Canine Appendicular Osteosarcoma (OSA) Quick Reference Guide (QRG)
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Introduction: QRGs for neoplasms are designed for diagnostic pathologists so they are aware of the gross or microscopic information needed by clinicians to assign prognoses and offer therapy options. For canine OSA the information needed from a pathologist is the diagnosis. This QRG is to be used for canine appendicular OSA and is not intended for canine axial or extraskeletal OSA or feline OSA.

Appendicular OSA is the most common primary bone tumor of dogs and is one of the most aggressive tumors in animals. Most dogs with OSA live less than one year after the diagnosis; the timing of euthanasia influences outcome data. Pulmonary metastases will eventually occur in >85% of dogs, and <15% will have detectable metastases at presentation. Clinicians will create treatment recommendations and assign a prognosis based on all the data gathered for that patient. Clinical data that aid the pathologist include breed, age, location on the limb, and radiographs of the primary bone lesion and thorax.[1] Each of these may add to the certainty of the diagnosis. See the OSA Guideline which provides additional information on OSA in dogs. A full Protocol for canine OSA is under development.

Diagnostic report: The only piece of data needed by a clinician from the pathologist to aid in assigning a prognosis and offer therapeutic options for canine appendicular OSA is the diagnosis. The presence of osteoid produced by neoplastic cells within a sarcoma located in the metaphyseal region of an appendicular bone is sufficient evidence for a microscopic diagnosis of OSA. The various histologic subtypes of OSA or the grading systems have not been proven to predict clinical outcomes. The oncologist will integrate the pathologist's diagnosis with all the data known for the dog.[1] Additional histologic or cytological assessments by the pathologist beyond the diagnosis are not needed for the clinician/oncologist to make recommendations to owners. However, it is recommended to also report the mitotic count (MC), presence of lymphovascular invasion (LVI), and lymph node (LN) status, if available. **Staging** is performed by clinicians.

> **LN status:** Report findings on any LN submitted; if the specimen is a limb amputation, the pathologist should search for a LN and if found submit for histopathology; <5% metastasize to LN, validation studies are needed to confirm whether OSA in a LN correlates with survival metrics.[2,3]

Histologic grading: Grading systems for canine appendicular OSA[4,5] could not be replicated by an independent group of pathologists; grading does not correlate with prognosis and does not predict appropriate treatment.[6,7]

Other histologic assessments: None of the following are known to be predictive of outcomes in canine OSA however, it is our philosophy that these three parameters should be reported on all aggressive neoplasms:

[8]MC in 2.37 mm^2
[9]LVI – Soft and strict criteria
Surgical margins

Surgical margin evaluation:

For limb-sparing – minimum of 4 samples that include the soft tissues and the bone from each end of the bone should be evaluated.

Full limb amputation – histological assessment at the excision margin is not necessary if there is at least one joint present between the tumor and the excision (amputation) margin. OSA located in proximal femur and proximal humerus, soft tissue margins should be assessed due to possible local infiltration; recommend at least 4 sites. It would be helpful if the surgeon indicated the closest margin they observed or any specific points along the excision margin they would like evaluated histologically.

Future investigations should evaluate a wide array of clinical, pathological, and molecular parameters correlated with accurate clinical outcome data to determine what, if any, further testing beyond a microscopic diagnosis will help predict outcome and or guide clinicians.

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