Quality in the practice of anatomic pathology is a facet of patient care that is most visible in the surgical pathology report. To address this issue, the Quality Management Practice Review Committee of the ASCP has designed a process that: (1) samples the current practice of pathology for single organs through a survey of a broad spectrum of practitioners; (2) analyzes the results in consultation with a group of knowledgeable pathologists, including at least one individual recognized for special expertise in the area; and (3) provides a commentary composed by the expert under the critical direction of the group. The resulting documents are intended to inform and guide rather than direct those who must evaluate any particular organ in the practice of surgical pathology.

This report concerns the urinary bladder, one of the 10 leading causes of cancer-related deaths in the United States. Table 1 characterizes the work environment of the survey participants. This is followed by general comments from the author. The report is organized according to the type of specimen usually submitted for pathologic evaluation of bladder disease, especially bladder cancer. For each specimen type, there is an introductory paragraph. This is followed by tables of the survey results divided into gross inspection, sectioning, microscopic evaluation, and reporting. Each table is followed by commentary from the author. The survey included questions concerning special techniques not routinely used in most laboratories. It did not include urinary cytology. This section was added by the author.

SURVEY OF PARTICIPANTS

Participants in the survey were members chosen to represent a variety of settings reflective of the distribution of pathology practices in this country. Practice settings were characterized according to hospital size and type as well as the workload in surgical pathology.

PRACTICE SURVEY AND COMMENTARY FOR URINARY BLADDER SPECIMENS: PATHOLOGICAL EXAMINATION AND REPORTING

General Comments And Personal Approach

The ASCP Survey on Surgical Pathologic Examination of the Urinary Bladder indicates a very high level of practice among the responders. Tissue specimens of urinary bladder are received in three basic forms: cystectomy (total, radical and occasionally partial), transurethral resection (TURB), and biopsy. Urinary cytology should be added to these forms. Most biopsy and cytology specimens are collected for diagnosis or monitoring of patients with a clinical suspicion of neoplasia. Almost all TURBs and cystectomies are submitted for evaluation of established cancers. Therefore, the following discussion primarily applies to pathological examination of bladder neoplasms, recognizing that special circumstances may exist for evaluating samples submitted for other reasons.

The rationale for many “standard” methods of examination, interpretation, and reporting has not been supported by rigorous studies. These approaches have been adopted largely through custom. Many are of questionable value in the management of patients. Among those of questionable value are specimen weight, tumor configuration, determination of angiolympathic invasion, substaging on the basis of muscularis mucosae, and the significance of intraepithelial abnormalities. As studies addressing the validity of certain customary approaches are performed, alterations in our recommendations will be required.

