

RECOMMENDATIONS FOR THE REPORTING OF SOFT TISSUE SARCOMA

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General Introduction for ADASP Reporting Guidelines & Checklists

It has been evident for decades that pathology reports are very variable even within a single institution. Standardization of reporting is the optimal way to insure that information necessary for patient management, prognostic and predictive factor assessment, grading, staging, analysis of outcomes and tumor registries is included in pathology reports. In recent years, two societies (first ADASP and then the CAP), have undertaken to publish guidelines for the reporting of common cancers. The CAP assigned multidisciplinary groups of pathologists, surgeons, radiation and medical oncologists to develop the protocols. They were then reviewed by other pathologists and clinicians. After those reviews the protocols were reviewed by multiple CAP committees and finally approved by the Board of Governors.

The ADASP, in contrast, chose a pathologist expert in each field to assemble a group from within the pathology community (with clinician input if desired) to write specific cancer protocols. These were then approved by the ADASP Council and subsequently by the membership. Even though both societies began the process at approximately the same time the streamlined approach adopted by the ADASP enabled them to publish years earlier in pathology journals frequented by anatomic pathologists. While the formats are somewhat different, the contents are essentially the same.

The American College of Surgery (ACS) Commission on Cancer (COC) accredits cancer centers in the USA. Recently, the COC decided to require elements, deemed as essential by the CAP, to be described in all pathology reports in their accredited cancer centers as of January 2004. Importantly they do not require that the specific CAP protocols or synoptic reports be utilized. ADASP has updated all of its protocols to comply with the COC requirements in the form of 37 uniform checklists, also available on this website in addition to the formal reporting guidelines. The checklists use the staging criteria cited in the American Joint Committee on Cancer (AJCC) 2002 staging manual (sixth edition) but include a variety of other references listed in each of the checklists. Moreover, the checklists are formatted for ease of use. They may be used as templates for uniform reporting and are designed to be compatible with voice activated transcription.

The different elements in these revised ADASP Diagnostic Checklists have been divided into *Required* and *Optional* . The term *Required* in this context only signifies compliance with the COC guidelines. ADASP realizes that specimens and practices vary and it will not be possible to report these elements in every case. However, ADASP hopes that pathologists will find these checklists to be useful in daily clinical practice, while facilitating compliance with the new COC requirements.

The checklists are in standard PDF file format, and may be easily downloaded from the ADASP website. They are not to be reproduced, altered or used for commercial purposes without consent from ADASP.

The Association of Directors of Anatomic and Surgical Pathology, 2003.

RECOMMENDATIONS FOR THE REPORTING OF SOFT TISSUE SARCOMA

Features to be Included in the Final Pathology Report

These recommendations are designed for the handling of commonly resected soft tissue sarcomas and, as such, they are applicable most often to tumors from adult and adolescent patients. Because surgical resection less often plays a central role in the management of pediatric sarcomas (particularly those of round cell type), because the majority of such cases are pretreated chemotherapeutically and because staging and grading systems in the pediatric setting are quite different from those employed for the more frequent adult lesions, these recommendations will not usually be applicable to tumors from children. However, these guidelines can still be used for the minority of pediatric cases which are treated primarily by surgical excision.

It is important to note that some parts of these recommendations cannot be applied easily to the growing number of adult sarcomas which have been pretreated with radiotherapy and/or chemotherapy. The changes commonly induced by such therapy make definitive histologic typing and grading often impossible. Furthermore, there are neither reliable methods nor established criteria for distinguishing treatment effects (e.g. necrosis or fibrosis) from spontaneous tumor cell necrosis or other degenerative changes.

