Synoptic Reporting in Veterinary Medicine
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Introduction

The purpose of Guidelines is to provide standardized methods used to evaluate tumors in animals and accrue data so that, over time, large data sets with comparable information can be evaluated and studies validated uniformly. Ultimately this will enable meaningful conclusions and accurate prognostic information that will improve patient care. This guideline focuses on collecting, archiving and retrieval of important parameters and characteristics of tumors, however, it can be used on non-neoplastic lesions as well. Guidelines and protocols are "living" documents which will be modified as new information becomes available.

Synoptic reporting is a method for reporting specific pieces of data in a discrete format in pathology reports.[1] In human medicine, these have progressed from individual efforts[2] to being mandated by the College of American Pathologists (CAP) for accreditation.[3] In general, a synoptic pathology report consists of pairs of data elements (the item being measured) and responses (the measurements being reported). These pairs may be either *required* or *optional.* Table 1 lists data elements on the left and responses to the right; it also compares a synoptic report with a narrative report. The narrative report also includes descriptors that are not required; in a synoptic report, these could be included in a separate descriptive section. The terminology used by CAP can be modified for veterinary pathology. Synoptic reporting has been shown to make pathology reports more readable to clinicians and patients,[1] as well as making reports more likely to include all data elements needed, however, synoptic protocols include data elements that have been established as diagnostic, prognostic or predictive.[4-7]

To develop an effective synoptic report typically requires the efforts of pathologists and clinicians, who develop the checklist of required and recommended items after reviewing the relevant literature.[8] Currently, there are two main groups producing templates in human medicine, CAP and the International Collaboration on Cancer Reporting (ICCR). Both require a committee of pathologists, oncologists, and other interested representatives (e.g., World Health Organization working groups, etc.) to develop a new protocol.[9,10]

Benefits

Ensuring Completeness of Reports

A number of studies have found that synoptic reporting produces reports that are more likely to contain the significant pieces of information about a disease (as required data elements) as compared to narrative reports. This is likely due to the checklist format in which the required data elements are identified by clinicians and pathologists for a specific disease. For human pancreatic tumors, 100% of synoptic reports had information about small vessel and perineural invasion, compared to 66% and 84% of narrative reports, respectively.[11] In addition, the stage could be determined in 100% of synoptic reports compared to 56% of narrative reports. In a comparison of melanoma reports, mitotic count, histologic subtype, predominant cell type, vascular and lymphatic invasion, neurotropism, desmoplasia, and distance to the nearest margin were all reported significantly more frequently in synoptic reports than narrative reports, both at the teaching institution responsible for the study and the outside reports sent in to the teaching institution for a second opinion.[5] Another study examining reports of colorectal cancer found that 84% of synoptic reports vs. 22% of narrative reports mentioned involvement of the serosa and 64% of synoptic reports vs. 14% of narrative reports mentioned distance from the tumor to the resection margin.[12] Omission of important data elements has also been reported in a survey of surgical pathology reports (n=368) of canine cutaneous mast cell tumors. Margins were reported in 92% of cases, however, lateral and deep margins were described separately in 77% of cases, margin direction was only given in 16% of cases and descriptions of the deep margin component were only available in 11% of cases.[13] A review of tumor margins for canine MCT and STT reported that only 7.5 % of published articles reported quantitative methods to evaluate margins and that the majority reported histologic margins as “complete” or incomplete” (dichotomously).[14]The checklist for the synoptic report form ensures that required data elements are provided for a specific tumor type; for example, the size of tumor and depth of invasion have been shown to be better predictors of canine PWT behavior than grading,[15,16] and both would be listed as “required data elements”. A goal for all of us should be to convince clinicians that they should identify the margins on the gross specimen and mark any specific regions of interest; synoptic

reports list who measured a specimen and identified the gross margin, which may help in this process.

Allowing for Automated Data Collection

While full implementation of standardized reporting would allow for easy automated data collection,[17] even simple implementations of synoptic reporting can allow for significant automated information extraction. For example, if all deep margins are listed as “DEEP MARGIN: <xx>mm” on a line by itself, it is comparatively easy to extract all margins from reports using standard text search and manipulation tools (e.g., grep, cut, etc.). Not only can this improve retrospective studies, but can also provide valuable clinical information, as extracted information can be compared between services, clinicians, and other variables to determine if these have an effect on patient outcomes.

Ease of Interpretation and Increased Satisfaction

From the beginning of synoptic reporting, clinicians in human medicine have reported increased satisfaction with synoptic vs. narrative reports.[2] A study of treating physicians and pathologists in Canada showed that both groups were able to find information in synoptic reports more easily, found that this type of report facilitated a consistent approach to interpretation of diagnostic and prognostic factors, and had higher overall satisfaction.[18] While pathologists felt that reports took approximately 25-50% longer to complete, treating physicians did not notice an increase in turnaround time for submitted pathology samples.

