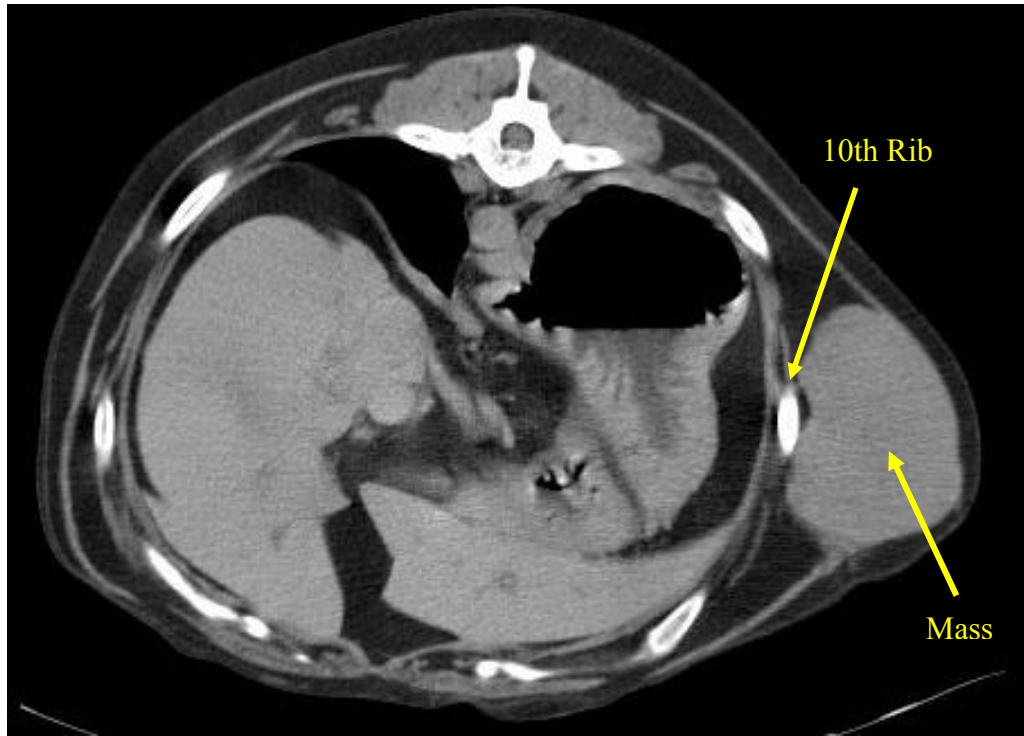


Caesar, an eight year-old, neutered male Labrador retriever was referred for further evaluation and treatment of a mass on the left lateral thoracic wall. The mass had been present and growing slowly for several months prior to evaluation. Prior to referral, fine needle aspiration and biopsy were consistent with an intermediate grade soft tissue sarcoma. Three view thoracic radiographs and abdominal ultrasound had showed no signs of metastatic disease. Full blood work and urinalysis were within normal limits. The patient was otherwise healthy with no other significant health history.



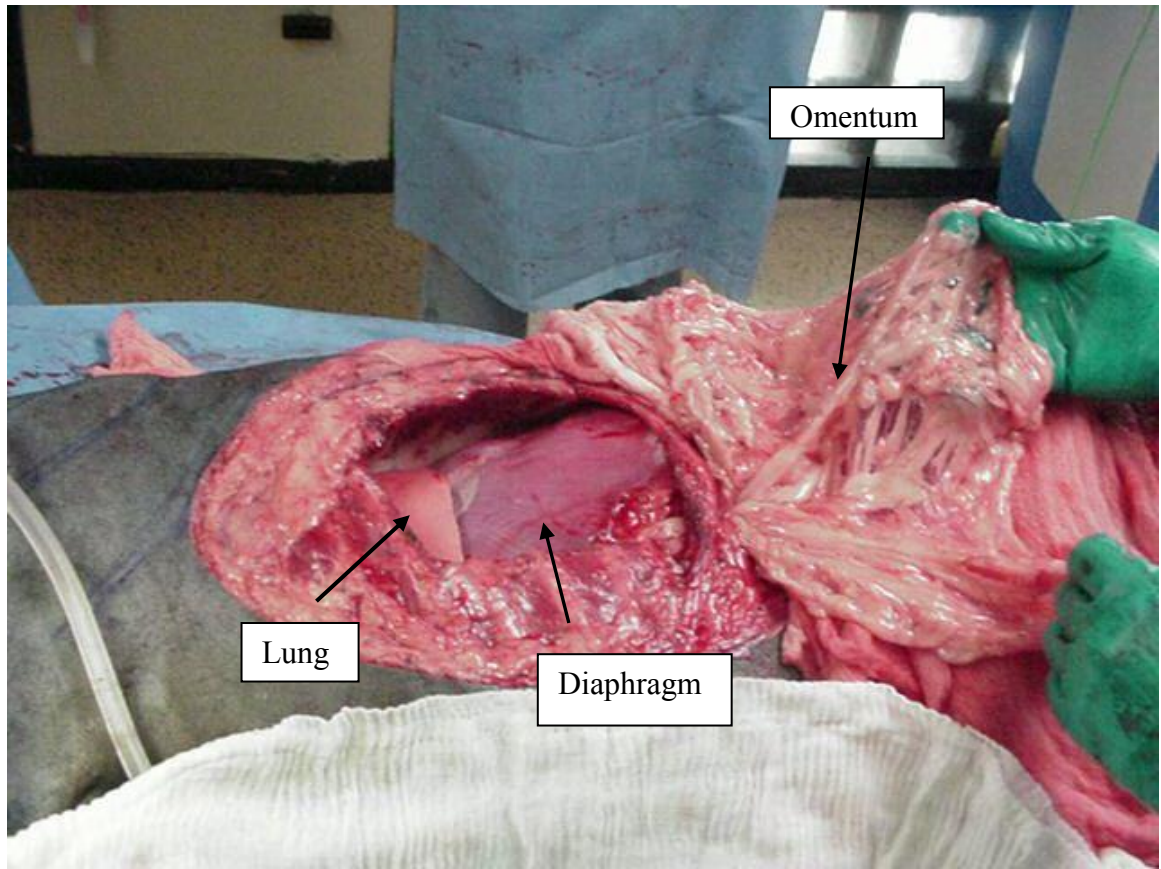
**Figure 1:** Appearance of mass on lateral thorax during surgical preparation.