Although not strictly related to the reporting of formal resection specimens, the Association offers the following guidelines regarding the increasing use of needle biopsy in soft tissue tumor diagnosis:

1. The principal role of needle biopsy is to document the presence of malignancy and to establish, if possible, whether a lesion is mesenchymal or not (i.e. to try to rule out metastatic carcinoma, melanoma and lymphoma); precise typing and grading are often

not possible and certainly are not mandatory on such limited material, although some biopsies may show obviously high grade tumor;

2. Needle biopsies are prone to sampling error and may not provide adequate material for diagnosis; pathologists should not be reluctant to request additional tissue (e.g. an incisional biopsy) when appropriate;
3. Because of potential sampling problems, grading rendered on a needle biopsy may be an underestimate; unless obvious high grade tumor is present, it is often inappropriate to provide a definitive grade;
4. While acknowledging the clinical convenience of needle biopsy (especially in diagnosing tumor relapse), the Association has concerns a) that the relative rarity and morphologic heterogeneity of soft tissue tumors renders them susceptible to misdiagnosis by this technique and b) that the increasing use of needle biopsy followed by preoperative therapy may lead to significant loss of useful pathologic and prognostic information. The Association, however, acknowledges that current oncologic fashion in some centers favors this operational combination. Pathologists may therefore sometimes have to make do with such limited material and hence may more often resort to a diagnosis of unclassified sarcoma.

The Following are Recommendations for Handling Resections Specimens:

Gross Description

1. How the specimen was received - fresh or in formalin, uncut or cut, oriented or not, margins inked or not.

Note: The Association recommends that, whenever possible, biopsies and resections of soft tissue sarcomas are received unfixed in the pathology laboratory (or frozen section room) as soon as possible after excision. This facilitates optimal utilization of special studies (see below) and minimizes artefactual distortion of specimen orientation and margins. The Association further recommends that, whenever possible, the precise orientation of a resection specimen be verified with the help of one of the operating surgeons.

2. How the specimen was labelled/identified and whether patient details correspond to those on the accompanying request form.
3. The type of procedure which was performed (where known or stated): excisional biopsy, simple or local excision, wide local excision, compartmentectomy, radical excision, amputation (state the type).
4. Measure the specimen and describe the tissues included: skin, subcutaneous fat, fascia, skeletal muscle (identify when possible), periosteum or bone, major neurovascular bundles, attached organs (for thoraco-abdominal, pelvic or retroperitoneal tumors).

Note: The closest resection margins (identified visually or by palpation) should be inked. It may not be necessary to ink the entire specimen margin (unless small) since this may be associated with misleading seepage of ink. If time allows, margins are

always more easily assessed after 6-12 hours fixation since firmer tissues are more easily cut without distortion.

5. Tumor description

- a) size of the tumor in cm (preferably in three dimensions);
- b) depth of the tumor where evident (e.g. dermal, subcutaneous, fascial, subfascial, intramuscular, visceral or more than one of these);
- c) presence or absence of necrosis - if present the approximate percentage of tumor involved should be stated, based upon serial slicing;

Note: The significance of necrosis in pre-treated soft tissue sarcomas at present is unknown but the extent of necrosis in such specimens should not be used as a grading parameter.

- d) appearance and texture of the tumor cut surface (e.g. color, firm/soft, fatty, gelatinous, calcified, hemorrhagic);
- e) presence or absence of previous biopsy site or scar, with dimensions and relationship to present resection margins;
- f) involvement or invasion of major structures such as nerve, bone, major blood vessels;
- g) presence of satellite nodules of tumor away from the main mass - if present their maximum dimension should be measured; also measure minimum distance to closest resection margin;
- h) presence of lymph nodes, along with size and description of cut surface;

Note: Lymph node dissection is not a routine component of the surgical management of most soft tissue sarcomas. Lymph nodes are not present in the majority of limb resection specimens and lymph node involvement is very uncommon except in certain specific tumor types, e.g. angiosarcoma and epithelioid sarcoma;

- i) measured minimum distance to margins; as a minimum, all margins that are less than 2 cm should be measured and specified in the final report. Most specimens have six margins - superficial/deep, proximal/distal, medial/lateral; if a margin consists of either a fascial layer, periosteum or other anatomical barrier (e.g. diaphragm) this should be specified;
- j) specify by letter or number the location or orientation (where pertinent e.g. margins) of each tissue block taken for routine processing;

Note: The Association recommends sampling of all areas which appear different macroscopically with an overall block number (in most cases) of approximately 1 per cm of the tumor's greatest dimension. For very large tumors (e.g. retroperitoneal) it is rarely necessary to take more than a total of 10-12 blocks of tumor. The Association also advocates the use of perpendicular (rather than en face) blocks from margins in soft tissue sarcoma. Any margin macroscopically more than 5 cm clear generally need not be sampled, except in cases of epithelioid sarcoma and angiosarcoma which are prone to subclinical proximal or satellite spread; conversely any margin closer than 1.5-2 cm is a potential source of

concern and en face sampling of such margins is not sufficiently sensitive in this specific setting.

