

## **Extrahepatic Bile Ducts**

**Protocol applies to all invasive carcinomas of the extrahepatic bile ducts. Sarcomas and carcinoid tumors are excluded.**

---

*Protocol revision date: January 2004  
Based on AJCC/UICC TNM, 6<sup>th</sup> edition*

### **Procedures**

- **Local or Segmental Bile Duct Resection**

#### **Author**

Carolyn C. Compton, MD, PhD

Department of Pathology, McGill University, Montreal, Quebec, Canada  
For the Members of the Cancer Committee, College of American Pathologists

**Previous contributors:** Jorge Albores-Saavedra, MD; Donald E. Henson, MD

**Surgical Pathology Cancer Case Summary (Checklist)**

*Protocol revision date: January 2004  
Applies to invasive carcinomas only  
Based on AJCC/UICC TNM, 6<sup>th</sup> edition*

**EXTRAHEPATIC BILE DUCTS: Resection**

Patient name:

Surgical pathology number:

**Note: Check 1 response unless otherwise indicated.**

**MACROSCOPIC****Specimen Type**

- Pancreaticoduodenectomy  
 Segmental resection of bile ducts(s)  
 Choledochal cyst resection  
 Other (specify): \_\_\_\_\_  
 Not specified

**Tumor Site (check all that apply)**

- Right hepatic duct  
 Left hepatic duct  
 Junction of right and left hepatic ducts  
 Cystic duct  
 Common bile duct  
      Proximal  
      Middle  
      Distal  
 Not specified

**Tumor Size**

Greatest dimension: \_\_\_ cm

\*Additional dimensions: \_\_\_ x \_\_\_ cm

 Cannot be determined (see Comment)

**MICROSCOPIC****Histologic Type**

- Adenocarcinoma (not otherwise characterized)
- Papillary adenocarcinoma
- Adenocarcinoma, intestinal type
- Adenocarcinoma, gastric foveolar type
- Mucinous adenocarcinoma
- Clear cell adenocarcinoma
- Signet-ring cell carcinoma
- Adenosquamous carcinoma
- Other (specify): \_\_\_\_\_
- Carcinoma, type cannot be determined

**Histologic Grade**

- Not applicable
- GX: Cannot be assessed
- G1: Well differentiated
- G2: Moderately differentiated
- G3: Poorly differentiated
- G4: Undifferentiated

**Pathologic Staging (pTNM)**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 liver, gallbladder, pancreas, and/or unilateral branches of the portal vein (right or left) or hepatic artery (right or left)
- pT4: Tumor invades any of the following: main portal vein or its branches bilaterally, common hepatic artery, or other adjacent structures such as the colon, stomach, duodenum, or abdominal wall

Regional Lymph Nodes (pN)

- pNX: Cannot be assessed
  - pN0: No regional lymph node metastasis
  - pN1: Regional lymph node metastasis
- Specify: Number examined \_\_\_\_  
Number involved \_\_\_\_

\* Data elements **with asterisks** are **not required** for accreditation purposes for the Commission on Cancer. These elements may be clinically important, but are not yet validated or regularly used in patient management. Alternatively, the necessary data may not be available to the pathologist at the time of pathologic assessment of this specimen.

Distant Metastasis (pM)

pMX: Cannot be assessed

pM1: Distant metastasis

\*Specify site(s), if known: \_\_\_\_\_

**Margins (check all that apply)**

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): \_\_\_\_\_

Carcinoma in situ absent at bile duct margin

Carcinoma in situ present at bile duct margin

**\*Perineural Invasion**

\*  Absent

\*  Present

\*  Indeterminate

**\*Venous (Large Vessel) Invasion (V)**

\*  Absent

\*  Present

\*  Indeterminate

**\*Lymphatic (Small Vessel) Invasion (L)**

\*  Absent

\*  Present

\*  Indeterminate

**\*Additional Pathologic Findings (check all that apply)**

\*  None identified

\*  Dysplasia

\*  Cholangitis

\*  Stones

\*  Other (specify): \_\_\_\_\_

**\*Comment(s)**

4 \* Data elements **with asterisks** are **not required** for accreditation purposes for the Commission on Cancer. These elements may be clinically important, but are not yet validated or regularly used in patient management. Alternatively, the necessary data may not be available to the pathologist at the time of pathologic assessment of this specimen.

