

Acknowledgement

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Naimul Hasan

The Author

Abstract

Osteosarcoma is an aggressive tumor and it can be assumed to have spread by the time it is first diagnosed; there is no possibility of preventing spread. That said, how well treatments can be expected to work depend on whether or not the tumor spread has progressed so as to be visible. Because osteosarcoma spreads to the lungs as one of its first stops, chest radiographs are important in checking for visible tumor spread. If there is already visible tumor spread at diagnosis, these changes what treatments are recommended. Some specialists recommend nuclear imaging of the skeleton to identify any spread to other bones, which might also alter recommendations; however, this form of imaging is not readily available. We received the dog in our hospital on 5/11/2022 with a history of leg fractures. It was brought here because of no improvement in previous treatments. Based on x-rays and various blood test results, it was suspected to be osteosarcoma, but a follow-up FNAC test and chest x-ray were advised to confirm. FNAC test report can tell if the disease is actually osteosarcoma. If osteosarcoma is confirmed, treatment other than surgery is unlikely to work.

Key Words: Osteosarcoma, X-Ray, Nuclear imaging, FNAC test

Chapter 1: Introduction

Osteosarcoma (OSA) is an aggressive neoplasm of the bone that is characterized by the production of osteoid¹. In canines, OSA accounts for 85% of tumors that arise in the bone and has an incidence rate of 13.9/100,000 per year, compared to 1.2/100,000 per year in humans^{2,3}. Large breed (>40 kg) dogs that are middle-age and older are most affected, with a median age at diagnosis of 7 years⁴. Most cases present in the appendicular skeleton, with the forelimb being more commonly impacted than the hind limb. Dogs often present with lameness, swelling at the site, and pain. Diagnosis is based on a physical examination and radiographs of the lesion. Pre-operative histological analysis of the lesion offers a definitive diagnosis and can be performed on bone biopsies obtained through open incisional, closed needle or trephine biopsy techniques^{1,5}. However, this procedure is quite invasive and increases the risk of pathological fracture. As such, fine needle aspirate of the bone lesion offers a less invasive diagnostic alternative^{6,8}. The initial work-up also involves thoracic radiographs to determine the presence of lung metastasis⁹.

The reason why a particular pet may develop this, or any tumor or cancer, is not straightforward. Very few tumors and cancers have a single known cause. Most seem to be caused by a complex mix of risk factors, some environmental and some genetic or hereditary. Osteosarcomas appear to affect large breed dogs more commonly than the small breeds. Reported predisposed breeds include Boxer Dogs, Doberman Pinschers, Golden Retrievers, German Shepherd Dogs, Great Danes, Great Pyrenees, Greyhounds, Irish Setters, Irish Wolfhounds, Labrador Retrievers, Rottweiler, Saint Bernards, and Weimaraners.

Osteosarcoma is very painful. If your dog has an osteosarcoma of the limb (appendicular osteosarcoma), lameness or a distinct swelling may be noted. Your dog may be more lethargic, have loss of appetite, and be reluctant to walk or play due to pain caused by the tumor on the bone.

Most dogs with osteosarcoma have lameness of a limb. Swelling is usually noted where the tumor has grown, and the area will be warm to the touch due to a tremendous amount of

inflammation. Your veterinarian will take X-rays of the region. Osteosarcomas appear lytic (meaning pieces of bone are missing) or 'moth-eaten' due to the loss of normal bone tissue. Fractures can be present if the bone has weakened enough.

Once a lesion is suspected, a more definitive diagnosis may be obtained by a fine needle aspiration. This involves taking a small needle with a syringe and suctioning a sample of cells directly from the lesion and placing them on a microscope slide. A veterinary pathologist then examines the slide under a microscope. This is performed under sedation. If this procedure is not diagnostic, a bone biopsy may be warranted. In most cases, lytic bone lesions found on X-rays are indicative of either an infectious or malignant process and further diagnostics are always recommended.

Osteosarcoma in dogs is extremely aggressive. At the time of diagnosis, about 90-95% of dogs will have micro metastasis, meaning the cancer cells have already spread elsewhere even though they are not detectable. Therefore, staging (searching for potential spread to other locations in the body) is always recommended in dogs with osteosarcoma. This may include blood work, urinalysis, X-rays of the lungs, and possibly an abdominal ultrasound. If any lymph nodes are enlarged or feel abnormal, further sampling may be pursued to determine if spread is present.

Without evidence of spread, the primary goal is local tumor control. This typically involves amputation of the affected limb. Though this is unsettling for many dog owners, most dogs do very well after amputation. Surgery is almost always pursued as long as it is a safe and viable option.

