Protocol for the Examination of Specimens From Patients With Carcinoma of the Distal Extrahepatic Bile Ducts

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The College of American Pathologists offers these protocols to assist pathologists in providing clinically useful and relevant information when reporting results of surgical specimen examinations. The College regards the reporting elements in the “Surgical Pathology Cancer Case Summary (Checklist)” portion of the protocols as essential elements of the pathology report. However, the manner in which these elements are reported is at the discretion of each specific pathologist, taking into account clinician preferences, institutional policies, and individual practice.

The College developed these protocols as an educational tool to assist pathologists in the useful reporting of relevant information. It did not issue the protocols for use in litigation, reimbursement, or other contexts. Nevertheless, the College recognizes that the protocols might be used by hospitals, attorneys, payers, and others. Indeed, effective January 1, 2004, the Commission on Cancer of the American College of Surgeons mandated the use of the checklist elements of the protocols as part of its Cancer Program Standards for Approved Cancer Programs. Therefore, it becomes even more important for pathologists to familiarize themselves with these documents. At the same time, the College cautions that use of the protocols other than for their intended educational purpose may involve additional considerations that are beyond the scope of these documents.

PROTOCOL FOR THE EXAMINATION OF SPECIMENS FROM PATIENTS WITH CARCINOMA OF THE DISTAL EXTRAHEPATIC BILE DUCTS

This protocol applies to all invasive carcinomas of the distal extrahepatic bile ducts. Well-differentiated neuroendocrine neoplasms (carcinoid tumors) and carcinomas of the perihilar bile ducts are not included. The seventh edition TNM staging system for distal bile duct of the American Joint Committee on Cancer and the International Union Against Cancer is recommended.

SURGICAL PATHOLOGY CANCER CASE SUMMARY (CHECKLIST)

Distal Extrahepatic Bile Ducts: Local or Segmental Resection, Pancreatoduodenectomy (note A)

Select a Single Response Unless Otherwise Indicated
*Data elements with asterisks are not required. However, these elements may be clinically important but are not yet validated or regularly used in patient management.

Specimen (select all that apply)
___ Common bile duct
___ Right hepatic duct
___ Left hepatic duct
___ Junction of right and left hepatic ducts
___ Common hepatic duct
___ Cystic duct
___ Choledochal cyst
___ Not specified

Other Organs Received
___ Stomach
___ Duodenum
___ Pancreas
___ Ampulla
___ Gallbladder
___ Other (specify): _________________________

Procedure
___ Pancreatoduodenectomy

Carcinoma of Distal Extrahepatic Bile Ducts—Washington et al
Segmental Resection Specimen
__ Cannot be assessed
__ Margins uninvolved by invasive carcinoma
Distance of invasive carcinoma from closest margin:
___ mm
Specify margin:
__ Margins involved by invasive carcinoma
__ Proximal bile duct margin
__ Distal bile duct margin
__ Other (specify):
__ Dysplasia/carcinoma in situ not identified at bile duct margin
__ Dysplasia/carcinoma in situ present at bile duct margin

Pancreaticoduodenal Resection Specimen
Proximal Margin (Gastric or Duodenal)
__ Cannot be assessed
__ Uninvolved by invasive carcinoma
__ Involved by invasive carcinoma

Distal Margin (Distal Duodenal)
__ Cannot be assessed
__ Uninvolved by invasive carcinoma
__ Involved by invasive carcinoma

Pancreatic Retroperitoneal Margin
__ Not applicable
__ Cannot be assessed
__ Uninvolved by invasive carcinoma
__ Involved by invasive carcinoma

If all margins uninvolved by invasive carcinoma:
Distance of invasive carcinoma from closest margin:
___ mm OR ___ cm
Specify margin:

Lymph-Vascular Invasion (note F)
__ Not identified
__ Present
__ Indeterminate

Perineural Invasion (note F)
__ Not identified
__ Present
__ Indeterminate

Pathologic Staging (pTNM) (note G)

TNM Descriptors (required only if applicable) (select all that apply)
__ m (multiple primary tumors)
__ r (recurrent)
__ y (posttreatment)

Primary Tumor (pT)
__ pTX: Cannot be assessed
__ pT0: No evidence of primary tumor
__ pTis: Carcinoma in situ
__ pT1: Tumor confined to the bile duct histologically
__ pT2: Tumor invades beyond the wall of the bile duct
__ pT3: Tumor invades the gallbladder, pancreas, duodenum, or other adjacent organs without involvement of the celiac axis or the superior mesenteric artery
__ pT4: Tumor involves the celiac axis or the superior mesenteric artery

