

Osteosarcoma

(Bone Cancer)

Basics

OVERVIEW

- Most common primary bone tumor in dogs
- “Appendicular” is an adjective relating to the limbs; “axial” is an adjective relating to the head and trunk of the body
- Osteosarcoma typically affects the appendicular skeleton of large- to giant-breed dogs; may be seen in the axial skeleton (composed of skull, spine, ribs, and sternum)
- Cancerous (malignant) tumor, with spread to the lungs (known as “lung metastases”) in more than 90% of dogs at the time of diagnosis; lung metastases may be microscopic
- Osteosarcoma may spread to soft tissues, such as the skin, kidney, and liver
- Osteosarcoma accounts for up to 85% of primary bone tumors in dogs
- Cats—less common; biologic behavior is less malignant than in dogs



GENETICS

- Appears to be inherited in giant breeds, such as Scottish deerhounds and Irish wolfhounds
- Increased likelihood of developing osteosarcoma does occur in some breeds
- Breed size and rate of maturity may be more important than breed or family line

SIGNALMENT/DESCRIPTION OF PET

Species

- Dogs
- Cats

Breed Predilections

- Dogs—large- to giant-breed dogs
- Cats—domestic shorthair

Mean Age and Range

- Dogs—bimodal peak at 2 years and 7 years; reported as young as 6 months of age
- Cats—average age, 8.5 years; range, 4–18 years of age

Predominant Sex

- Dogs and cats—no strong indication that a particular sex is more likely to develop osteosarcoma than the other sex

SIGNS/OBSERVED CHANGES IN THE PET

- Depend on site

- Signs may be subtle
- Appendicular skeleton (limbs)—swelling, lameness, and pain common
- Axial skeleton (skull, spine, ribs, sternum)—localized swelling, detectable mass, pain
- Other complaints—lack of appetite (inappetence) and sluggishness (lethargy)
- A firm, painful swelling of the affected site common
- Degree of lameness—varies from mild to non-weight-bearing
- Buildup of fluid (known as “edema”) around affected area
- Fractures occurring at the site of weakened bone (known as “pathologic fractures”) are rare

CAUSES

- Unknown

RISK FACTORS

- Dogs—large- to giant-breed dogs; metallic implants at fracture-repair sites; history of exposure to ionizing radiation
- Dogs—early spay/neuter
- Cats—unknown

Treatment

HEALTH CARE

- Diagnostic evaluation—outpatient
- Surgery and the first chemotherapy treatment—inpatient
- Subsequent chemotherapy—outpatient
- Manage pain, as needed
- Radiation therapy will decrease pain effectively in dogs and cats

ACTIVITY

- Restricted after surgery, until adequate healing has occurred

DIET

- Dietary management is not required
- Weight lost may benefit amputees in general

SURGERY

Dogs

Appendicular Sites (Relating to the Limbs)

- Amputation of affected limb—limb amputated at the forequarter (including the scapula and shoulder joint) or hip
- Limb-sparing or salvage therapy—used for osteosarcoma of the distal radius (bone in the lower front leg); available at a limited number of referral hospitals
- Chemotherapy—recommended after either surgical procedure

Axial Sites (Relating to the Head and Trunk of the Body)

- Aggressive surgical removal (excision) of the tumor, depending on location of the tumor
- Chemotherapy—recommended after surgery
- Osteosarcoma of the lower jaw (known as “mandibular osteosarcoma”) may have less aggressive biologic behavior than other sites; however, the cancer can still spread (metastasize); therefore, chemotherapy is still indicated

Soft Tissue Sites (Tissues Other than Bone)

- Aggressive surgical removal (resection) of the tumor
- Chemotherapy recommended after surgery

Metastasectomy (Surgical Removal of Metastasis)

- Surgical removal of metastasis to the lungs (known as “pulmonary metastasectomy”)—has been described; indicated in dogs that: (1) had a long disease-free interval (over 300 days) after diagnosis; (2) have only 1–2 detectable lung nodules based on computed tomography scan (CT scan)

Cats

Appendicular Sites (Relating to the Limbs)

- Amputation of affected limb
- Chemotherapy generally not necessary

Axial Sites (Relating to the Head and Trunk of the Body)

- Attempt aggressive surgical excision—depending on site of lesion
- Local recurrence—main reason for treatment failure

Both Species

- Inoperable cancer—radiation therapy to control signs and improve the pet's condition, but not to cure (known as “palliative intent”)
- Pain management with medications such as nonsteroidal anti-inflammatory drugs (NSAIDs), opioids, or bisphosphonates may improve quality of life and thus prolong survival

Medications

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive

- Post-surgical chemotherapy with either platinum-based protocol (cisplatin, carboplatin), or doxorubicin is the current standard of care
- Palliative medication is intended to improve the pet's condition and quality of life, it is not a cure for the cancer; these drugs are used to control pain and/or decrease inflammation; options include: aspirin, piroxicam, or other nonsteroidal anti-inflammatory drugs; acetaminophen with or without codeine, tramadol or a fentanyl patch— not all of these drugs can be used in combination or in cats; always consult your pet's veterinarian for the most appropriate pain management for your pet

Follow-Up Care

PATIENT MONITORING

- Monitor for reduction of bone-marrow activity (known as “myelosuppression”), resulting in low number of red blood cells, white blood cells, and/or platelets; should have a complete blood count (CBC) performed 7–10 days after chemotherapy
- Take chest x-rays (radiographs) every 2–3 months after surgery
- Take x-rays (radiographs) of graft site for cases with limb-sparing or salvage therapy every 2–3 months after surgery, because local recurrence is possible after limb salvage

POSSIBLE COMPLICATIONS

- Spread of cancer (metastasis) to lungs, bone, and soft tissue sites
- Hypertrophic osteopathy (a bone disorder that causes painful swelling of bone and lameness) with spread of cancer to lungs (lung metastases)
- Pets that undergo limb-sparing or limb-salvage procedures may develop infections, local recurrence of the cancer, or failure of the surgical implants
- Amputees rarely show complications secondary to arthritis in the other legs

EXPECTED COURSE AND PROGNOSIS

- Prognosis is poor; achievable goals should be to relieve discomfort and prolong life

Dogs

- Median survival without treatment, with amputation alone, or with palliative radiation therapy alone—approximately 4 months
- Median survival with surgery and chemotherapy—10 months

- Osteosarcoma of the lower jaw (known as “mandibular osteosarcoma”)—less aggressive than other sites; 1-year median survival time with surgery alone—71% reported in one study

Cats

- Appendicular (involving the limbs)—median survival with surgery: greater than 2 years
- Axial (involving the head and trunk of the body)—median survival of 5.5 months

Key Points

- The most common primary bone tumor in dogs
- This disease has an aggressive biologic behavior; therapy should be directed at the painful bone tumor (using either surgery or radiation therapy) as well as at metastatic disease (using chemotherapy)
- Prognosis is poor; achievable goals should be to relieve discomfort and prolong life
- Cure is unlikely