- k) tissue taken for special studies (e.g. electron microscopy, snap-freezing, cytogenetic analysis or DNA flow cytometry) should be specified.

Diagnostic Information

1. Site and depth of tumor;
2. Histological type (use WHO system¹ when possible - a simplified classification scheme is also provided in Appendix 1); if tumor type is unknown then the term 'unclassified sarcoma' with a qualifier such as pleomorphic, spindle cell, myxoid or round cell is useful;
3. Maximal dimension of tumor (in cm) ;
4. Histologic grade;

Note: The Association acknowledges that most published grading systems for soft tissue sarcomas correlate with outcome. However no existing system is perfect and some specific tumor types are definitionally either high or low grade while others are not susceptible to meaningful grading (e.g. alveolar soft part sarcoma, clear cell sarcoma, epithelioid sarcoma) - see Appendix 2. For these reasons histologic grading is often somewhat subjective and the Association does not believe that use of any specific published grading system should be mandatory at this time. The two systems used most widely are those of the French (FNCLCC)²⁻⁴ and the National Cancer Institute (NCI)^{5,6}.

Either system may be used so long as this is clearly stated in the report. Most recent data demonstrates that the FNCLCC system is more effective⁷ but the Association acknowledges that there remains a need for future refinement in histologic grading of soft tissue sarcomas. The ADASP Soft Tissue Tumor checklist uses the FNCLCC system.

5. Minimum distance(s) to resection margins - any margin less than 2 cm from the tumor should be specified in terms of location and distance;

Note: It is believed generally that surgical margins of less than 1.5-2 cm in soft tissue sarcoma predispose to an increased risk of local recurrence unless further surgery or irradiation is undertaken. However if a surgical margin is bounded by an unbreached layer of fascia or periosteum this risk probably does not apply⁸, but such margins should still be measured if close.

6. Histologic evidence of a pre-existing benign lesion (only applicable to nerve sheath neoplasms);
7. Lymph node status (if present);
8. Results of any special investigations (e.g. special stains, immunohistochemistry, electron microscopy, DNA flow cytometry, karyotype).

Optional Features in Diagnostic Report

In many tumor types one or more of the features listed below may impact on either the likelihood of recurrence or overall prognosis.^{9,10} Although mitotic rate and estimation of

necrosis are key features of most grading systems, some pathologists may prefer to comment on them specifically in the final report.

1. Mitotic rate, expressed as number of mitoses per 10 high power fields;

Note: While acknowledging that mitotic rates vary according to factors such as cellularity, section thickness, fixation and the type of microscope used, since there is no better or more reliable alternative the Association recommends that mitoses be counted using the x40 objective and that mitoses be counted in the most proliferative area identified. Average counts over a larger area have no known significance in this specific context.

2. Extent of necrosis, as confirmed histologically;
3. Presence or absence of vascular invasion, irrespective of vessel type;
4. Character of lesional margin - e.g. circumscribed, focally infiltrative, diffusely infiltrative;
5. Presence, extent and type of inflammatory infiltrate.

This report was first prepared in 1998 by an Ad Hoc Committee composed of Christopher D.M. Fletcher (Chair), Richard L. Kempson and Sharon W. Weiss. These guidelines were updated in 2003. Correspondence should be addressed to the Chair of the Ad Hoc Committee

APPENDIX I: CLASSIFICATION OF SOFT TISSUE SARCOMAS

ADIPOCYTIC TUMORS

INTERMEDIATE (locally aggressive)

Atypical lipomatous tumor/well-differentiated liposarcoma

- a) lipoma-like
- b) sclerosing
- c) inflammatory
- d) spindle cell

MALIGNANT

- dedifferentiated liposarcoma
- myxoid/round cell liposarcoma
- pleomorphic liposarcoma

FIBROUS/MYOFIBROBLASTIC TUMORS

INTERMEDIATE (rarely metastasizing)

