

Canine Soft Tissue Sarcomas

Client Informational Handout



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Overview

Soft tissue sarcomas represent a diverse group of tumors that are grouped together on the basis of similar pathologic appearance and clinical behavior. Soft tissue sarcoma subtypes include: fibrosarcoma, myxosarcoma, liposarcoma, rhabdomyosarcoma, leiomyosarcoma, and undifferentiated sarcoma. Peripheral nerve sheath tumors and perivascular wall tumors are often included under the umbrella term of soft tissue sarcoma, as they behave similarly to some less aggressive sarcomas. Sarcomas are unique in that they often feel very defined but they have indistinct tumor margins that like to invade adjacent tissue (tentacle-like extensions of the tumor). These tumors generally behave in a locally invasive fashion but a subset can metastasize (spread) to other sites such as the lungs (rarely lymph nodes). There are 3 primary grades that are assigned to soft tissue sarcomas: grade 1 (low grade), grade 2 (intermediate grade) and grade 3 (high grade). The grade is important as it is associated with prognosis; generally speaking low or intermediate grade tumors carry a better prognosis than high grade tumors.

Clinical Signs

Soft tissue sarcomas on the external body are commonly slowly progressive masses that are noticed by owners over time. They are typically non-painful and can occur anywhere on the body. Clinical signs tend to be related to the location and size of the tumor. Large tumors can disrupt function and cause discomfort.

Diagnosis

Obtaining a biopsy for histopathology, where a sample of the tumor is evaluated by a pathologist, typically provides a definitive diagnosis. Fine needle aspiration, where a sample of cells is collected, for cytology can sometimes yield a presumptive diagnosis of sarcoma. Therefore many times we will often attempt a cytologic diagnosis first since it is less invasive with rapid turnaround time for results. Generally a grade and other prognostic factors are determined following removal of the entire tumor but a grade may be provided with a small biopsy sample. It is important to note that the grade of a tumor may change once the entire mass is removed.

Staging

Staging refers to the evaluation of your pet for evidence of spread (metastasis) of the sarcoma. Soft tissue sarcomas typically behave in a locally aggressive fashion but some of them can spread to other sites. The most common site of metastasis is lung, however sarcomas occasionally spread to lymph node, liver, spleen and other sites. Staging therefore depends on your pet's presentation but the most common tests performed include complete blood count, chemistry profile, urinalysis and imaging of the lungs (radiographs/x-rays or CT scan). For large tumors or those located in difficult-to-remove locations, advanced imaging with CT or MRI may be needed to help determine treatment options.

Treatment Options and Prognosis

Definitive-Intent Treatment for Long-Term Control:

1. **Surgery:** Surgical excision is the standard-of-care treatment for soft tissue sarcomas, although this can sometimes be challenging depending on the location of the tumor. Sarcomas are "sneaky" tumors that

can extend tentacles outside of the primary mass, so tumor cells may be left behind after surgery that can cause recurrence. The surgeons will work to determine the best approach to remove the mass while trying to get good margins. In most cases, surgery will work with oncology and radiation oncology to determine the optimal treatment options that exist. Generic risks of surgery include discomfort after the procedure (managed with anti-pain medications), bleeding, dehiscence (falling apart of the incision), postoperative infection (rare) and failure to completely remove all of the tumor cells. For low and intermediate grade tumors that are completely removed, the prognosis is excellent and we do not expect recurrence. For high grade tumors, they may still be at risk for local recurrence and metastasis so additional therapy with radiation therapy and/or may be recommended.

2. **Revision Surgery:** For tumors that are incompletely resected, additional treatment may be recommended especially in younger dogs and in dogs with high grade tumors. Sometimes there is an option to pursue another surgery (a “revision surgery”), where a second attempt is made to completely remove all the tumor cells. For incompletely resected tumors that are not amenable to a second surgery, definitive-intent radiation therapy (RT) may be recommended, especially in younger dogs with high-grade tumors.
3. **Definitive-intent RT:** RT is an option for incompletely excised tumors and as a pre-operative treatment if surgery is initially deemed to be challenging or unlikely to completely remove the tumor. Definitive-intent RT is effective at managing residual disease and provides long-term local control (3-5 years) with surgery in the majority of dogs with sarcomas. Definitive RT consists of daily radiation treatments that are administered Monday through Friday for 4 weeks - dogs are welcome to stay with us or come in and out of the hospital each day. RT is administered under general anesthesia and we use fast acting anesthetic agents so that our patients maintain good quality of life between treatments. An RT-planning CT may be required depending on the location of the tumor to help sculpt radiation dose to the tumor around normal tissue. Acute radiation side effects are reversible changes to irradiate normal tissue that occur by the end of treatment and peak approximately 5-7 days after the last dose of RT are common. Acute effects depend in part on the location of the primary tumor, since RT includes a margin of tissue around that tumor. The most common acute side effects include skin irritation in the radiation site (comparable to a sunburn reaction that progresses to a dry and then moist desquamation). Most dogs do very well with no evident toxicity the first 2-3 weeks; the skin subsequently becomes red (erythematous) followed by dry and flaky (dry desquamation) followed by moist desquamation. These side effects typically develop by week 4 and peak the first after treatment of radiation, but typically heal rapidly in 1-3 weeks. Late radiation effects are irreversible side effects that occur months to years following RT and can include white hair coat (leukotrichia), alopecia (permanent hair loss), pigmented skin in the irradiated field, secondary tumor formation (usually > 3-5 years after RT), and bone necrosis (usually >3-5 years after RT). The likelihood of late toxicity with a definitive-intent protocol is very low (< 1%). The delivery of small radiation doses each day minimizes the likelihood of late toxicity as this preferentially allows normal tissue to repair radiation damage in between treatments.