Regional Lymph Nodes (pN)
__ pNX: Cannot be assessed
—Tumors arising in the biliary tree are Small cell carcinomas and undifferentiated (histologic
This cholangiocarcinoma is not required
Washington et al
—Carcinomas may arise in chole-
—For adenocarcinomas, a quantita-
____________________________________

—Not applicable
— pM1: Distant metastasis
* Specify site(s), if known: ______________________

*Additional Pathologic Findings (select all that apply)
(note H)
* None identified
* Choledochal cyst
* Dysplasia
* Primary sclerosing cholangitis
* Stones
* Other (specify): ______________________

*Ancillary Studies
* Specify: ______________________

*Clinical History (select all that apply)
* Primary sclerosing cholangitis
* Inflammatory bowel disease
* Biliary stones
* Other (specify): ______________________

*Comment(s): ______________________

* Data elements with asterisks are not required. However, these elements may be clinically important but are not yet validated or regularly used in patient management.

EXPLANATORY NOTES

A: Application.—Tumors arising in the biliary tree are classified into 3 groups: intrahepatic, perihilar, and distal (Figure 1). Perihilar tumors are defined as those involving the hepatic duct bifurcation or extrahepatic biliary tree proximal to the origin of the cystic duct; distal tumors are defined as those lesions arising between the junction of the cystic duct–bile duct and the ampulla of Vater. This protocol applies only to cancers arising in the distal extrahepatic bile ducts above the ampulla of Vater (Figure 1) and includes malignant tumors that develop in congenital choledochal cysts and tumors that arise in the intrapancreatic portion of the common bile duct. It does not include low-grade neuroendocrine neoplasms (carcinoids) or tumors arising in the ampulla of Vater. Carcinomas arising in the cystic duct are grouped for staging purposes with carcinomas of the gallbladder. Tumors arising within the intrahepatic bile ducts or perihilar bile ducts are classified and staged using the liver tumor protocol of perihilar bile duct protocol. Tumors of the pancreas and ampulla of Vater are classified separately.

B: Choledochal Cyst.—Carcinomas may arise in choledochal cysts (congenital cystic dilatation or duplications) of the bile duct. Histologically, they are classified in the same way as those arising in the gallbladder or bile ducts. Stones may be found in these cysts. If dysplasia or carcinoma in situ is found on initial microscopic sections, then multiple additional sections should be examined to exclude invasive cancer in other areas of the cyst.

C: Histologic Type.—For consistency in reporting, the histologic classification published by the World Health Organization, shown later, is recommended. However, this protocol does not preclude the use of other systems of classification or histologic types. By World Health Organization convention, the term cholangiocarcinoma is reserved for carcinomas arising in the intrahepatic bile ducts (see intrahepatic bile ducts protocol).

Some histologic types of extrahepatic bile duct carcinoma are prognostically significant; papillary carcinomas, which are often polypoid on macroscopic examination, have the best prognosis. High-grade tumors, such as signet-ring cell carcinomas, small cell carcinomas, and undifferentiated carcinomas, are associated with a poorer prognosis when compared with adenocarcinoma. Many of the special subtypes, such as clear cell adenocarcinoma, are rarely encountered.

World Health Organization Classification of Carcinoma of the Extrahepatic Bile Ducts

Adenocarcinoma
Papillary adenocarcinoma
Adenocarcinoma, intestinal type
Adenocarcinoma, gastric foveolar type
Mucinous adenocarcinoma
Clear cell adenocarcinoma
Signet-ring cell carcinoma
Adenosquamous carcinoma
Squamous cell carcinoma
Small cell carcinoma
Large cell neuroendocrine carcinoma
Undifferentiated carcinoma
Biliary cystadenocarcinoma

* These histologic types are not usually graded.
† By convention, signet-ring cell carcinomas are assigned grade 3 (see later).
‡ Small cell carcinomas and undifferentiated (histologic type) carcinomas are assigned grade 4 (see later).

D: Histologic Grade.—For adenocarcinomas, a quantitative grading system based on the proportion of gland formation within the tumor is suggested and shown in the following:

Grade X Grade cannot be assessed
Grade 1 Well differentiated (greater than 95% of tumor composed of glands)
Grade 2 Moderately differentiated (50%–95% of tumor composed of glands)
Grade 3 Poorly differentiated (less than 50% of tumor composed of glands)

Definitions corresponding to the previously listed histologic grades are as follows.

| Grade 1 | Composed entirely of glands or has less than 5% solid or cordlike growth patterns |
| Grade 2 | Has more than 5% but less than 50% solid or cordlike growth patterns |
| Grade 3 | Has 50% to 100% solid or cordlike growth patterns |

For squamous cell carcinomas, a rare tumor type in the extrahepatic bile ducts, a suggested grading system follows. If there are variations in histologic differentiation.
within the tumor, the highest (least favorable) grade is recorded.

