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Garbage in, garbage out: Improving oncology care through collaboration

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Clinicians and pathologists are members of a team, problem solvers with mutual goals to understand and improve the quality of life of the patient. Clinicians are highly dependent on pathologists to guide the diagnostic plan, decrease the number of differential diagnoses, and often provide the final clue to a definitive diagnosis. The definitive diagnosis is critical to estimate prognosis and determine potential treatment options for the patient. Pathologists, in turn, are dependent on clinicians to provide interesting problems to solve and valuable work for their laboratories and research programs. Considering their shared goals, good communication and collaboration between clinicians and pathologists should be easy. However, the need for improvement in communication and collaboration has been recognized for decades¹⁻⁴ and experience suggests that problems persist. This presentation will present examples of some of the barriers as well as potential solutions for better teamwork to improve outcome for our clients and patients. The greatest gains will be achieved with changes in the current practices of clinicians. These will be highlighted. However, from a clinician's perspective, there are also changes pathologists could do to foster better communication and promote improved clinical practice. The focus is on cytology, but many of the principles would apply to other diagnostic methodologies as well.

Opportunities for clinicians:

1. Improve the quality of specimens
2. Provide thorough histories and lesion descriptions
3. Recognize the limitations of the test
4. Foster dialogue with pathologists

Improve quality of specimens submitted for cytological evaluation:

The quality of the specimen is likely the most significant factor limiting the accuracy of cytology.⁵ Keys to achieving good quality specimens for cytology include selection of the appropriate lesion for sampling, selection of the appropriate technique for sample collection, and careful preparation of the slides. Regarding lesion selection, it is important for clinicians to understand which tissues and lesions are more likely to yield highly cellular samples for cytology (e.g. lymph nodes, round cell tumors, carcinomas, etc.) as well as which lesions are likely to lead to equivocal results (e.g. sites of inflammation where highly reactive normal tissue can mimic neoplasia).⁶ In many cases, surgical biopsy is a better initial diagnostic test than cytology. That said, considering the safety and relative low cost of fine needle aspirate and cytology, it is usually an excellent early step in the diagnostic process. If the clinician can convey the limits of cytology to the client and adjust their technique to the situation to maximize the amount of material collected, then fine needle aspirate (FNA) and cytology is an excellent choice.

Sample collection seems so simple, yet inadequate technique is one of the key factors limiting sample quality and therefore diagnostic yield. Lesions only a few millimeters in diameter can yield diagnostic samples and, using different techniques, so can some samples collected from tissues that do not usually exfoliate well. The technique chosen must be adapted to the situation. There are excellent reviews of techniques,^{5,7} but good aspiration and smearing techniques are difficult to learn from a lecture or text. It is difficult for faculty to create realistic laboratory experiences for repeated practice, so much of the learning occurs with clinical cases, sometimes to the detriment of the patient. It would be helpful if clinical and pathology faculty from multiple institutions shared resources, teaching tools and techniques to create better learning opportunities for veterinary students and for continuing education. However, since much of the learning regarding sample collection and smearing technique occurs in practice, every cytology submission is an opportunity for learning. Most of the learning occurs through self-assessment but also via valuable feedback from the pathologist. This feedback is appropriately included in the pathology report (e.g. "the sample was poorly cellular with significant blood contamination limiting interpretation, recommend biopsy"), but would be enhanced with direct conversation between the pathologist and clinician.

The equipment and technique for sample collection via fine needle aspirate depends on the demeanor of the patient, anatomy, tissue type, vascularity, size of the lesion, and the results of initial sampling attempts. With consideration of the anatomy and simple manipulative skills or image-guidance, adequate samples can be collected from even small targets in deeper tissue planes. Generally, if you can feel it, you can sample it. For instance, a small (<1 cm) caudal superficial cervical lymph node can be sampled, even in an overweight dog, by using a longer needle and the non-aspiration (capillary) technique. Localization of the needle tip within the node can be ascertained by moving the node up and down during sampling while watching the movement of the hub of the needle. If the needle tip is in the node, the skin serves as a fulcrum and the hub makes a wide “wagging” excursion when the node is moved. If the needle tip is in the fat surrounding the node, the hub tends to remain more perpendicular to the skin during the movement of the node. Once the location of the needle tip is confirmed with a “wag” of the needle hub, in and out movement of the needle allows sampling from more than one area of the node to obtain an adequate sample. Different techniques are used for other lesion types, tissues, and locations. A critical evaluation of techniques would be helpful to develop evidence-based best practice guidelines, but ultimately techniques need to be adapted to the specific case. Clinicians need to know alternative techniques to allow them to adapt to the situation.