Chemotherapy is nearly always pursued post-surgery to help control the disease for as long as possible. Other treatment options may also be available, including certain forms of radiation therapy.

Chapter 2: Case Presentation

2.1: Clinical history

The case was discovered during a pet hospital placement. It was a **German shepherd** named **Bella** and it was 7 years old. The body weight was **39 kg** and it was a **female** dog. 2 months before being brought to the hospital, the dog developed pain in his front right leg and at the same time developed an infection in his other leg. The dog's owner somehow forgot about the painful leg for about more than one month while treating the infection. He thought he would treat the painful leg after recovering from the infection. After recovering from the infection, he first took the dog to a private veterinarian and eventually brought it to **Teaching and Training Pet Hospital and Research Centre, Purbachal, Dhaka.**

2.2: Diagnostic procedure

After she was brought to the hospital, after hearing her previous history, her body temperature and dehydration level were first checked. Then the affected area is X-rayed. As can be seen on X-ray, **calcium deposits** have formed a **callus** in the affected area. It was not really possible to arrive at a diagnosis just by looking at the X-ray report. Due to which she is asked to do some more tests. There was **Blood serum profile for Dog**, where **Bilirubin** value was somewhat **high 0.7mg/dl**, **Urea** value was **high 41.9mg/dl** and **Creatinine** value was also **high 2.05mg/dl**. In Serological test report **C-Reactive Protein (CRP)** value was **24mg/L** where the reference value is **<0.6mg/L**. In Immunological test report **TSH** value was **1.59ng/ml** where the reference value is **<0.6ng/ml**. After reviewing all the test reports we came to a conclusion that the disease was more likely to be **Osteosarcoma**. Later she was asked to undergo **FNAC test** to become conformable.

2.3: Treatment protocol

The dog has to go through various veterinary treatments from the beginning. Since the doctors were not convinced about the disease from the beginning, most of the doctors gave her symptomatic treatment. On **8/9/22** she started her first treatment and was started on **Prednisolone** and **Omeprazole**. Antibiotics were suggested on **10/9/22** and it was **Ceftriaxone**. After running these medicines for several days without seeing any significant improvement, she was later referred to another specialist doctor. He saw the x-ray report and suggested some **antibiotics, antihistaminic**. As there was no improvement even within 1 week, the dog was brought to **Teaching and Training Pet Hospital and Research Centre** in Dhaka on **5/11/22**. After another x-ray and several blood tests, **Clindamycin** was given for 1 week and a surgeon was advised.

2.4: Response to treatment

Since the previous doctors had given only symptomatic treatment, the dog had not improved appreciably with this treatment. None of the above medicines could break the calcium callus but the condition of the affected area remained the same without worsening. Later, after seeing the surgery specialist, he gave some temporary medicine, but if osteosarcoma is confirmed through FNAC test, then there is no other way except **surgery** and **chemotherapy**.

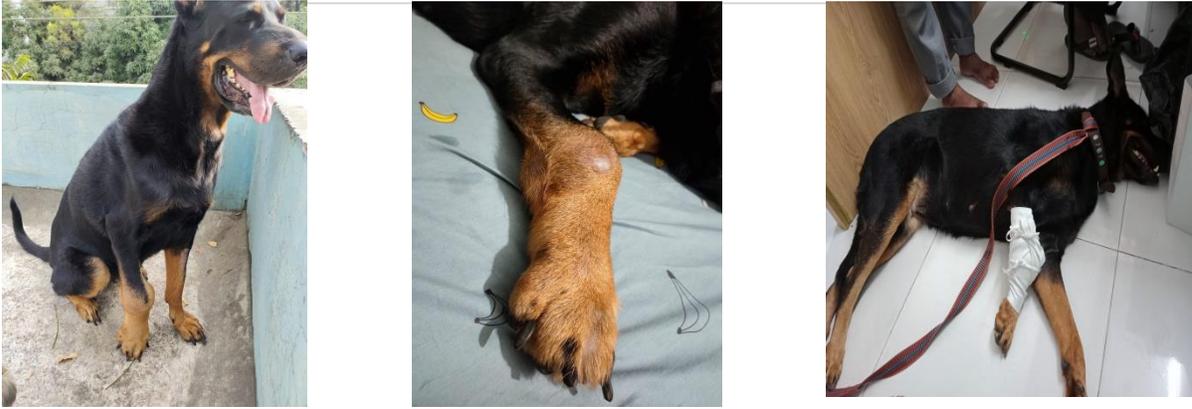


Fig 1: Affected area of the dog



Fig 2: X-Ray film of affected area

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Haematology Report for Dog

Owner's Name: Sayed Bin Masud
Pet's Name: Bella
Age: 08 Yrs
Sex:
Breed:
Registration No: 113
Date: 07-11-22