Grade X Grade cannot be assessed
Grade 1 Well differentiated
Grade 2 Moderately differentiated
Grade 3 Poorly differentiated

Tumors with no differentiation or minimal differentiation that is discernible only in rare tiny foci (undifferentiated carcinomas by the World Health Organization classification) are categorized as grade 4.

E: Margins.—Locoregional recurrence, as opposed to distant metastases, is usually the first site of disease recurrence and is often related to residual tumor located in the proximal or distal surgical margins of the bile duct or from tumor located along the dissected soft tissue margin in the portal area. Local recurrence (usually at the surgical margins) can be attributed in many cases to tumor spread longitudinally along the duct wall and to perineural and lymph-vascular invasion.

Complete surgical resection with microscopically negative surgical margins is an important predictor of outcome in multivariate analysis for both perihilar and distal bile duct carcinomas, with overall 5-year survival for distal tumor improved from roughly 10% for patients with positive margins to 27% for those with negative resection margins.\(^6\)

Malignant tumors of the extrahepatic bile ducts are often multifocal.\(^7\) Therefore, microscopic foci of carcinoma or intraepithelial neoplasia may be found at the margin(s) even though the main tumor mass has been resected. In some cases it may be difficult to evaluate margins on frozen section preparations because of inflammation and reactive change of the surface epithelium or within the intramural mucous glands. If surgical margins are free of carcinoma, the distance between the closest margin and the tumor edge should be measured.

Because 5% of patients with bile duct carcinoma have synchronous carcinomas of the gallbladder, examination of the entire surgical specimen, including the gallbladder, is advised.

F: Perineural and Vascular/Lymphatic Invasion.—Perineural and lymphatic invasion are common in extrahepatic bile duct carcinomas, although they are found less often in early-stage cancers (11%).\(^8\) They should be specifically evaluated because they are associated with adverse outcome on univariate analysis.\(^9\) Although perineural invasion is sometimes useful for distinguishing carcinoma from nonneoplastic glands, caution should be used in interpretation of this finding in ducts affected by primary sclerosing cholangitis because perineural invasion by benign hyperplastic intramural glands has been reported in this setting\(^10\) and in adenomatous hyperplasia.

G: TNM and Anatomic Stage/Prognostic Groupings.—Surgical resection is the most effective therapy for extrahepatic biliary tract carcinomas, and the best estimation of prognosis is related to the anatomic extent (stage) of disease at the time of resection. In particular, lymph node metastases are predictors of poorer outcome.\(^1,11\)

For malignant tumors of the distal extrahepatic bile ducts, the TNM staging system of the American Joint Committee on Cancer and the International Union Against Cancer is recommended.\(^2\) The staging system also applies to tumors arising in choledochal cysts.

According to the American Joint Committee on Cancer/International Union Against Cancer convention, the designation “T” refers to a primary tumor that has not been previously treated. The designation “p” refers to the pathologic classification of the TNM, as opposed to the
clinical classification, and is based on gross and microscopic examination. pT entails a resection of the primary tumor or biopsy adequate to evaluate the highest pT category, pN entails removal of nodes adequate to validate lymph node metastasis, and pM implies microscopic examination of distant lesions. Clinical classification (cTNM) is usually carried out by the referring physician before treatment during initial evaluation of the patient or when pathologic classification is not possible.

Pathologic staging is usually performed after surgical resection of the primary tumor. Pathologic staging depends on pathologic documentation of the anatomic extent of disease, whether or not the primary tumor has been completely removed. If a biopsied tumor is not resected for any reason (eg, when technically unfeasible) and if the highest T and N categories or the M1 category of the tumor can be confirmed microscopically, the criteria for pathologic classification and staging have been satisfied without total removal of the primary cancer.

**TNM Descriptors**

For identification of special cases of TNM or pTNM classifications, the "m" suffix and "y," "r," and "a" prefixes are used. Although they do not affect the stage grouping, they indicate cases needing separate analysis. The "m" suffix indicates the presence of multiple primary tumors in a single site and is recorded in parentheses: pT(m)NM.