Solitary fibrous tumor (incorporates hemangiopericytoma)

Inflammatory myofibroblastic tumor

Dermatofibrosarcoma protuberans

Low grade myofibroblastic sarcoma

Myxoinflammatory fibroblastic sarcoma

Infantile fibrosarcoma

MALIGNANT

Adult fibrosarcoma

Myxofibrosarcoma

Low grade fibromyxoid sarcoma

Sclerosing epithelioid fibrosarcoma

SO-CALLED FIBROHISTIOCYTIC TUMORS

INTERMEDIATE (rarely metastasizing)

Plexiform fibrohistiocytic tumor

Giant cell tumor of soft tissue

MALIGNANT

Undifferentiated pleomorphic sarcoma/pleomorphic 'MFH'

Undifferentiated pleomorphic sarcoma with giant cells/giant cell 'MFH'

Undifferentiated pleomorphic sarcoma with prominent inflammation/inflammatory 'MFH'

Malignant tenosynovial giant cell tumor

SMOOTH MUSCLE TUMORS

Leiomyosarcoma

PERIVASCULAR TUMORS

Malignant glomus tumor

SKELETAL MUSCLE TUMORS

Rhabdomyosarcoma

- embryonal
- botryoid
- spindle cell
- alveolar
- pleomorphic

VASCULAR TUMORS

INTERMEDIATE (rarely metastasizing)

Kaposi sarcoma

MALIGNANT

Epithelioid hemangioendothelioma

Angiosarcoma (lymphangiosarcoma)

NEUROECTODERMAL TUMORS

Malignant peripheral nerve sheath tumor

- with heterologous rhabdomyosarcoma (Triton tumor)
- with other mesenchymal heterology
- epithelioid variant

Malignant granular cell tumor

Malignant melanotic schwannoma

Malignant peripheral primitive neuroectodermal tumor (PNET)
(extraskeletal Ewing's sarcoma)

EXTRASKELETAL CHONDRO-OSSEOUS TUMORS

Extraskeletal mesenchymal chondrosarcoma

Extraskeletal osteosarcoma

TUMORS OF UNCERTAIN DIFFERENTIATION

INTERMEDIATE (RARELY METASTASIZING)

Angiomatoid 'MFH'

Ossifying fibromyxoid tumor

Myoepithelioma/mixed tumor

MALIGNANT

Alveolar soft part sarcoma

Epithelioid sarcoma

Synovial sarcoma

Extraskeletal myxoid chondrosarcoma

Clear cell sarcoma (malignant melanoma of soft parts)

Desmoplastic small cell tumor

Extrarenal rhabdoid tumor

Intimal sarcoma

PEComa

Malignant mesenchymoma

APPENDIX 2: GUIDELINES FOR GRADING SOFT TISSUE SARCOMAS

Tumors which are definitionally high grade

Ewing's sarcoma/PNET
Rhabdomyosarcoma (except spindle cell and botryoid variants)
Angiosarcoma
Pleomorphic liposarcoma
Soft tissue osteosarcoma
Mesenchymal chondrosarcoma
Desmoplastic small cell tumor
Extra-renal rhabdoid tumor

Tumors which are definitionally low grade

Atypical lipomatous tumor/
well-differentiated liposarcoma
Dermatofibrosarcoma protuberans
Infantile fibrosarcoma
Angiomatoid 'MFH'

Tumors which are not gradable but which often metastasize within 10-20 years of follow-up

Alveolar soft part sarcoma
Clear cell sarcoma
Epithelioid sarcoma
'Low-grade' fibromyxoid sarcoma

Tumors of varying behavior for which grading may be prognostically useful

Myxoid liposarcoma
Leiomyosarcoma
Malignant peripheral nerve sheath tumor
Myxofibrosarcoma
Fibrosarcoma
Unclassified pleomorphic sarcoma ('MFH')*

Tumors of varying behavior for which grading parameters not yet well established

Synovial sarcoma
Myxoid chondrosarcoma
Malignant granular cell tumor
Malignant mesenchymoma

*Lesions labelled as unclassified pleomorphic sarcoma/pleomorphic 'MFH' can only be graded if non-sarcomatous mimics with similar morphology have first been excluded.

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