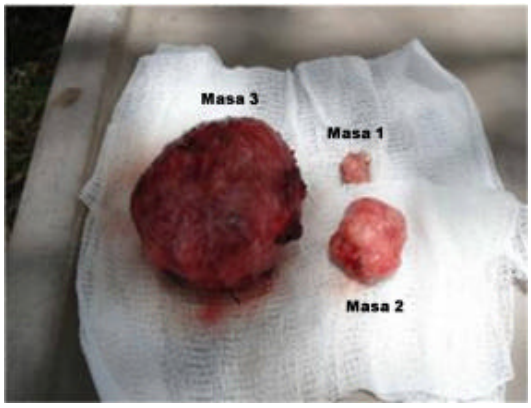

Fig. 2: Tumors extracted from the mammary glands of the Mexican gray wolf. The largest nodular mass measured 7×6×4 cm and the smallest 1.5×1.3 cm

We prepared an area outside the fenced enclosure as the site for the surgical procedure. We gave an intramuscular anesthetic injection of 1.5 mL of a mix of 1 mL ketamine and 2 mL acepromazine and continually monitored reflexes and vital signs during sedation. We laid the wolf on her side, disinfected the skin surface with povidine-iodine allowed the area to dry and removed the masses by electrocautery. We incised the first two masses and cauterized the blood vessels that fed the area from the segmented lateral abdominal vessels and the iliac circumflex vessels, removed the tumors and sutured the wound with catgut caliber 00. To remove the third mass which measured 7×6×4 cm (Fig. 2), we injected another 1.5 mL dose of the ketamine-acepromazine mix as we noticed a slight loss of the sedative effect in the patient and we injected 5 mL of adrecaine in different places at the base of the tumor in order to extract it painlessly. We

Fig. 3: Post-operative recovery of the wolf

sutured the wound with catgut and silk 00. We disinfected the area with povidine-iodine again at the end of the procedure which lasted approximately 1 h and 40 min and the wolf awoke from sedation 1 h after surgery (Fig. 3). We placed the samples in glass jars with 10% formaldehyde and transported them to Durango's General Hospital for pathological analysis.

RESULTS AND DISCUSSION

The rapid increase in inflammation of the mammary gland and symptoms observed coincide with the development of mammary cancer in dogs: abnormal inflammation that persists over time or continues to grow, anorexia, weight loss, apathy, rigidity in some part of the body (McCarthy *et al*., 2003). We took the sample for histopathology analysis from the third tumor (Fig. 2) which was superficially smooth. Once we cut the mass, we noted its hard consistency with mostly solid grayish areas and another zone of mucous membrane like consistency and a light green color (Fig. 4).

Laboratory analysis confirmed the diagnosis of Malignant Mammary Neoplasia (MMN) composed of infiltrating ductal carcinoma with centers of mucinous, epidermoid and chondrosarcoma (metaplastic carcinoma). The finding that the tumor was mixed is similar to a study reported by Wilson and Fowler in which they identified four different histological types in one individual. It has been observed in female dogs that less differentiated tumors have a greater chance of negatively effecting hormonal receptors (Chun and Garret, 2005; Valladares *et al*., 2007). The mixed mammary tumor is the most commonly identified neoplasm in domestic dogs and malignant tumors often develop from benign masses. Approximately 70% of dogs with mammary neoplasia have

Fig. 4: Mass #3 with a smooth outer surface and hard consistency

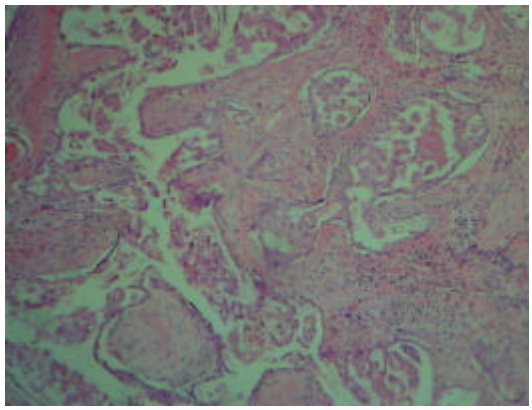

Fig. 5: Infiltrating canalicular carcinoma

mixed type tumors but 50% of these coexist with malignant tumors of different types (Fig. 5 and 6). Niemand found that the carcinomas were characterized by rapid growth and formation of metastasis but above all for the outer covering that can be slightly displaced shows signs of edema and is parchment like which coincides with the observations in which the initial tumor grew extraordinarily fast and two more masses appeared within 30 days. The age of the wolf (14 years) placed her in the highest category of mammary cancer risk. McCarthy *et al.* (2003) report that mammary gland cancer is the second most common type of neoplasia in canines and that it most often appears in senile bitches and 52% of all neoplasia occur in individuals >10 years; 40-50% of which are malignant.

The size of the two larger tumors and the possibility of metastasis to other organs leave us with a conservative prognosis for the subject. Chun and Garret (2005) mention that the initial prognosis depends on the size of the tumor

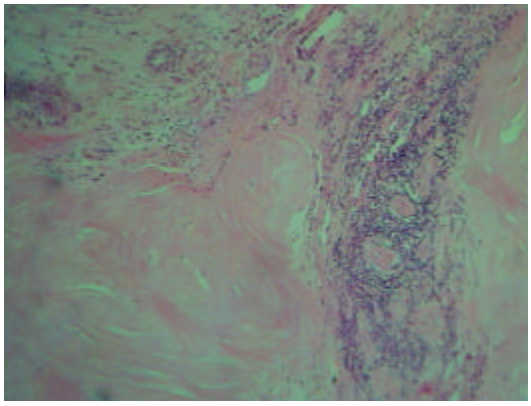

Fig. 6: Infiltrating canalicular carcinoma and chondrosarcoma (metaplastic carcinoma)

at time of diagnosis. The two tumors that were <2 cm in diameter suggest a survival time of approximately 3 years whereas tumors >3 cm in diameter suggest 4-6 months survival. The most effective therapy for any type of neoplasia is oncological surgery as soon as possible and the excision must be complete in order to prevent recurrence or metastasis. In such cases, Niemand and McCarthy *et al.* (2003) recommend total extirpation of the chain of mammary tissue in which the tumors were found due to the probability of lymphatic and vascular metastasis which is more likely in a partial extirpation.

However, in this case we choose to only remove the masses given the following circumstances: age of the wolf, lack of laboratory studies, lack of clinical studies, lack of a surgeon experienced in such a procedure, very large bilateral incisions, lack of medication and material for such a procedure, lack of an isolation cage for post-operative care and lack of staff to carry out post-operative care. The principal objective for the surgery was to improve the animal's quality of life.

CONCLUSION

We report the case of oncological surgery to remove three neoplasia from the mammary gland of an adult she-wolf. Histopathological analysis of samples of the masses confirmed the diagnosis of Malignant Mammary Neoplasia (MMN) with infiltrating ductal carcinoma.

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