It is important to record the amount of tissue received, perhaps primarily as a correlation to the amount submitted. This can be done either by counting the number of specimens in each sample container, measuring the specimens, or weighing them. With the possible exception of TURBs, the weight of the specimen has little bearing on clinical management.
Classification of transitional cell neoplasms according to
their growth pattern (papillary or solid) offers very little useful
information for patient care so long as it is understood that
neither papillary nor solid urothelial neoplasms are currently
classed as in situ. 2-4 The distinction has been widely applied to transitional cell neoplasms and may originate from a time when in situ lesions were defined as both papillary and flat, and carcinoma in situ as a distinct entity had not been
well established. All papillomas and grade 1 transitional cell
carcinomas, almost none of these tumors are invasive. Therefore, the
designation "papilloma" or "transitional cell carcinoma grade
in situ" should be recorded separately according to their cytological
severity as dysplasia (atypical hyperplasia) or CIS. A severely
differentiated, angulated, wispy groups of muscle fibers within
the lamina propria. In the human urinary bladder, these mus­
cular walls. For example, the spaces underlying the urothelium
often are not in the same plane as the muscle fibers, and can be
used as a substitute landmark only in the most general sense.
The orientation of most specimens, especially those with inva­
sive cancers, may not allow such a finely tuned interpretation of
depth of invasion.
Urologists have learned by empirical observation that transi­
tional cell neoplasms not invading the muscular wall at initial
diagnosis are amenable to bladder sparing treatments and may
identify patients at decreased risk for an adverse outcome.
They refer to such lesions, regardless of configuration, grade, or
presence of lamina proprial invasion as "superficial bladder
tumors." A statement of the presence of muscular wall (detru­
sor) tissue in the specimen is important to urologists, and must
be reported even if the muscle is not invaded by the tumor.14
Intraepithelial abnormalities with cytological features re­
sembling those of bladder neoplasms (dysplasia/atypical hy­
perplasia) should be noted, but the clinical importance of this
information is not completely clear. Intraepithelial lesions are
best examined using fixatives that preserve the greatest amount of
nuclear detail. Bouin's-type fixatives are optimal, but tissues
exposed to these solutions cannot be subsequently examined
by electron microscopy, and are suboptimal at best for flow
cytometry.12 Zinc formalin produces specimens with sufficient
nuclear detail for adequate analysis by those methods. Phos­
phate buffered formalin is acceptable, but special attention
should be paid to maintaining a constant pH of 6.8 to 7.0 in the
solution. The lowest grade of intraepithelial lesions (simple hyper­
plasia, dysplasia, atypical hyperplasia) is difficult to define and
recognize. The highest grade lesions (CIS) are easily seen,
but usually accompany high-grade invasive tumors known to
have a poor prognosis anyway. A flat intraepithelial lesion with
cytologic features identical to those of a contiguous papillary or
invasive neoplasm should be considered part of the tumor
rather than a separate neoplasm. In contrast, similar intra­
epithelial abnormalities occurring at non-contiguous sites
should be recorded separately according to their cytological
severity as dysplasia (atypical hyperplasia) or CIS. A severely
dysplastic lesion separate from CIS has not been defined as an
entity with distinctive clinical or pathological features in the
urinary bladder.11 A full thickness change such as required by
the 1961 Congress on Uterine Cervical Lesions is not necessary
to recognize CIS in the urothelium.
Urinary cytology is essential to accurate detection and moni­
toring of patients with bladder neoplasms.6,11 It is especially
useful in cases of carcinoma in situ and in patients treated with
topical therapy. It is the only reliable method to monitor pa­
tients with intestinal conduits, and will become important to
the assessment of the increasing number of individuals with
"intestinal neobladders" connected to their residual urethras.
Many, if not most, pathologists involved in examining speci­
mens from bladder cancer patients routinely evaluate urinary
samples. This type of specimen should be an integral part of
any commentary on bladder specimen examination.

TABLE 1. SIZE AND TYPE OF HOSPITAL

| Number of | Non-University | Private | Laboratory | Total |
| Beds (%)  | Hospital (%)   | Hospital (%) | (%)       | (%)   |
|<100       | 8             | <1        | 2          | 11    |
|100-299    | 34            | 3         | 3          | 38    |
|300-500    | 24            | 10        | 0          | 34    |
|>500       | 8             | 9         | 0          | 17    |
|Total (%)  | 74            | 23        | 3          | 100   |

Number of Surgical Specimens (per year)

<table>
<thead>
<tr>
<th>Number of Surgical Specimens (per year)</th>
<th>Size of Workload</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2,500 2,500 to 5,000 5,000 to 10,000 10,000 to 20,000 &gt;20,000</td>
<td>9% 20% 30% 35% 6%</td>
</tr>
</tbody>
</table>

A.J.C.P. • December 1994

Cystectomy

These specimens almost always include the entire urinary
bladder and contiguous pelvic structures such as segments of
ureters and paravesical fat. In women, the entire urethra is
anatomical barrier separating a lamina propria from a submu­
cosa. The thick-walled blood vessels appearing in this area
often are not in the same plane as the muscle fibers, and can be
used as a substitute landmark only in the most general sense.
included. In men, a segment of urethra is usually included, although some surgeons resect the entire organ. The prostate gland, seminal vesicles, and segments of vasa deferentia also are included in specimens from men. Most surgeons will have separately submitted portions of distal ureters for frozen section examination to ensure adequacy of resection, so that the ureteral margins in the cystectomy specimen will not represent the actual distal margins. The urethral margin is generally distinct. Except in unusual circumstances, specimens need not be inked.

Partial cystectomies are almost always composed only of urinary bladder. Although not addressed in the survey, they can be evaluated using the same principles. Full thickness sections from the lateral margins of these wedge-shaped specimens, embedded so as to section the specimen margin (after minimal facing of the block) are recommended.