## Background Documentation

---

*Protocol revision date: January 2004*

### **I. Cytologic Material**

#### **A. Clinical Information**

1. Patient identification
  - a. Name
  - b. Identification number
  - c. Age (birth date)
  - d. Sex
2. Responsible physician(s)
3. Date of procedure
4. Other clinical information
  - a. Relevant history
    - (1) inflammatory bowel disease
    - (2) sclerosing cholangitis
    - (3) choledochal cyst
  - b. Relevant findings (eg, jaundice, serum bilirubin, endoscopic retrograde cholangiopancreatography [ERCP])
  - c. Clinical diagnosis (eg, bile duct obstruction)
  - d. Procedure (eg, brushing, washing, other)
  - e. Operative findings
  - f. Anatomic site(s) of specimen(s) (eg, left/right hepatic ducts, common bile duct)

#### **B. Macroscopic Examination**

1. Specimen
  - a. Unfixed/fixed (specify fixative)
  - b. Number of slides received, if applicable
  - c. Quantity and appearance of fluid specimen, if applicable
  - d. Other (eg, cytologic preparation from tissue)
  - e. Results of intraoperative consultation
2. Material submitted for microscopic evaluation
3. Special studies (specify) (eg, cytochemistry, immunocytochemistry)

#### **C. Microscopic Evaluation**

1. Adequacy of specimen (if unsatisfactory for evaluation, specify reason)
2. Tumor, if present (Note **A**)
  - a. Histologic type, if possible (Note **B**)
  - b. Histologic grade, if possible (Note **C**)
  - c. Other features (eg, necrosis)
3. Additional pathologic findings, if present
4. Results/status of special studies (specify)
5. Comments
  - a. Correlation with intraoperative consultation, as appropriate
  - b. Correlation with other specimens, as appropriate
  - c. Correlation with clinical information, as appropriate

## II. Local or Segmental Bile Duct Resection

### A. Clinical Information

1. Patient identification
  - a. Name
  - b. Identification number
  - c. Age (birth date)
  - d. Sex
2. Responsible physician(s)
3. Date of procedure
4. Other clinical information
  - a. Relevant history
    - (1) inflammatory bowel disease
    - (2) sclerosing cholangitis
    - (3) choledochal cyst
  - b. Relevant findings (eg, jaundice, serum bilirubin, ERCP)
  - c. Clinical diagnosis (eg, bile duct obstruction)
  - d. Procedure
  - e. Operative findings
  - f. Anatomic site(s) of specimen(s) (eg, left/right hepatic ducts, common duct)

### B. Macroscopic Examination

1. Specimen
  - a. Organ(s)/tissue(s) included
  - b. Unfixed/fixed (specify fixative)
  - c. Orientation, if indicated by surgeon
  - d. Previously opened
  - e. Dimensions of bile duct (include thickness of wall)
  - f. External surface of bile duct (color, adhesions, mass)
  - g. Obstruction (partial/complete)
  - h. Stones present (number, type)
  - i. Description of other tissues, as appropriate
  - j. Results of intraoperative consultation
2. Tumor (Note **A**)
  - a. Location
    - (1) origin in bile duct segment
    - (2) origin in choledochal cyst (Note **D**)
  - b. Configuration (Note **E**)
  - c. Size (largest dimension)
  - d. Descriptive features (eg, color, consistency, necrosis)
  - e. Extent of invasion (Note **F**)
3. Additional pathologic findings
4. Margins, as appropriate (Note **G**)
5. Regional lymph nodes
  - a. Location, if possible (Note **F**)
  - b. Number
6. Other organ(s) or structure(s)
  - a. Involved by tumor by direct extension
  - b. Metastatic involvement by tumor
  - c. Additional pathologic findings
7. Tissues submitted for microscopic evaluation