For cases in which surgery is deemed not possible or challenging, preoperative RT may allow for tumor cells to be effectively “sterilized” at the margins of the mass so that even if surgery is unable to completely remove all the tumor with a wide margin, the likelihood of tumor recurrence is lower. While this is a standard

approach in human oncology (to pursue radiation first and then surgery), in veterinary patients, we have more data on surgery first followed by RT. Your oncology team will discuss the benefits and disadvantages to pursuing preoperative RT versus postoperative RT if it is relevant.

4. **Stereotactic ablative radiation therapy (SABR) or stereotactic body radiation therapy (SBRT):** For tumors that are not amenable to surgery, hypofractionated (large dose) radiation may be an option for tumor control, particularly for owners who do not wish to pursue conventional RT with surgery. While we know the most about conventional RT given in small doses each day over several weeks, we are interested in investigating the use of higher doses of radiation less frequently. Stereotactic ablative body radiation therapy (SABR) or stereotactic body radiation therapy (SBRT) refers to the use of high doses of radiation given in 3-5 fractions to measurable tumors. Currently, we do not know if this provides equal control to conventional RT but it is an alternative option for owners wishing to consider a different approach. A CT is required for planning so that we can sculpt the radiation beams precisely to the tumor target. Not all dogs and cats are good candidates for this type of therapy; SABR/SBRT is likely optimal for small, very well defined targets. Depending on the radiation prescription, acute toxicity may be less severe than with conventional protocols. There is a higher risk of late radiation toxicity to normal tissue that is adjacent to the tumor, as the radiation dose given at each treatment is very high to try and kill as many tumor cells as possible. Your oncology team will discuss the potential risks and benefits of this option with you.

Palliative-Intent Treatment:

1. **Surgery:** For some tumors that are large or causing discomfort, surgery alone may improve quality of life even if the surgeons cannot remove the tumor in its entirety. Some tumors will be slow to grow after surgery while others will grow back very quickly and it can be difficult to predict this.
2. **Palliative Intent RT:** Palliative RT involves larger doses of radiation given less frequently (typically once a day for 5 days or once a week for 4 treatments) to a relatively low dose overall. The likelihood for acute toxicity is very low as the goal is simply to improve quality of life and slow tumor growth or improve clinical symptoms (ulceration, bleeding, discomfort). The response is not as durable as with definitive-intent protocols because “tumoricidal” doses are not used. Because a larger dose of radiation is given with each dose, there is a higher likelihood of late radiation toxicity in normal tissue, as higher doses of radiation preferentially damage normal tissue. Palliative RT is something that can be pursued at any point in the disease process, since the primary goal is to improve quality of life. An RT-planning CT may be needed to help sculpt radiation doses to the tumor around normal tissue.
3. **Chemotherapy/Targeted Therapy:** Surgery and RT provide local control to tumor but in some cases, chemotherapy or other systemic drugs may help to alleviate clinical signs and slow down tumor growth. Your oncology team will discuss the potential advantages and disadvantages if this is appropriate.

Cautious Monitoring / No Further Treatment:

1. For tumors that are incompletely excised or narrowly excised, cautious monitoring is an option should adjuvant treatment with RT not be pursued. It is difficult predict when or if tumor recurrence will develop as sarcomas can regrow quickly after surgery or take years to regrow (If they regrow). Consequently, for older

dogs with low-grade tumors, regrowth may not occur in their lifetime and monitoring of the area without further intervention may be acceptable. Certain tumors, such as those > 3 cm or invasive into tendons seem to be more likely to recur than dogs with smaller, more superficial low-grade tumors. Recurrent tumors can be treated with surgery and/or RT; however, it is important to know that recurrent tumors are more difficult to control than “naïve” tumors.

2. Monitoring is also an option for large tumors if definitive or palliative therapy is declined. We will work with you to ensure that your pet is comfortable with good quality of life.

It is important to discuss all options with your oncology team as alternative treatments may be more appropriate for your pet. Please do not hesitate to let us know if you have questions or concerns.