Soft tissue sarcomas tend to be locally aggressive tumors with low tendency to metastasize. The best treatment option is aggressive surgical resection with wide margins. Because the grossly palpable tumor may not be representative of the full extent of disease, a CT examination was recommended for surgical planning. The CT images showed the tumor to be in close proximity to the lateral aspects of the 8<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup>, and 11<sup>th</sup> ribs. Based on the CT imaging, resection of the mass en bloc with the adjacent ribs and thoracic wall was recommended.



**Figure 2:** CT appearance at the level of the 10<sup>th</sup> rib.

Multiple rib resection leaves a defect in the thoracic wall. This defect must be repaired to restore thoracic wall integrity and negative pressure coupling during respiration. In this case, the defect was repaired by placement of Marlex mesh. The mesh was then covered with omentum tunneled from the peritoneum to cover the mesh. The omentum helps seal the thoracic defect, which would otherwise be positioned beneath only skin and subcutaneous tissue. In addition, it aids in mobilizing fluid from the wound region, which can lead to seroma formation in up to 50% of cases.



**Figure 3:** Appearance of defect following rib resection. Caudal aspect of left caudal lung lobe is visible along with thoracic surface of the diaphragm. The omentum has been tunneled through the abdominal wall.



**Figure 4:** Appearance of defect following mesh placement. Note reduced size of wall defect following tensioning of mesh and adjacent ribs.



**Figure 5:** Appearance of defect following placement of omentum.

Because of the large size of the skin defect remaining following mass resection, skin closure required mobilization of an axial pattern flap. In this case, a thoracodorsal axial pattern flap had been outlined prior to initiation of surgery. The flap was partially elevated and rotated into the defect to aid in closure. A thoracostomy tube was placed prior to closure to allow drainage of any fluid or air accumulation within the thoracic cavity.



**Figure 6:** Skin markings have been made to outline proposed mass resection and margins for thoracodorsal axial pattern flap. TA = approximate location of thoracodorsal artery.



**Figure 7:** Appearance of closure the morning following surgery, showing flap in place over defect.

Caesar recovered very well post-operatively. He was ambulatory with a good appetite and attitude the following morning. His thoracostomy tube had produced minimal fluid and air overnight and was removed the morning following surgery. He had some minor swelling and inflammation along his incision lines, which resolved within a few days of surgery. His incision healed well with no dehiscence and no seroma formation. His skin sutures were removed 2 weeks following the procedure and he was limited to leash walks only for 3 weeks. He has returned to full activity with no complications evident at this time. The resected tissue was submitted for histopathology and margin evaluation. The interpretation remained consistent with a soft tissue sarcoma, more specifically interpreted as a hemangiopericytoma or peripheral nerve sheath tumor. The deep margin was bordered by intact body wall including ribs and intact pleura. The lateral margins were 5cm in all directions, indicating complete surgical excision.

As stated above, soft tissue sarcomas tend to be locally aggressive tumors that are slow to metastasize. They are graded as low, intermediate, or high grade based on factors such as mitotic index and degree of necrosis on histopathology. I use a rule of thumb of doubling metastatic rate with each grade, beginning with 10% for low-grade masses. Intermediate tumors then have approximately 20% and high grade 40% metastatic

potential. This illustrates the relatively low potential for spread, with even the high-grade tumors at less than 50% metastatic rate. However, these tumors can be very aggressive and difficult to control locally. The best predictor for long-term control is completeness of surgical excision, and the initial surgery has the best chance for success. If resection is deemed close, or incomplete, options for treatment include additional surgical resection if possible, and/or radiation therapy to follow. Currently, chemotherapy has a minimal role in the management of these tumors.

In some instances, both radiation therapy and surgery are planned for tumor management. This is most common for appendicular masses where adequate surgical margins cannot be achieved without amputation. For these cases, a marginal resection is planned to reduce tumor burden to microscopic disease, and the location is then radiated. This can result in excellent long-term control without loss of a limb.

An additional aspect of this case worth commenting on is the usefulness of advanced diagnostic imaging. Although soft tissue sarcomas can often appear to be discrete masses, the palpable borders usually represent pseudocapsule formation with additional neoplastic tissue present beyond the palpable borders. Contrast enhanced CT or MRI are very useful for defining the full extent of disease to plan surgical resection. In this case, the imaging was useful in determining the number of ribs that would require resection along with the mass.

Caesar returned to full activity within weeks of surgery and has had no complications or evidence of recurrence following several months of post-operative monitoring. Caesar's case is a good illustration of the extent to which sometimes daunting neoplastic processes can be managed successfully.





**Figure 8:** Appearance of surgical site approximately 6 weeks following procedure.