**Gross Inspection and Processing**

<table>
<thead>
<tr>
<th>Survey Information</th>
<th>% Affirmative Responders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record weight of specimen</td>
<td>42.2</td>
</tr>
<tr>
<td>Record measurements of specimen</td>
<td>99.5</td>
</tr>
<tr>
<td>Record measurements of tumor</td>
<td>96.8</td>
</tr>
<tr>
<td>Record length of attached ureters</td>
<td>90.3</td>
</tr>
<tr>
<td>Record length of attached urethra</td>
<td>71.5</td>
</tr>
<tr>
<td>Cut specimen while in fresh state prior to fixation</td>
<td>39.1</td>
</tr>
<tr>
<td>Fix overnight before sectioning</td>
<td>65.6</td>
</tr>
<tr>
<td>If prostate is included, inject with fixative before sectioning</td>
<td>10.2</td>
</tr>
<tr>
<td>Submit section(s) of ureteral margin for histologic examination</td>
<td>95.2</td>
</tr>
<tr>
<td>Submit section(s) of urethral margin for histologic examination</td>
<td>97.3</td>
</tr>
<tr>
<td>Identify margins using ink</td>
<td>76.2</td>
</tr>
<tr>
<td>Identify margins using methods other than ink</td>
<td>34.1</td>
</tr>
<tr>
<td>Use different color inks for different surfaces</td>
<td>27.0</td>
</tr>
<tr>
<td>Describe size and location of any abnormality</td>
<td>88.1</td>
</tr>
<tr>
<td>Save piece of frozen tumor tissue for possible future study</td>
<td>10.8</td>
</tr>
<tr>
<td>Search paravesical tissue for lymph nodes and submit all lymph nodes for histologic processing</td>
<td>93.5</td>
</tr>
<tr>
<td>State whether the apex of bladder is (grossly) involved by tumor</td>
<td>64.7</td>
</tr>
</tbody>
</table>

**COMMENTARY**

There is remarkable uniformity in the methods by which pathologists inspect and process cystectomy specimens. A method worth considering, but not widely used, involves inflating the bladder with formalin, fixing overnight, and bivalving the specimen in the frontal plane. The preferred method can be summarized as follows:

- Open specimen along the anterior mid-line, creating angular cuts at the dome if necessary to pin the specimen flat;
- Measure specimen, including lengths of ureteral segments and urethra (do not probe urethra or ureters for identification; look for ties or clips on ureters);
- Remove paravesical fat and search for lymph nodes (there are rarely more than 2 or 3);
- Record any urothelial abnormalities (erythema, surgical resection ulcers, tumors) but do not rub the mucosa;
- Pin bladder and associated tissue flat and fix overnight.

**Sectioning**

<table>
<thead>
<tr>
<th>Survey Information</th>
<th>% Affirmative Responders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Label each section as to site of origin</td>
<td>88.1</td>
</tr>
<tr>
<td>Submit full thickness sections of bladder having visible tumor to demonstrate:</td>
<td></td>
</tr>
<tr>
<td>invasion depth</td>
<td>95.7</td>
</tr>
<tr>
<td>invasion pattern</td>
<td>85.4</td>
</tr>
<tr>
<td>relationship to adjacent mucosa</td>
<td>92.9</td>
</tr>
<tr>
<td>Submit full thickness sections of bladder having tumor-free-mucosa to show:</td>
<td></td>
</tr>
<tr>
<td>ureteral orifices</td>
<td>49.7</td>
</tr>
<tr>
<td>trigone</td>
<td>71.7</td>
</tr>
<tr>
<td>right wall</td>
<td>69.0</td>
</tr>
<tr>
<td>left wall</td>
<td>69.0</td>
</tr>
<tr>
<td>dome</td>
<td>69.0</td>
</tr>
<tr>
<td>urethral margin</td>
<td>82.6</td>
</tr>
<tr>
<td>Submit random full thickness sections of bladder having tumor-free mucosa</td>
<td>84.3</td>
</tr>
<tr>
<td>Submit full thickness sections to show abnormal mucosa away from tumor</td>
<td>91.4</td>
</tr>
<tr>
<td>Submit 1 to 3 sections of bladder tumor</td>
<td>39.3</td>
</tr>
<tr>
<td>or</td>
<td></td>
</tr>
<tr>
<td>Submit 3 or more sections of bladder tumor</td>
<td>52.2</td>
</tr>
<tr>
<td>or</td>
<td></td>
</tr>
<tr>
<td>Submit at least 3 sections of bladder tumor plus 1 additional section for each 1 cm of tumor</td>
<td>31.8</td>
</tr>
<tr>
<td>Submit sections to show paravesical soft tissue margin of tumor</td>
<td>87.4</td>
</tr>
<tr>
<td>State the depth of tumor invasion</td>
<td>95.7</td>
</tr>
<tr>
<td>State whether the muscularis (propria) is involved</td>
<td>97.8</td>
</tr>
<tr>
<td>State whether the paravesical fat is invaded</td>
<td>96.8</td>
</tr>
<tr>
<td>For all lymph nodes found, submit entire node for histologic sectioning</td>
<td>84.5</td>
</tr>
<tr>
<td>If prostate is present, follow the usual protocol (used at your institution) for its examination</td>
<td>87.0</td>
</tr>
</tbody>
</table>
COMMENTARY