Test Name	Result	Reference Value
Hemoglobin (Hb%)	11.3 g/dl	12.3 - 19.0 g/dl
Total WBC Count	15,400 /cumm	6,000-17,000
Neutrophils	36 %	45 - 72
Lymphocytes	48 %	10 - 40
Monocytes	10 %	01 - 09
Eosinophils	00 %	01 - 08
Basophils	00 %	00 - 01
RBC Count	6.55 m/l	5.7 - 8.5
HCT / PCV	41.8 %	35.0 - 55.0
MCV	56.3 fl.	60.0 - 75.0
MCH	27.8 pg	27.5 - 33.2
MCHC	34.2 g/dl	32.5 - 37.0
Platelet count	3,09,000 /cumm	1,75,000 - 5,00,000

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MedCare
THE CARE IS US

Report Date: 07/11/2022
Sample Collection Date: 06/11/2022
Species: Dog
Patient Name: Sayed Bin Masud
Age: 8.5 Year
Sex: Male
Ref Doctor: Saif

Serological Test Report

Investigation	Results	Unit	Reference value
C-reactive Protein (CRP)	24	mg/L	<6.0

Note:
1. Please correlate with clinical findings.
2. The sample was collected by the owner and send to us for test. The shaking during the transportation, method of preservation may affect after the test result.

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AniMedCare
LEAVE THE CARE TO US

Report Date: 07/11/2022
Sample Collection Date: 06/11/2022
Species: Dog
Patient Name: Sayed Bin Masud
Age: 8.5 Year
Sex: Male
Ref Doctor: Saif

Immunological Test Report

Test name	Result	Unit	Ref. Value
Total Tri Iodothyronine (T3)	0.45	ng/ml	0.45-1.7
Total Thyroxine (T4)	37.87	nmol/L	27.6-88.3
Free Thyroxine (FT4)	1.00	nmol/L	0.82-0.10
TSH	1.59	ng/ml	< 0.60

Note:
1. Please correlate with clinical findings.
2. The sample was collected by the owner and send to us for test. The shaking during the transportation, method of preservation may affect after the test result.

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Fig 3: Report of different test

Chapter 3: Discussion

Osteosarcoma is a malignant tumor of the bone. This cancer has the same appearance as human pediatric osteosarcoma¹⁰. Osteosarcomas are tumors that arise from the abnormal production of cells that create and break down bone (called osteoblasts and osteoclasts, respectively)¹¹. The long bones (arms and legs) are the most commonly affected, though bones such as the jaw, hips, or pelvis may also be affected. Osteosarcoma can also affect non-bony tissues, including the mammary glands, spleen, liver, and kidneys. This is called extra skeletal osteosarcoma¹².

Treatment for canine OSA involves removal of the primary tumor through either limb-spare or limb amputation surgery¹³. Patients that undergo surgery alone have a short median survival time of 101–177 days (~6 months) due to the development of lung metastases, the most common site of OSA metastasis¹⁴.

Since the dog we're working with in the study didn't show significant improvement after a lot of symptomatic treatment from the start, it means there's a disease at the affected site that we haven't yet confirmed. Later, if any cancer cells are found with the affected area through the FNAC test, then we will confirm whether the disease is osteosarcoma, and if it is osteosarcoma, the affected leg may have to be amputated through surgery.

Chapter 4: Conclusion

Osteosarcoma (OSA) is the most common primary bone tumor in dogs and cats. Approximately 80-85% of all canine skeletal tumors are diagnosed as osteosarcomas. Although the exact etiology is unknown, there has been some evidence that derangement of bone growth or differentiation of new bone at the long bone metaphysis may be to blame. They are locally invasive and highly metastatic which makes them particularly hard to manage.

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Biography

I am Naimul Hasan, son of Anwar Ullah and Selina Akter. I am from Chhagalnaiya, Feni. I passed secondary school certificate examination (S.S.C) in 2013 (G.P.A -5.00) from Chhagalnaiya Govt. Pilot High School and higher secondary certificate examination (H.S.C) in 2015 (G.P.A -4.83) from Moulavi Shamsul Karim College, Chhagalnaiya, Feni. I am a student of 22nd batch and now an intern student under the Faculty of Veterinary Medicine in Chattogram Veterinary and Animal Sciences University, Khulshi, Chattogram. In the future I would like to work in the field of Medicine.