

# Canine Osteosarcoma

*A PowerPage Presented By*



Osteosarcoma (OSA) is the most common primary bone tumor in dogs. Its most common form affects the appendicular skeleton of large or giant breed dogs; however, it can also affect the axial skeleton as well, which occurs more frequently in smaller dogs. In dogs, it is a locally and metastatically aggressive disease that is very similar to the disease's human form. This PowerPage will focus on the more common appendicular form with a brief review of the axial skeleton form of the disease.

## Key Points

- Most commonly occurs in **large and giant breed** dogs in the **metaphyseal** regions of the appendicular skeleton
  - **Distal radius**, proximal humerus, distal femur, proximal tibia (“away from the elbows and toward the knees”)
- Can present for chronic progressive lameness or acute lameness after an inciting incident such as jumping off the couch or out of the car
- **Amputation** of an affected limb is the most effective way to eliminate pain but is considered palliative as 90% of dogs will eventually develop metastasis
- Metastasis most commonly spreads to the **lungs** but can occasionally occur in lymph nodes or other bones
- Chemotherapy can help extend median survivals to 10-12 months

## Diagnostics

### Limb radiographs

- Classically a lytic and productive lesion at the metaphysis of the bone
- A diaphyseal lesion should raise red flags for the lesion potentially being metastatic from a primary tumor from somewhere else in the body
- Do not cross joints into adjacent bones



Figure 1. Lateral radiograph of a productive and lytic osteosarcoma lesion of the distal radius. Image courtesy of DVM Insight.

### Fine needle aspirate cytology

- Aspirate the center of the lesion
  - Aspirates of the periphery often result in “reactive bone”
- Use ultrasound guidance to help insert the needle into cracks of the cortex
- Warn the owner about the possibility of pathologic fracture with aspiration or biopsy

### Biopsy

- May be required for a definitive diagnosis in equivocal cases

### Thoracic radiographs

- **Pulmonary metastasis** visible in less than 10% of cases at the time of diagnosis but will develop in the future in most cases
  - Visible pulmonary metastasis portends a poor prognosis and therefore must be performed prior to treatment

### Bone scan or nuclear scintigraphy

- Used to find or rule out suspected bone metastasis
- Technetium-99–hydroxymethylene diphosphonate binds to areas of active bone and is detected in imaging
- Sensitive, but poorly specific
  - Increased uptake can occur with bone tumors, arthritis, fractures, or osteomyelitis
- Alternatively, full body radiographs can be performed

### Bloodwork

- Elevation in **alkaline phosphatase** on a chemistry panel is associated with a worse prognosis

## Treatment

### Surgery

- **Amputation** is the most effective way to alleviate pain of bone destruction
  - Palliative as most dogs will develop metastasis in the future
- Limb-sparing procedures
  - Surgical removal of the bone tumor with replacement of a prosthetic at the ostectomy site
  - Also considered palliative
  - High rates of complications: **chronic resistant infections**, tumor recurrence, failure of surgical constructs
  - Expensive and limited to experienced surgeons

### Radiation therapy

- Can be effective in palliating the pain of bone tumors in up to 75% of cases, for about 2-3 months
  - No detectable improvement in pain in 25%
- Pathologic fractures may be more likely to occur if pain is well controlled and use of the limb is increased

### Chemotherapy

- Proven to extend survivals over surgery alone
- Chemotherapy protocols mostly consist of a platinum drug (**cisplatin or carboplatin**) as a single agent or in conjunction with **Adriamycin** (doxorubicin)
- Generally thought not to be effective if macroscopic disease is present
- **Bisphosphonates** (pamidronate) are osteoclast inhibitors that can help palliate pain in patients where surgery is not an option

## Prognosis

### Median survival times

- Amputation alone: 4-6 months
- Surgery (amputation or limb spare) with chemotherapy: 10-12 months
- Presence of macroscopic metastatic disease: 1-3 months

## Axial osteosarcoma

- Make up 25% of all OSAs and occur more commonly in small- or medium-sized dogs compared to appendicular OSA
- Common locations: mandible, maxilla, scapula, ribs, spine, pelvis



- The mandible has a better prognosis compared to all other sites
  - 70% 1-year survival with surgery alone
- Other locations generally thought to have aggressive clinical courses similar to the appendicular disease

## References

Withrow, S. *Withrow & MacEwen's Small Animal Clinical Oncology* 4th ed. 2007, pp 540-567.