The "y" prefix indicates those cases in which classification is performed during or after initial multimodality therapy (ie, neoadjuvant chemotherapy, radiation therapy, or both chemotherapy and radiation therapy). The cTNM or pTNM category is identified by a "y" prefix. The ycTNM or ypTNM categorizes the extent of tumor actually present at the time of that examination. The "y" categorization is not an estimate of tumor before multimodality therapy (ie, before initiation of neoadjuvant therapy).

The "r" prefix indicates a recurrent tumor when staged after a documented disease-free interval and is identified by the "r" prefix: rTNM.

The "a" prefix designates the stage determined at autopsy: aTNM.

**T Category Considerations** (Figures 2 and 3)

**pTis**

For bile duct carcinomas, "carcinoma in situ" (pTis) as a staging term includes neoplastic cells cytologically indistinguishable from invasive carcinoma but confined within the glandular basement membrane. Separation of high-grade dysplasia from carcinoma in situ is subjective and, because morphologic criteria are ill defined, is subject to interobserver variability. The term carcinoma in situ is not widely applied to glandular neoplastic lesions in the gastrointestinal tract but is retained for tumor registry reporting purposes as specified by law in many states. Noninvasive bile duct carcinomas with a papillary growth pattern are classified as pTis.

**pT2 and pT3**

Because the histology of the extrahepatic biliary tree varies along its length, with little smooth muscle in the wall of the proximal ducts as compared with the distal bile duct, assessment of depth of tumor invasion may be difficult. In addition to the problem caused by lack of discrete tissue boundaries, inflammatory changes in the bile ducts and desmoplastic stromal response to tumor may cause distortion. To overcome these difficulties, it has been proposed that the pathologist measure the depth of invasion of tumor from the basal lamina of normal epithelium to the point of deepest tumor invasion; however, this system has not yet been widely adopted for staging purposes.

**Vessel Invasion**

According to the American Joint Committee on Cancer/International Union Against Cancer convention, vessel invasion (lymphatic or venous) does not affect the T category indicating local extent of tumor unless specifically included in the definition of a T category.

**N Category Considerations**

The regional nodes for distal bile duct carcinomas are the same as those for carcinomas of the pancreatic head and include the following: lymph nodes along the common bile duct, hepatic artery, and celiac trunk; posterior and anterior pancreaticoduodenal nodes; and nodes along the superior mesenteric vein and the right lateral wall of the superior mesenteric artery.

Tumor involvement of other nodal groups is considered distant metastasis. Anatomic division of regional lymph nodes is not necessary, but separately submitted lymph nodes should be reported as submitted. A minimum number of lymph nodes examined for accurate staging.
has not been determined, but examination of at least 12 lymph nodes is suggested.2

Routine assessment of regional lymph nodes is limited to conventional pathologic techniques (gross assessment and histologic examination), and data are currently insufficient to recommend special measures to detect micrometastasis or isolated tumor cells. Thus, neither multiple levels of paraffin blocks nor the use of special/ancillary techniques, such as immunohistochemistry, are recommended for routine examination of regional lymph nodes.

Stage Groupings

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<th>T2</th>
<th>T3</th>
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<td>N0</td>
<td>N0</td>
<td>M0</td>
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<tr>
<td>Stage IA</td>
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<td>N0</td>
<td>M0</td>
<td></td>
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<tr>
<td>Stage IB</td>
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<td>N0</td>
<td>M0</td>
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<tr>
<td>Stage IIA</td>
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<td>N0</td>
<td>M0</td>
<td></td>
</tr>
<tr>
<td>Stage IIB</td>
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<td>N1</td>
<td>M0</td>
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<td>T2</td>
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<td>Any N</td>
<td>M1</td>
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* M0 is defined as no distant metastasis.

H: Additional Findings.—Chronic inflammatory conditions affecting the bile ducts are associated with higher risk for biliary tract carcinomas. The most common risk factor for cholangiocarcinoma of the extrahepatic bile ducts in Western countries is primary sclerosing cholangitis, characterized by multifocal strictures and inflammation of the extrahepatic and intrahepatic biliary tree. Patients with primary sclerosing cholangitis are at risk for multifocal biliary carcinomas. In Japan and Southeast Asia, hepatolithiasis due to recurrent pyogenic cholangitis with biliary stones is a more common risk factor for biliary malignancy. Biliary parasites such as Clonorchis sinensis and Opisthorchis viverrini, prevalent in parts of Asia, are also associated with carcinomas of the extrahepatic bile ducts.

References