Almost all pathologists routinely submit sections to fully evaluate tumors and their invasiveness. They are also interested in the urethral and ureteral margins. There is considerably less agreement regarding the number of sections required to adequately characterize the tumor and the sampling of pre-selected sites of apparently normal mucosa. Estimations of volume of neoplastic tissue at specimen margins are apparently not attempted. Given the complexity of a cystectomy specimen and the variety of abnormalities that might occur, it seems reasonable to take the following sections (Fig. 1):

- Margins of ulcers or tumors at 1 section per cm diameter of lesion (full thickness);
- Sections through the deepest portions of ulcers or tumors (full thickness);
- Sections from mottled or erythematous areas of mucosa (need not be full-thickness, but should include bladder wall);
- Representative sections from grossly normal mucosa at the dome, lateral walls, trigone (need not be full-thickness);
- The distal urethra (this is best accomplished by amputating the distal urethra at a point approximately 1 cm from the surgical margin and creating vertical sections from this piece, so that the distal surgical margin will have been sampled at multiple right angle sites; a portion of the underlying prostate gland in men tends to stabilize the sections in the embedding process and reveals tumor involvement of periurethral ducts and should be included);
- Transections of distal, mid-portions, and intramural portions of ureters;
- Representative sections of prostate gland (if present) to include any grossly visible lesions, and any portion of the peri-urethral part of the gland not previously included in the sections of urethral margin;
- Representative sections of seminal vesicles and vasa deferentia.

In most cases, the entire cystectomy specimen can be included in less than 25 blocks. A reasonable attempt should be made to identify intramucosal abnormalities, but several studies have already indicated that intraepithelial dysplasia/CIS occurs in essentially every case if diligently sought. It is not necessary to reconfirm this in every case. Widespread intramucosal disease will be sampled with the recommended techniques and should be recorded, because it might have prognostic importance. If prostate glands are serially sectioned, 40% to 50% will contain areas of adenocarcinoma. These carcinomas are usually low grade and low stage. There is no evidence that their presence affects overall prognosis. The prognostic importance of transitional cell carcinoma in the prostate gland is more controversial. Many experts consider prostatic involvement to be evidence of a high stage tumor whereas others believe that prostatic involvement is only important if the tumor has invaded the stroma. If the distal urethra is sectioned according to the method above, a great deal of prostatic tissue will be included. Gross inspection of the prostate can identify large tumors in the majority of instances. Given the available data, it

![Fig. 1. Routine sections of cystectomy specimen. (Adopted from a diagram used by the National Bladder Clinical Collaborative Group A. — = sections (not exactly oriented); Ur = ureter; U = urethra; SV = seminal vesicle; P = prostate; and E = erythema.)](https://academic.oup.com/ajcp/article-abstract/102/6/715/1755453/ASCP-Survey-on-Anatomic-Pathology-Examination-of)
seems reasonable to keep the random prostate sections to a minimum.

**Microscopic Evaluation**

**Survey Information**

<table>
<thead>
<tr>
<th>% Affirmative Responders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classify tumor according to growth pattern (eg, papillary, non-papillary, etc.)</td>
</tr>
<tr>
<td>Classify tumor according to histologic cell type (eg, transitional cell, adenocarcinoma, etc.)</td>
</tr>
<tr>
<td>Assign grades, specifying the grading system: 1 to 2 grade system (low-grade vs high grade)</td>
</tr>
<tr>
<td>1 to 3 grade system</td>
</tr>
<tr>
<td>1 to 4 grade system</td>
</tr>
</tbody>
</table>