- a. Carcinoma, including:
    - (1) point of deepest penetration
    - (2) interface with adjacent tissue
  - b. Uninvolved mucosa
  - c. Margins of extrahepatic ducts (Note **G**)
  - d. Other margins, as appropriate (Note **G**)
  - e. All lymph nodes
  - f. Other lesions
  - g. Frozen section tissue fragment(s) (unless saved for special studies)
  - h. Other tissue(s)/organ(s) (specify) (eg, liver, pancreas, gallbladder, duodenum)
7. Special studies (specify) (eg, histochemistry, immunohistochemistry, DNA analysis)

### C. Microscopic Evaluation

1. Tumor
  - a. Histologic type (Note **B**)
  - b. Histologic grade (Note **C**)
  - c. Extent of invasion (Note **F**)
  - d. Venous/lymphatic vessel invasion
  - e. Perineural invasion (Note **H**)
2. Margins (Note **G**)
  - a. Bile duct margins
  - b. Other margins, as appropriate
3. Regional lymph nodes
  - a. Number
  - b. Number involved by tumor (Note **F**)
4. Additional pathologic findings, if present
  - a. Dysplasia
  - b. Carcinoma in situ
  - c. Sclerosing cholangitis
  - d. Other(s)
5. Metastasis to other organ(s) or structure(s) (specify site)
6. Other tissue(s)/organ(s)
7. Results/status of special studies (specify)
8. Comments
  - a. Correlation with intraoperative consultation, as appropriate
  - b. Correlation with other specimens, as appropriate
  - c. Correlation with clinical information, as appropriate

## Explanatory Notes

### A. Application

This protocol applies only to carcinomas arising in the extrahepatic bile ducts (including choledochal cysts) and in the cystic duct. It does not include carcinoid tumors or tumors arising in the ampulla of Vater. More than 98% of the malignant tumors of the extrahepatic bile ducts are carcinomas. They are often associated with a history of ulcerative colitis. Tumors arising within the intrahepatic bile ducts are classified and staged as liver tumors (see Liver protocol).

**B. Histologic Type**

For consistency in reporting, the histologic classification published by the World Health Organization (WHO), shown below, is recommended.<sup>1</sup> However, this protocol does not preclude the use of other systems of classification or histologic types. By WHO convention, the term “cholangiocarcinoma” is reserved for carcinomas arising in the intrahepatic bile ducts (see Liver protocol). For reporting of carcinoma in situ, the term intraepithelial neoplasia is recommended by the WHO classification.

Some histologic types of extrahepatic bile duct carcinoma are prognostically significant; papillary carcinomas, which are often polypoid on macroscopic examination (see Note E, Configuration), have the best prognosis.<sup>1</sup> High-grade tumors such as signet-ring cell carcinomas, small cell carcinomas, and undifferentiated carcinomas are associated with a poorer prognosis compared to adenocarcinoma.

**WHO Classification of Carcinoma of the Extrahepatic Bile Ducts**

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

<sup>#</sup> These histologic types are not usually graded (see below).

<sup>##</sup> By convention, signet-ring cell carcinomas are assigned grade 3 (see below).

<sup>###</sup> Small cell carcinomas and undifferentiated (histologic type) carcinomas are assigned grade 4 (see below).

**C. Histologic Grade**

For adenocarcinomas, a quantitative grading system based on the proportion of gland formation within the tumor is suggested<sup>1</sup> and shown below.

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

Definitions corresponding to the above histologic grades are as follows.

Grade 1	Composed entirely of glands or has less than 5% solid or cord-like growth patterns
---------	--



- Grade 2 Has from 6% to 49% solid or cord-like growth patterns  
Grade 3 Has 50% to 100% solid or cord-like growth patterns

For squamous cell carcinomas, a rare tumor type in the extrahepatic bile ducts, a suggested grading system is shown below. If there are variations in the 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

Note: Tumors with no differentiation or minimal differentiation that is discernible only in rare tiny foci (undifferentiated carcinomas by WHO classification) are categorized as grade 4.