Comparable studies in veterinary oncology are needed. Subjectively it appears that some veterinary clinicians prefer narrative reports and suggest that synoptic reports look too “brief”, (e.g. not as professional as paragraphs). Some feel that the list appearance suggests the pathologist did not review the case carefully, as it is too easy to complete lists therefore they should pay less for the report. In the list format, pathology jargon that may appear impressive is no longer present (anisokaryosis, anisocytosis). Clinicians at universities have told veterinary students - if you have the option, elect descriptive reports as it forces the pathologist to “look longer and think more”. None of these are confirmed with a study but they need to be evaluated. If these perceptions are true, then explaining that the synoptic style of reporting ensures all

critical elements of a tumor are studied and provided in an easy to find style (Table 1), and that these are omitted in significant portions of narrative reports in veterinary and human oncology, may help clinicians see benefits that will improve patient care. We want clinicians to be confident that our reports are factual, accurate and contain all the critical data necessary for them to provide a prognosis and treatment options.

Challenges

There are a number of potential challenges to adoption of synoptic-formatted reports in veterinary medicine. Some of the major obstacles are presented below (in no particular order); however, given the fundamental and sweeping nature of this change, there are likely other unforeseen challenges to wide-scale implementation.

Lack of Standardization

A major gap in the generation and use of synoptic reports in veterinary medicine is a lack of knowledge of and standardization of measurement of prognostic parameters, as discussed in the other Guidelines in this document. When methods are standardized, or at least guidelines followed, development of standardized reporting formats (e.g. synoptic reports) can be developed. There are also no standards for terminology, such as immunohistochemical findings (e.g., “positive” vs. “immunoreactive” vs. “present”), which hinders design of standardized reports.

Uncertainty

One element of a pathology report that isn’t obvious with the synoptic format is how to express *uncertainty*. The synoptic format examples discussed here are primarily adapted for diagnoses of tumors that are confirmed, as each synoptic report template is specific to a particular type of neoplasm. However, this format would still be useful in ensuring completeness of reports in cases that are likely, but not definitively, a specific tumor. While recommendations about how to deal with uncertainty would need to be made by the group creating the synoptic templates, several approaches are possible and need discussion and input from others. At the bottom of the report the term “Diagnosis” is listed as a required data element and beneath that “Comment” is listed as an optional element. Contents of the comment section are narrative and are at the discretion of the pathologist, but this is an obvious place where level of certainty of the diagnosis and what other tests might be considered could be provided. Dealing with

uncertainty for the clinician is best left in the comment section. Flagging cases or data elements (parameters) that are not certain for archiving or publication purposes may require other approaches. In Table 1 we used an asterisk (*) to denote features which would need clarification, especially if cases were to be used in a publication. This type of notation can be used for any data element that the pathologist was not certain of (e.g. diagnosis; differentiation score). This would “flag” items requiring clarification. Another option is that the word “presumptive” could be appended to the diagnosis, which has the advantage of being common in the pathologist lexicon. However, this makes automatic parsing more difficult, leading to difficulties in using information in subsequent retrospective studies. The synoptic format could be restricted to cases where the diagnosis is certain. That would clarify when a particular template should be used, but would make future retrospective studies more difficult, as cases that are likely, but not definitively, a particular tumor would not be included in the synoptic report format. Clinicians and others that may use cases for publication need to know when additional testing may be required to increase the level of certainty. Additional ideas are welcomed, and we hope others will contribute suggestions.

Resident Training

Another issue for many pathologists, particularly in academia, is the effect switching to synoptic reports could have on resident training. Given that residency training programs require written descriptions, and that synoptic reporting has not been universally adopted, residents still require experience in writing narrative reports. This can be mitigated by requiring narrative reports in other resident educational settings (case conferences) to provide practice in writing narrative reports for neoplasms. The checklist approach provides trainees with the important criteria to be searched for and therefore is educational. Possible adoption of the synoptic reporting concept is worthy of discussion by a broad group of stake holders representing various pathology practice settings (state diagnostic labs, commercial labs, teaching hospital labs, governmental reporting, industry, toxicologic pathology, and international organizations). If there is traction towards adoption of synoptic reporting, then further engagement and interaction between coordinators of training programs and certifying examinations (internationally) could mitigate potential issues.

