Canine Osteosarcoma: Part 2

Part 2 of this 2-part series on canine osteosarcoma discusses treatment and follow-up protocols, along with cost and prognosis. Part 1, which appears on page 17 of the July issue, includes patient history and diagnosis of the disease.

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Tx Treatment

Inpatient or Outpatient

- Patients typically require brief hospitalization after amputation or limb salvage surgery.
- Outpatient treatment can be initiated for the remainder of the treatment course, provided no severe adverse effects develop.

Surgical

Amputation

- Amputation followed by chemotherapy is the most common surgical combination treatment.
- Large- and giant-breed dogs typically function well after limb amputation.
  - Most owners are pleased with their pets' mobility and quality of life after surgery.
- Moderate preexisting degenerative joint disease found in most older, large-breed dogs is not a contraindication for amputation.
  - Severe preexisting orthopedic or neurologic conditions may cause poor results; careful preoperative examination is important.
- Complete forequarter amputation is generally recommended for forelimb lesions, as is coxofemoral disarticulation amputation for hindlimb lesions.
  - This level of amputation assures complete removal of local disease and results in an optimal cosmetic and functional outcome.
- For proximal femoral lesions, complete amputation with en bloc acetabulectomy is recommended to obtain proximal soft tissue margins.
- Surgery alone must be considered palliative, as it does not address risk for metastatic disease.

Limb Salvage

- Although most dogs function well following amputation, limb sparing is preferable in dogs with severe preexisting orthopedic or neurologic disease.
- Until recently, only a few reports of limb salvage in dogs have appeared in the literature.
- Limb function has generally been good, and survival has not been adversely affected.
  - However, limb salvage has a much higher complication rate than does amputation.

MORE ▶

Experience More

Osteosarcoma is definitively diagnosed by bone biopsy. Watch how to perform this procedure by scanning this page with the Layar App on your smartphone or tablet.

OSA = osteosarcoma

- Chemotherapy is required to prolong survival.
- Suitable candidates for limb salvage include dogs with appendicular OSA or those otherwise in good general health.
  - Other criteria include absence of pathologic fracture, <360° involvement of soft tissue, and presence of a firm/definable soft tissue mass versus edematous lesion.
- The most suitable cases for limb salvage are dogs with tumors in the distal radius or ulna.
  - Current limb salvage procedures require arthrodesis.
  - Arthrodesis of the scapulohumeral, coxofemoral, stifle, or tarsal joints following limb sparing generally results in only fair-to-poor function.
    - This has generally prevented surgeons from recommending limb salvage near these joints.
- Limb salvage surgery and aftercare are complicated and expensive.
  - A coordinated team effort among surgical and medical oncologists, radiologists, pathologists, and technical staff is required.
- Described methods of limb salvage include massive allografts, autografts, metal endoprostheses, distraction osteogenesis, and vascularized bone transfer.
  - Each method has unique advantages and limitations.
- Choice of limb-sparing method depends on several factors (eg, owner choice, patient disposition, individual risks).

Medical

Palliative Treatment

- Oral analgesics (eg, NSAIDs, narcotics, amantadine [NMDA receptor antagonist], gabapentin [GABA analogue]) can be prescribed to control pain.
  - Response to analgesics can decrease as local disease progresses.
- Palliative radiation therapy can help control pain.
  - Effective at relieving pain and lameness for approximately 3–4 months and typically has no adverse effects
  - Typically administered during 2–4 outpatient sessions with the patient anesthetized or heavily sedated to prevent movement during radiation
  - Palliative radiation therapy does not lower risk for pathologic fracture or extend survival, unless combined with chemotherapy.[1]
- Amputation may be a palliative treatment in patients with pathologic fracture or marked pain, or when palliative radiation therapy is not available.
  - Amputation can remove the source of pain, but without chemotherapy metastatic disease can occur within 1–3 months following amputation.[2]
- Typical expected survival time with palliative analgesic therapy alone is 3 months; median survival time for palliative radiation or amputation (both without chemotherapy) is 5 months.[2,3]

Curative-Intent Treatment

- OSA is rarely cured with chemotherapy alone, but surgery or radiation combined with chemotherapy can markedly prolong survival.
- The keystone of curative-intent treatment is adjuvant chemotherapy.
  - Chemotherapy can prolong survival time when used in combination with amputation, limb salvage, or certain forms of radiation therapy.
  - Chemotherapy is most effective at delaying the onset of metastatic disease.
    - When used without surgery or radiation, it cannot adequately eliminate the pain and progressive growth of the primary tumor.
  - The most common chemotherapy agents used are carboplatin and doxorubicin, either as single-agent or combination therapy.
  - Dogs can typically tolerate chemo-

