

Principles of Oncologic Surgery

Caroline Prymak BVSc(Hons), CertVR, MBA, MRCVS, DSAS, DipACVS, DipECVS

Diplomat, American and European Colleges of Veterinary Surgeons

RCVS Specialist in Small Animal Surgery

Biopsy Principles

Knowing the tumour tissue type is essential for treatment planning and can be determined by cytology or tissue biopsy. Obtaining this information is important when the owner's willingness to treat is influenced by the type and extent of treatment that is necessary. Treatment without prior knowledge of tumour type is only appropriate when treatment or willingness to treat would not be affected.

Cytology is a simple, fast and inexpensive method of screening masses. Only a few tumour types can be definitely diagnosed with cytology alone (round cell tumours, lipoma) but it can be helpful in differentiating tumour verses non-tumour and indicate if biopsy is necessary. Cytology is indicated for any palpable external mass and can be used internally with ultrasound guidance.

Tissue biopsy is essentially required for definitive tumour diagnosis. Techniques include:

- * needle core biopsy
- * incisional biopsy
- * excisional biopsy

Even though theoretically the risk of tumour spread with biopsy exists, the benefits of a definitive diagnosis far outweigh the risks. Histology is in the majority of cases diagnostic. Biopsy can also give an indication of the malignant potential of the tumour by the degree of tumour cell differentiation and the degree of invasion and destruction of surrounding tissue. Grading schemes have been adopted for a variety of tumour types which assign a numerical value to pathological changes. Tumour grade can be highly prognostic and can help guide treatment planning.

Needle core biopsy utilises a coring instrument (usually 12 to 16 gauge) which cuts a core of tissue from the mass,

holding in within the instrument (e.g. Tru-cut). Only local anaesthesia with or without sedation is necessary in most cases. The individual cores are small, but architecture is maintained and multiple samples can be taken from a single entry site. Needle core biopsy is less useful with highly inflamed, cystic, deep or non-palpable masses.

If needle core is not applicable or is non-diagnostic *Incisional Biopsy* is indicated. For skin masses biopsy should be obtained at the junction of normal tissue/mass to evaluate tumour behaviour. For deeper masses this may not be possible. Image assisted biopsy may help select appropriate biopsy sites for deeper masses. General anaesthesia is generally needed for incisional biopsies and therefore the surgeon should aim to obtain enough tissue to assure a diagnosis. Masses which are very necrotic, cystic or haemorrhagic often require larger tissue samples.

Incisional biopsies should always be made in an orientation and manner that will not compromise definitive tumour removal. The entire biopsy site must be removed since it is potentially contaminated with tumour cells. Incisional biopsies on the extremities should be performed parallel to the long axis, rather than perpendicular, as this will make the definitive resection more feasible in an area with minimal skin for closure.

Excisional biopsy is the removal of the entire mass and its submission for histology. This should only be performed if the extent of the resection is not influenced by tumour type (e.g. splenic, lung masses). It may also be performed if a second larger surgery can easily be performed if the mass has been incompletely resected previously. This is usually only possible for smaller skin masses on the trunk where there is a lot of loose skin. The advantage is that diagnosis and treatment are possible with a single surgery.

Tissue obtained for biopsy should be placed in neutral buffered formalin at a volume of 1 part tissue to 10 parts formalin. This will allow adequate tissue fixation. Tissue pieces greater than 1-2 cm³ may require incisions into the tissue to allow penetration of the fixative. This can be done in a “bread loaf” fashion, incising into the tissue from one surface and leaving the other side intact to maintain orientation. Margin evaluation should not be compromised. Large specimens e.g. spleens can be fixed in a large container and then appropriate samples placed in a smaller amount of formalin for transport. It is often best to save the entire specimen so that more samples can be submitted if a diagnosis cannot be made.

Communication with the pathologist is essential in many cases. A precise history and physical examination are often invaluable in guiding the pathologist to a diagnosis. When margin evaluation is requested a drawing to aid in orientation can be very helpful. It is important to logically interpret the biopsy results. If the results do not fit the case discuss it with the pathologist or a medical or surgical oncologist. More tissue, new sections or special stains may be necessary. Submission of slides or blocks to another pathologist for a “second opinion” should be sort in difficult cases.

Surgical Margins

Preoperative assessment of surgical margins is important and depends on the tumour type and normal structures surrounding it. A surgical margin should be aimed at within normal healthy tissue. Special imaging modalities are important when assessing deeply infiltrative tumours. Plain radiographs cannot assess soft tissue tumour margins. Ultrasound can be useful for discerning tissue interfaces. CT is used for assessing hard tissues especially when masses are in complex bone areas. MRI provides the best way to assess soft tissue interfaces. As a general rule any tissue that the tumour contacts must be removed with a margin to eliminate microscopic spread. This distance is dictated by the biological behaviour of the tumour, which is a function of the tumour type and in certain cases by the grade of tumour. A good descriptive histopathology report is essential for determining surgical

margins. Ideally the deep margin should extend at least one tissue plane deep to the tumour. Planning surgical margins requires a comprehensive knowledge and experience with wound closure techniques. Potentially difficult or involved closure procedures should not compromise tumour excision.

Postoperative Margin Evaluation

After tumour resection it is important to identify margins of interest. This normally involves the resection site closest to the tumour. It can also involve deep, lateral and skin margins if it involves a subcutaneous tumour. For masses within organs it can be more difficult to assess margins. Careful evaluation of contact organs or serosal surfaces is necessary and biopsy of suspected area is important in order to determine “margins”. As discussed the biological behaviour of the tumour will often dictate margin identification. India ink obtained from art shops can be painted on to tissue margins in question. The specimen should be allowed to air dry for 2-3 minutes prior to placing it in formalin. Suture tags can also be used to identify margins of interest. As much help as possible should be given to the pathologist so that they can actually identify the orientation of the surgical margins of interest.

The surgeon must be able to interpret the histopathology report. A report of clean margins must be interpreted with caution. It is not feasible for a veterinary pathologist to examine all margins unless the mass is very small. The surgeon can help by submitting representative samples and identifying questionable margins. If a report describes tumour extending to within a few cells widths of a marked margin then the ability to predict surgical cure will be influenced by the biological behaviour of the tumour. Incomplete margins mean incomplete resection. When in doubt recut or consider adjuvant therapy.

If during surgical resection the tumour is cut through, then the entire wound is potentially contaminated. This requires re-cutting the entire previous wound or applying adjuvant therapy to all of the previously operated area.

Questions regarding this or on any other veterinary related matter must be discussed with your veterinary surgeon. The information contained herein is of a general nature only and may not relate to the specific conditions exhibited by your pet. Specifics of each case must be discussed with your veterinary surgeon. For further information, fact-sheets for clients and articles for veterinary surgeons, contact <http://members.aol.com/opvet>