

In pets that develop a malignant cancer affecting a limb, complete excision of the tumor is often the best option to improve comfort, extend longevity, and/or potentially cure the condition. Depending on the size, location, and type of cancer affecting the limb, in some cases amputation of the limb is recommended to achieve complete removal. Although most patients tolerate limb amputation surprisingly well, it is not an option for all animals.

Limb sparing is a broad term referring to various surgical treatments for cancer in the limbs of animals where complete amputation would normally be recommended but is not possible due to concerns of concurrent orthopedic or neurologic conditions or poor expected recovery.

## **What does limb sparing entail?**

Because limb sparing is a general term encompassing a wide-variety of surgical and therapeutic techniques, the possible options for treatment are largely dependent on each patient. A variety of cancers may affect the pet's limbs and, based on the type, may have varying tendencies to spread locally at the site of occurrence (invasion) or spread to other locations in the body (metastasis). Surgical removal of a primary tumor may either be performed with the intent of curing the disease through complete removal, or may be performed to reduce pain associated with the primary tumor and prolong survival in cases where metastasis and future recurrence is expected.

## **Tumors of Soft Tissue**

Treatment of malignant soft tissue tumors is typically focused on local control through the complete excision of the tumor, if possible, including wide margins of apparently normal tissue to catch any direct microscopic spread of the disease. Guidelines for soft tissue tumor excision are dependent on tumor type and grade; however, they typically include wide (2-4 cm) margins of normal tissue around the tumor. This may be a difficult feat when removing tumors from the body and extremely challenging on tumors of the limb where vital muscles and nerves lie close to the surface beneath a comparatively tight layer of skin. Veterinary surgeons are specially trained in techniques for the reconstruction and closure of the wounds resulting from tumor excision, including skin advancements, flaps, and grafts. Following tumor excision, additional therapies may be recommended, including radiation and/or chemotherapy.

## **Tumors of the Bone**

Although there are multiple tumors that can affect the bones, the most common bone tumor seen in veterinary patients is osteosarcoma. This tumor type is typically destructive of the bone at the site of the growth and has a high rate of metastasis to other areas of the body. Historically, treatment of osteosarcoma was primarily through limb amputation because the tumor may be extremely painful and may cause destruction that weakens the affected bone, leading to fractures.

Using the limb-sparing principles, excision of only the affected portion of the bone may be possible, combined with various stabilization procedures, including bone plate fixation, bone graft placement, and bone distraction techniques. Following surgery, additional therapies may be recommended, including chemotherapy and/or radiation. The ability to utilize a limb-sparing procedure depends on multiple factors, including the location of the tumor and the degree of tumor invasion into the surrounding tissues.

## **Partial Amputations and Prosthetics**

Due to advances in prosthetics for veterinary patients, in some cases of disease affecting the extremities of limbs, partial amputation can be performed and combined with an internally implanted or externally applied prosthetic device that provides the pet with a functional, weight-bearing limb. To improve the outcome and acceptance of prosthetics, physical therapy is a crucial component of the recovery process.

## **What pets are candidates for limb sparing?**

The decision to pursue a limb-sparing procedure requires a treatment plan designed for the individual pet's needs and based on the input and consensus of the primary veterinarian, surgeon, oncologist, and, most importantly, the pet owner. Planning for treatment may require specific pre-operative staging and testing, including advanced imaging techniques, such as a CT scan or MRI, and consultation with a radiologist.

As surgery requires general anesthesia, bloodwork is required to assess your pet's health and must be performed within two weeks of the date of the procedure. Ensuring appropriate pain management is a high priority both during and after surgery.

Complications following surgery are dependent on the type of procedure performed. Possible complications associated with oncologic surgery include the risk of local re-growth of the tumor, metastasis, incisional dehiscence, swelling, or infection, and, in some cases, implant failures or fractures. Your surgeon will discuss the particular risks and complications associated with any procedures that are planned for your pet.

## **What is the post-operative recovery and care?**

After surgery, activity restriction is typically required to allow for healing, with no running, jumping, or playing permitted for a period of time dependent on the procedure. Additional treatments may be recommended through the medical or radiation oncologist.

Physical therapy may be recommended for the pet following surgery, and may include treatments to decrease swelling or post-operative pain and help encourage usage of the limb, as well as a home-exercise plan and appointments with the rehabilitation practitioner, dependent on your pet's needs.