GABA = gamma-aminobutyric acid, NMDA = N-methyl-D-aspartate, OSA = osteosarcoma, SRT = stereotactic radiotherapy

Alternative Therapy

- Alternative therapy options have not been proven beneficial in controlling signs or prolonging survival as compared with conventional options.
- However, an alternative therapy can often be used to complement conventional therapy.
- Acupuncture, massage, and other wellness therapies are frequently used in combination with conventional treatment.
- Owners should avoid administering herbs and/or supplements during chemotherapy or after surgery until their use has been discussed with the oncologist or homeopathic veterinarian.
- Herb–drug and herb–herb interactions have not been extensively studied but have resulted in unexpected toxicities in patients with OSA according to anecdotal evidence.

therapy better than humans.
  - Adverse effects in dogs are typically minimal.
    - Severe adverse effects requiring hospitalization occur in very few patients.
- When chemotherapy is used in combination with surgery or certain forms of radiation therapy, average survival time is >1 year.
  - This represents a 4- to 6-fold increase in survival time as compared with palliative treatment.[1]
- Chemotherapy is typically given q3wk for 4–6 treatments.
- Some patients that receive curative-intent therapy may live up to 2 years; fewer may live ≥5 years.

Stereotactic Radiotherapy

- Stereotactic radiotherapy (SRT) is a recent development in the treatment of OSA.
- Sometimes referred to as stereotactic radiosurgery, SRT uses specialized radiation treatment units with on-board CT imaging and specialized targeting ability to deliver very high doses of radiation to the tumor while protecting nearby normal structures from harmful doses.
  - This treatment has shown promise in the development of a "nonsurgical limb" salvage technique using radiation to kill the tumor followed by chemotherapy.
  - Complications include fracture and infection of the involved limb.
  - Chemotherapy is still required to achieve the prolonged survival.

Nutritional Aspects

- Many claims have been made about the benefits of specific diets or supplements, but little substantiating objective evidence exists.
- Most oncologists currently recommend choosing a well-balanced, high-quality diet.

Activity

- Recommendations for activity after therapy depend on the treatment protocol.
  - With amputation, activity does not need to be restricted once tissues have healed.
  - Other treatments (eg, palliative, limb salvage) may require prolonged activity restrictions for the best outcomes.

Client Education

- It is important to give the client all possible options to make an informed choice (see **Alternative Therapy**).
  - This includes honest discussion of benefits and disadvantages of curative-intent treatment vs palliative-intent treatment, costs, expected survival times, and possible complications.
- Referral to an oncologist should be offered.

Follow-up

Patient Monitoring

- Dogs require very close follow-up throughout treatment and for 1 year thereafter.
- Typical follow-up after treatment includes monthly rechecks for 3 months, q3mo for 1 year, and q6mo thereafter.
- Complete history and physical examination, thoracic radiography (3 views), CBC, and serum chemistry panel should be performed at each visit.
- Particular attention should be directed to examining the limb (or amputation site) and addressing general lameness issues to detect regrowth of tumor or spread to other bony sites.
- Thoracic radiographs should be examined for evidence of metastatic disease.

In General

Relative Costs

- Curative-intent therapy: $$$$$
- Palliative therapy: $$–$$$$$

Cost Key
$ = up to $100
$$ = $101–$250
$$$ = $251–$500
$$$$ = $501–$1000
$$$$$ = more than $1000

Prognosis

- With curative-intent treatment, median survival time is 1 year (50% of dogs alive at 12 months) and 10%–30% of dogs alive at 2 years.
  - Patients are usually euthanized because of metastatic disease.
- With palliative treatment, the median survival time is 3–5 months.
  - Patients are usually euthanized for pain related to the primary tumor or pathologic fracture (with analgesia and radiation therapy) or metastatic disease (for palliative amputation).

Future Considerations

- Oncology is a constantly evolving field.
- It is important to consult with a medical oncologist and surgical oncologist before initiating treatment to ensure owners are presented with all available options.
- Treatment modalities can change rapidly as new information becomes available. ■ cb

See **Aids & Resources**, back page, for references & suggested reading.