**REPORTING**

<table>
<thead>
<tr>
<th>% Affirmative Responders</th>
</tr>
</thead>
<tbody>
<tr>
<td>State tumor/node/metastasis (TNM) staging system that you use</td>
</tr>
<tr>
<td>State whether there is carcinoma in situ</td>
</tr>
<tr>
<td>Describe the extent of carcinoma in situ</td>
</tr>
<tr>
<td>Comment on the presence and degree of dysplasia</td>
</tr>
<tr>
<td>Comment on angiolymphatic invasion</td>
</tr>
<tr>
<td>Comment on multiple microscopic foci of cancer</td>
</tr>
<tr>
<td>State the distance of the tumor from surgical margins</td>
</tr>
</tbody>
</table>

If prostate is included in the surgical specimen, state whether tumor:
- Extends into prostatic urethra; 88.1
- Extends into periurethral ducts; 74.5
- Invades prostatic stroma. 94.6

**ASSIGN GRADES**, specifying the grading system:
- 1 to 2 grade system (low-grade vs high grade) 2.8
- 1 to 3 grade system 58.6
- 1 to 4 grade system 44.8

**COMMENTARY**

Classification of neoplasms according to their depth of invasion, dissemination (if known), and degree of cytologic anaplasia is standard procedure for most pathologists. In organs lined by urothelium, most pathologists also evaluate the grossly unremarkable mucosa. Microscopic evaluation should include observations of the following:

- Pathologic abnormalities and their sites of origin, including non-neoplastic abnormalities such as previous surgical sites;
- The histologic type, grade (TCC only), and depth of invasion of neoplasms;
- The presence or absence of angiolymphatic invasion, realizing that many subepithelial spaces are not true vessels;
- Specimen margins (distal ureters, urethra and the soft tissue margin) overlying the tumor/surgical resection site;
- Abnormalities in contiguous organs.

The lack of uniformity in grading bladder neoplasms is not surprising. Almost all pathologists agree that grading of transitional cell neoplasms is important as an indicator of future behavior. There are several grading systems in current use. With notable exceptions, the histologic criteria by which any individual tumor could be classified into any particular grade have not been well established in the literature. A certain amount of intra- and interobserver variability can be expected when systems are poorly defined, or when multiple variables must be considered. Given these problems, a surprising degree of uniformity in approach, if not in nomenclature, occurs for transitional cell neoplasms. Many clinicians and pathologists recognize that the lowest grade tumors are histologically and cytologically benign even though they are associated with a high frequency of new tumors arising in the bladder. Many clinicians and pathologists also agree that the potential for aggressive behavior is proportional to the degree of cellular anaplasia. Studies using both empirical observations and flow cytometry strongly indicate that the majority of anaplastic transitional cell tumors, whether graded as grade II or grade III in the WHO system or as grade 2 to grade 4 in the Ash-Broders system, are aneuploid and aggressive. Non-transitional cell neoplasms can be graded, but correlations of grade with behavior have been less clear.
• Urinary bladder;
• Segment of urethra;
• Segments of ureters;
• Seminal vesicles;
• Segments of vasa deferentia;
• Prostate gland;
• Paravesical fibroadipose tissue.

Communication with clinicians is greatly facilitated if the grading scheme used is included on the report. This can be easily accomplished by noting the scheme, such as WHO, Ash-Broders, Bergkvist, etc., beside the numerical classification (ie, WHO I/III, Ash-Broders 2/4, Bergkvist 3/4. The author's personal grading preference is detailed elsewhere.1 Information regarding staging (ie, extent of invasion, lymph node metastases, and dissemination to distant sites), should be recorded. It can be communicated directly using the UICC/AJCC system or indirectly through inclusion of this information in a note or description included in the pathology report.4

TRANSURETHRAL RESECTIONS

Transurethral resections (TURBs) are almost always removed from patients with highly suspicious lesions or pathologically proven carcinomas. Orientation is often a problem, especially in the evaluation of muscle invasion. Collagenous tissue may be abundant and may be mistaken for muscle.