In order to adapt the sampling technique, clinicians need a rapid assessment of the adequacy of the sample collected. Rapid on-site evaluation (ROSE) would be ideal.⁸ Although potentially feasible in large veterinary practices, ROSE, at least as practiced in human hospitals, is impractical for most veterinary situations. However, the clinician can do a reasonable cursory assessment of the sample to determine if additional samples or techniques are warranted. ROSE helps determine if samples are adequate. The cursory evaluation proposed here is useful to determine if samples are likely inadequate and therefore additional sampling is required. Most clinicians collect samples until they have several slides with visible smears of tissue or fluid. In addition to this basic visual assessment, I recommend staining one slide for a rapid microscopic assessment as well. Most clinicians routinely prepare multiple smears from each aspirate. Usually, one or more of the slides appears to be of lower quality on visual examination (small sample or poor smear technique). If microscopic evaluation of one of these lower-quality slides shows abundant intact nucleated cells, then the entire set of slides is more likely to be adequate for cytology. However, if the material appears necrotic, most cells are lysed, or there are few nucleated cells present, then additional sample collection attempts should be considered before the patient leaves the hospital or clinic. The adjustment in technique depends on the appearance of the sample under the microscope. For instance, if the cells are necrotic, one should sample the periphery of the lesion instead of the center. If cells are lysed, a more gentle technique is warranted for slide preparation. If the sample is hemodiluted, the lesion should be sampled in another area, using a different technique. Gentler handling or fewer needle passes through the lesion may result in less hemorrhage. If the needle is removed before the hub of the needle contains blood, then the entire sample remains in the shaft of the needle and therefore can be expelled onto the slide for analysis. If the hub of the needle contains visible tissue fluid or blood, then it is likely that some of the sample has been lost in the needle. There are methods to salvage and use samples stuck in the hub, but it is helpful to repeat the aspirate attempt to avoid sample loss.

There is also room for improvement in slide preparation by clinicians and veterinary technicians.^{5,7} Similar to sampling techniques, the smear technique should be adapted to the situation. The best technique will depend on the consistency and volume of the material expressed on the slide. For instance, small volumes of low viscosity material usually results in greater adhesion between the slides, leading to more cell lysis when a “pull” or “squash” technique is done. In this situation, better quality slides will be obtained using a two-step technique similar to a blood smear. In situations where the initial smear appears too thick, cellular material can be transferred to another slide for additional thinner smears. There are several variations to make the best slides with what is available or make corrections when initial smears are not adequate. Most of these tips are learned through experience, but we could do a better job of teaching as well. Another alternative would be to remove the need for technical skill by validating techniques such as cell block and liquid cytology.⁹

Provide thorough histories and lesion descriptions:

The clinical team should provide the pathologist with signalment, lesion size and location, physical and imaging characteristics (cystic or solid, single or multiple), growth rate, symptom severity and duration, history of malignancy or infectious disease, current treatment, sampling technique, and differential diagnoses.^{7,10} Some clinicians may provide limited clinical information with the erroneous goal to avoid biasing the pathologist. However, it is more likely that clinical information is lacking because clinicians are busy, they do not fully appreciate the importance of the information, and/or they ask staff who are not familiar with the case to complete the requisition form. Education is likely the best solution, but improved requisition forms could help. If needed for repeat offenders, sample evaluation could be delayed until the requisition form is complete.

Recognize the limitations of the test:

Although a definitive diagnosis is not always feasible based on cytology, the test is usually helpful to eliminate some of the differential diagnoses or guide a choice between additional diagnostic options.⁶ A better understanding of the limits of the test would result in less frustration for clinicians and likely a greater respect for the cytopathologist. It would be helpful if clinicians understood that a careful choice of words in cytology comments is not due to indecision, but rather due to a thorough understanding of the limits of the analysis and an appropriate reluctance to overstate. The pathologist describes what is on the slide, the radiologist describes radiographic findings, and ultimately it is the clinician's responsibility to tie all of the information together to decide on a likely diagnosis.