Time in Reporting / Lack of Specialized Software

Many pathologists have concerns regarding the length of time needed to create a synoptic report,[18] however, when synoptic reports have been implemented in human medicine, many of these concerns were in reference to technology issues rather than with the reporting format. In veterinary medicine, no current laboratory information management system (LIMS) can use synoptic reporting. However, any word processor can be used to implement synoptic reporting without specialized software;[17] all that is required is to type the data element, a separator (such as TAB), and the response. Templates can be saved containing required and optional data elements, making it easier for pathologists to fill out reports quickly. These can then be copied and pasted into any LIMS or word processor for subsequent reporting.

Lack of Awareness

Finally, another obstacle to implementation of synoptic reporting is a lack of awareness of synoptic reporting and its potential benefits in veterinary medicine. Clinicians should be informed that this is not a shortcut for pathologists; in fact, it may be more time consuming. The ease of retrieval of the critical information on a case is increased for clinicians, pathologists, and researchers. In straightforward cases, clinicians will save time by rapid review of short critical descriptors and checklists of relevant parameters for case management. In difficult cases, additional narrative description, interpretation, and/or verbal discussion between the pathologist and the clinician may be needed to explain how a specific diagnosis, conclusion, or interpretation was arrived at and what could be done to increase the level of diagnostic certainty. Concepts such as this fit well with “rounds” types of case presentations by residents better than narrative formats geared towards examinations. Establishing working groups of pathologists and oncologists to develop guidelines for specific neoplasms is necessary and will help promote awareness and develop checklists that benefit pathologists, clinicians and patients. Knowing that templates for synoptic tumor reports were created by oncologists and pathologists working together should add confidence in the format. There will also need to be a united education effort with

academia, diagnosticians, clinicians, certifying examination committees, and other stake holders to ensure widespread knowledge and adoption of the new format.

Future Considerations

As standards are developed, templates for synoptic reporting will need to be revised. To allow for standardization, once created, each report template will be assigned a version number. The website will list the current version, provide notifications to denote changes to templates, archive old versions, and list changes between versions. Finally, the template version could also be added as a required data element to reports, making it clear which version was used for a particular report. A similar approach is planned for updated versions of guidelines, protocols, and appendices, analogous to what is presently done by CAP.

The next step beyond synoptic reporting is standardized reporting; that is, having a standardized, specific set of responses for each required question.[7] Ultimately, this can lead to automated staging and grading, as well as improving data harvesting for future research and clinical applications. The addition of free text fields associated with standardized options would allow for customization of reports while retaining standardization for further applications.

Table 1: Comparison of synoptic and narrative reports.

Synoptic Report

Signalment:

History:

Data Element	Response
MASS SIZE:	3 cm x 2 cm x 2 cm
HOW MEASURED:	Gross measurement by laboratory
BIOPSY TYPE:	Excisional
LOCATION:	Left Forelimb proximal to elbow
ASSESSMENT METHOD:	Manual light microscopy with glass slides
HISTOLOGIC TYPE:	Perivascular wall tumor (PWT)
CRITERIA:	Perivascular whorling
DEEPEST LAYER INFILTRATED:	Dermis
HOW DETERMINED:	Histology
DIFFERENTIATION SCORE:	1
MITOTIC COUNT (PER 2.37mm^2):	6
MITOTIC SCORE:	1
NECROSIS:	0
NECROSIS SCORE:	0
TOTAL SCORE:	2
HISTOLOGIC GRADE:	1
LYMPHOVASCULAR INVASION:	None*
METASTASIS:	Not determined*
HOW DETERMINED:	
MARGINS INKED:	By laboratory
MARGIN TYPE:	Radial
DEEP MARGIN HTFD:	3 mm

LATERAL MARGIN HTFD: 6 mm
CAPSULE: No
INFILTRATIVE: Yes

Diagnosis: Perivascular wall tumor, grade I, left forelimb

Comment:

*Denotes features which would need clarification, especially if case was to be used in a publication. This type of notation can be used for any characteristic that pathologist was not certain of (e.g. diagnosis).

Narrative Report

In one transverse and two longitudinal sections (from a 3 x 2 x 2cm mass from the left forelimb, per submitter), the dermis is disrupted by a highly cellular, infiltrative, unencapsulated mass. The mass is composed of cells forming bundles and whorls surrounding empty capillaries. The cells have indistinct borders and eosinophilic cytoplasm. The nuclei are medium to large and fusiform, with finely stippled chromatin and single, central prominent nucleoli. Mitoses average 6 in an area of 2.37mm^2. No necrosis is seen. The mass is separated from the deep and lateral sample margins by 3mm and 6mm, respectively.

DIAGNOSIS:

Perivascular wall tumor, grade I, left forelimb

Comment:

Table 1: The same information in each report is in the same color font.The synoptic format allows easier retrieval of important tumor parameters and the checklist format helps ensure that all parameters are reported. Total “score” and scores for individual parameters are present in synoptic not narrative. Comments would be identical in both styles.

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