Microscopic Evaluation

Survey Information

<table>
<thead>
<tr>
<th>% Affirmative Responders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classify tumor according to growth pattern (eg, papillary, non-papillary, etc.)</td>
</tr>
<tr>
<td>Classify tumor according to histologic cell type (eg, transitional cell, adenocarcinoma, etc.)</td>
</tr>
<tr>
<td>Distinguish between invasion of muscularis mucosae and muscularis propria</td>
</tr>
<tr>
<td>Comment on other non-malignant conditions (eg, inflammation and radiation change)</td>
</tr>
</tbody>
</table>

COMMENTARY

Responding pathologists attempt to classify bladder neoplasms according to the information included in the section on cystectomy. Almost three fourths are able to identify the muscularis mucosae as a tissue component distinct from muscularis propria. Because the muscularis mucosae usually is poorly developed in humans and the thick-walled blood vessels that occupy the lamina propria tend not to occur in a uniform plane, it is difficult to recommend using the muscularis mucosae to divide subepithelial connective tissue into two layers: lamina propria and submucosa.1 Most pathologists recognize that not all TURBs are performed for neoplastic disease. The recommended approach to microscopic evaluation of TURBs is summarized as follows:

- Identify pathological abnormalities;
- Observe the extent of the abnormalities;
- Observe type, grade, and depth of invasion of neoplasms;
- Observe the presence of fat (fat may occur within the bladder and does not always indicate transmural transgression).

Gross Inspection and Processing

<table>
<thead>
<tr>
<th>% Affirmative Responders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record measurements of specimen</td>
</tr>
<tr>
<td>Record weight of specimen</td>
</tr>
<tr>
<td>Embed entire specimen</td>
</tr>
<tr>
<td>Embed representative portion of specimen</td>
</tr>
</tbody>
</table>

Commentary

Most pathologists record some measure of the amount of specimen received. The specimen is usually small enough to be entirely embedded for microscopic examination. Fat is not uncommon in TURBs. It may be paravesical or part of the lamina propria or even muscularis propria. An accurate distinction is not always possible. The usual method of inspection and processing can be summarized as follows:

- Weigh specimen;
- Record greatest dimensions of largest and smallest pieces (aggregate dimensions depend on how tightly the examiner compresses the tissue and are less reliable than a combination of weight and measurement);
- Sample generously; in most cases the entire specimen can be embedded in less than 10 cassettes; Bouin’s-type fixatives may not be optimal for large specimens; zinc formalin is preferable to phosphate buffered formalin.
The pathology report for transurethral resections of the bladder (TURBs) should include:

- A list of all pathologic abnormalities expressed in diagnostic terms;
- The histological type, grade (TCC only), depth of invasion, and presence of angiolymphatic invasion of neoplasms;
- The presence of muscularis propria (detrusor) and whether or not it is invaded by the neoplasm;
- The presence of intraepithelial abnormalities (report as a separate diagnosis if isolated and as a flat component of a papillary or invasive neoplasm if contiguous);
- The presence of fat or granulomas;
- A comment on thermocoagulation artifact only if it compromises microscopic evaluation.

**Microscopic Evaluation**

Survey Information

- Classify tumor according to growth pattern (eg, papillary, non-papillary, etc.)
- Classify tumor according to histologic cell type (eg, transitional cell, adenocarcinoma, etc.)
- Comment on other non-malignant conditions (eg, inflammation and radiation change)

**EXAMINATION AND REPORTING OF BLADDER BIOPSIES**

Bladder biopsies are usually obtained with "cold cup" forceps, which yield a small portion of tissue that curls into a ball in the fixative. Orientation is not a significant problem. Depending on size, specimens can be bisected before embedding.

**Gross Inspection and Processing**

Survey Information

- Record measurements of specimen
- Record weight of specimen
- Embed entire specimen
- Embed representative portion of specimen
- If specimen is small, section the block at multiple levels

**COMMENTARY**

The approach to bladder biopsies is similar to that for TURBs, but differs in two important respects: biopsies are not always performed for evaluation of neoplasms, and intramucosal abnormalities more often are the focal point for interpretation. Being small, these biopsies are amenable to fixation in solutions with poor penetrating qualities, such as Hollande’s. The recommended procedure can be summarized as follows:

- Record number of specimens;
- Measure the largest and smallest specimen and record in terms of greatest dimension of each;
- Fix in a Bouin’s-type solution, such as Hollande’s, or in zinc formalin; either is preferable to phosphate buffered formalin;
- Section at multiple levels; two sections at each of three levels should suffice.