Foster dialogue with pathologists:

Good teamwork is based on mutual respect, trust and good communication.¹¹ It is hard to generate the first two without the latter. Communication between clinicians and pathologists is often limited to written communication on requisition forms and pathology reports. There is no opportunity for questions of clarity, sharing in the joy of intellectual challenges, or expressions of appreciation and gratitude. Clinicians certainly need to contact pathologists when they have questions about results or need help in the diagnostic process, but the relationship would likely be enhanced if clinicians also called periodically to close the loop, sharing clinical information which may be interesting or educational for the pathologist.

For challenging cases, many pathologists get second opinions within their laboratory and state that on the final report. However, when a second opinion has not been obtained, clinicians should not be reticent to ask for one. Second opinions should be welcomed by all health professionals.¹² When we disagree, the only winner is the patient.¹³

Opportunities for pathologists:

1. Maintain high standards
2. Strive for consistency and clarity in reports
3. Continue research to improve care
4. Foster dialogue with clinicians
5. Evaluate all of the slides

Maintain high standards:

Pathologists should expect more from clinicians and educate us to improve. Don't be satisfied with "garbage in" regarding sample quality and data on the requisition form. These seemingly simple topics continue to reduce the value of cytology and may therefore lead to unnecessary expense or diagnostic tests for our patients. Although not exciting, these problems are worthy of continued effort from both sides to improve quality and consistency.

Regarding the samples submitted, pathologists should continue to include information in the written report about the quality of the sample and the impact that sample quality had on the diagnostic accuracy in the case.⁶ The report is part of a legal medical record and the audience may be a different clinician than the one who submitted it. Without an assessment of sample quality, a lack of abnormal findings may be misinterpreted as a lack of disease. To improve the quality of samples submitted, pathology services could offer training, suggestions of available resources, or creation of better ones. Directions to online resources could be offered in boilerplate portions of reports. When pathologists identify clinicians who repeatedly submit inadequate samples, a call from the pathologist with suggested resources would be

helpful. Poor sample quality is an opportunity for learning and improved care, two things clinicians care deeply about.

Regarding clinical information on requisition forms, pathologists could help clinicians improve through continued education about the value of the information, development of consensus guidelines, and standard requisition forms.¹⁰ Online requests can ease data collection through drop down lists, mouse-over balloons with instructions or examples, and blocks to prevent submission until the data is complete. As a last resort, cytological analysis can be delayed until clinical information is provided.

In addition, a focus on high standards for submission to the laboratory must continue to be matched or exceeded by high standards for the output from the laboratory. Quality assurance and continual improvement in the laboratory are critical to creating trust in the clinician-pathologist relationship. Although clinicians may not like waiting, they generally understand the balance between turn-around time and quality of analysis (e.g. additional time needed for a second opinion, immunocytochemistry, etc.). Experienced clinicians respect pathologists for their rigorous attention to detail and focus on quality in analysis and reporting. Stick to your guns.

Strive for consistency and clarity in reports

Many clinicians remain unclear about probability expressions in cytology reports and this has an effect on clinical decision-making, including decisions about euthanasia.¹⁴ Clinicians would appreciate development of standardized terminology, clear definitions, widespread education, and a critical re-evaluation of understanding of the revised terminology.

The Oncology Pathology Working Group has made excellent progress to improve consistency and clarity in reporting for several malignancies and continued work is ongoing. In addition to the valuable consensus statements produced by this group, the collaboration has been a good venue to improve communications and relationships between oncologists and pathologists. As oncology practice evolves, we may also benefit from a veterinary version of synoptic reporting analogous to that promoted by the College of American Pathologists.^{15,16}

Continue research to improve care

As the peer-reviewed literature on the topic grows, the practice of cytology is becoming more evidence based, improving confidence.^{17,18} Yet many questions remain unanswered, from optimizing sample quality to cytology of normal tissues and a variety of disease states. Research provides an excellent opportunity to improve collaboration between pathologists and clinicians, where we share needs and rewards. Large prospective studies would be ideal, but there is also value in well-designed retrospective studies, particularly if we follow standards (STARD) to optimize quality of the research and reporting.¹⁸ Effort is needed to determine best practices and to disseminate that knowledge, as well as clinical experience, to a wider audience.

Foster dialogue with clinicians

The street goes both ways.

Evaluate all of the slides

Please...and thank you.

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