**Reporting**

Survey Information

- State whether there is carcinoma in situ
- Describe the extent of carcinoma in situ
- Comment on the presence and degree of dysplasia
- Comment on angiolymphatic invasion
- Comment on multiple microscopic foci of cancer
- Comment on whether the muscularis propria is present
- Comment on whether the muscularis propria is invaded
- Distinguish between invasion of muscularis mucosae and muscularis propria
- Assign grades, specifying the grading system:
  - 1 to 2 grade system (low-grade vs high-grade)
  - 1 to 3 grade system
  - 1 to 4 grade system
- Comment on the extent of artifacts

**COMMENTARY**

In contrast to other types of bladder specimens, epithelial denudation is often a prominent feature in biopsy specimens. When present, significant denudation should be noted because intramucosal abnormalities cannot be adequately interpreted. Responding pathologists evaluate biopsies in a fashion similar to TURBs. Their approach includes the identification of any pathologic alteration, and a notation of the presence of portions of muscular wall.
COMMENTARY

The pathology report for biopsies should include:
- Diagnosis of pathologic abnormalities (denudation is often the most appropriate diagnosis);
- The type, grade (TCC only), depth of invasion (lamina propria or muscularis propria), and presence of angiolymphatic invasion of neoplasms;
- A comment on associated conditions such as granulomas;
- A comment on thermocoagulation artifact only if this impedes diagnostic evaluation;
- Recording of associated intraepithelial abnormalities (CIS, dysplasia). If the intraepithelial abnormality is adjacent to a papillary or invasive tumor, record as a flat component of that tumor. If the intraepithelial abnormality is not contiguous, record as a separate diagnosis.

Special Techniques in the Evaluation of Bladder Cancer

Survey Information

<table>
<thead>
<tr>
<th>% Affirmative Responders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perform DNA analysis by flow cytometry (including by referral to another laboratory)?</td>
</tr>
<tr>
<td>never</td>
</tr>
<tr>
<td>occasionally</td>
</tr>
<tr>
<td>frequently</td>
</tr>
<tr>
<td>always</td>
</tr>
<tr>
<td>Perform DNA analysis by image analysis (including by referral to another laboratory)?</td>
</tr>
<tr>
<td>never</td>
</tr>
<tr>
<td>occasionally</td>
</tr>
<tr>
<td>frequently</td>
</tr>
<tr>
<td>always</td>
</tr>
</tbody>
</table>

ITEMS NOT ADDRESSED IN THE SURVEY

Urinary Specimens

Cytologic sampling of the urinary bladder constitutes a type of specimen that should be included in any survey of the current practice of pathology in this area. Urinary specimens may include randomly voided urine, catheterized urine, or bladder washings. All can be examined using the same cytologic criteria. These criteria have been detailed and illustrated in the literature.8-11 Urinary cytology samples more of the urothelium than can be sampled with biopsies and the results may or may not correlate. Almost all true carcinomas can be detected using this method, especially if multiple samples are obtained. Persistent or recurrent bladder carcinoma can be detected using urinary cytology when lesions are not visible cystoscopically.

Gross Inspection And Processing

- Record amount and color of specimen;
- Preserve specimen to inhibit bacterial overgrowth and cellular degeneration; refrigeration is satisfactory, but dilute alcohol solutions may also be used;
- Process as soon as possible, ideally within 4 hours;
- Process using usual techniques (in most laboratories, the cytocentrifuge is used but membrane filter preparations are equally good);
- Stain in such a way as to optimize nuclear detail (EA50 is preferred but other stains are adequate).

Microscopic Evaluation And Reporting

- Report the presence of normal, dysplastic (atypical), suspicious, and malignant cells (almost all malignant cells will be epithelial and most will be of high cytologic grade, but some low grade neoplasms can also be identified cytologically). Malignant cells can be graded, but it should be emphasized...
that correlations above that achieved by statistics alone (90% of malignant neoplasms will be transitional cell) probably cannot be achieved, and neoplasms cannot be localized by cytology; carcinoma in situ cannot be reliably distinguished from invasive carcinomas of similar cytologic grade.

Acknowledgments. The survey on which this report is based was organized and conducted by the American Society of Clinical Pathologists under the direction and sponsorship of the Quality Management Practice Review Committee, George C. Hoffman, MD, (Chair), Philip L. Barney, MD, Thomas A. Bonfiglio, MD, Russell K. Brynes, MD, Rodger C. Haggitt, MD, David F. Keren, MD, Merle A. Legg, MD, John C. Watts, MD, and expert panel members Yao Shi Fu, MD, Robert W. McKenna, MD, William M. Murphy, MD, Robert E. Petras, MD, and Lawrence D. True, MD.

REFERENCES