#### **D. 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 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.

#### **E. Configuration**

Configuration includes polypoid, nodular, diffusely infiltrating, or combined features. Polypoid tumors, which often prove to be papillary carcinomas on microscopic examination, have a better prognosis and should be specifically reported.<sup>1,2</sup>

#### **F. TNM and Stage Groupings**

The TNM staging system for malignant tumors of the extrahepatic bile ducts of the American Joint Committee on Cancer (AJCC) and the International Union Against Cancer (UICC) is recommended by the protocol and shown below.<sup>3,4</sup> The staging system also applies to tumors arising in choledochal cysts.

By AJCC/UICC convention, the designation “T” refers to a primary tumor that has not been previously treated. The symbol “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.

**Primary Tumor (T)**

- TX Primary tumor cannot be assessed
- T0 No evidence of primary tumor
- Tis Carcinoma in situ
- T1 Tumor confined to the bile duct histologically
- T2 Tumor invades beyond the wall of the bile duct
- T3 Tumor invades the liver, gallbladder, pancreas, and/or unilateral branches of the portal vein (right or left) or hepatic artery (right or left)
- T4 Tumor invades any of the following: main portal vein or its branches bilaterally, common hepatic artery, or other adjacent structures such as the colon, stomach, duodenum, or abdominal wall

**Regional Lymph Nodes (N)**

- NX Regional lymph nodes cannot be assessed
- N0 No regional lymph node metastasis
- N1 Regional lymph node metastasis

**Distant Metastasis (M)**

- MX Distant metastasis cannot be assessed
- M0 No distant metastasis
- M1 Distant metastasis

**Stage Groupings**

Stage 0	Tis	N0	M0
Stage IA	T1	N0	M0
Stage IB	T2	N0	M0
Stage IIA	T3	N0	M0
Stage IIB	T1	N1	M0
	T2	N1	M0
	T3	N1	M0
Stage III	T4	Any N	M0
Stage IV	Any T	Any N	M1

**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 following 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 prior to 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.

### Additional Descriptors

#### Residual Tumor (R)

Tumor remaining in a patient after therapy with curative intent (eg, surgical resection for cure) is categorized by a system known as R classification,<sup>5</sup> shown below.

RX	Presence of residual tumor cannot be assessed
R0	No residual tumor
R1	Microscopic residual tumor
R2	Macroscopic residual tumor

For the surgeon, the R classification may be useful to indicate the known or assumed status of the completeness of a surgical excision. For the pathologist, the R classification is relevant to the status of the margins of a surgical resection specimen. That is, tumor involving the resection margin on pathologic examination may be assumed to correspond to residual tumor in the patient and may be classified as macroscopic or microscopic according to the findings at the specimen margin(s).

#### **Vessel Invasion**

By AJCC/UICC 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. In all other cases, lymphatic and venous invasion by tumor are coded separately as follows.

#### Lymphatic Vessel Invasion (L)

LX	Lymphatic vessel invasion cannot be assessed
L0	No lymphatic vessel invasion
L1	Lymphatic vessel invasion

#### Venous Invasion (V)

VX	Venous invasion cannot be assessed
V0	No venous invasion
V1	Microscopic venous invasion
V2	Macroscopic venous invasion

### **G. Margins**

It is important to evaluate carefully all surgical margins, including an assessment of vascular (lymphatic and blood vessel) and perineural invasion. Local recurrence 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.<sup>6</sup>

Local recurrence (usually at the surgical margins) is most common with carcinomas arising in the hepatic duct(s).

In addition, malignant tumors of the extrahepatic bile ducts are often multifocal.<sup>7</sup> 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 atypia 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.

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

#### H. Perineural and Lymphatic Invasion

Perineural and lymphatic invasion are common in extrahepatic bile duct carcinomas. They should be specifically evaluated since they are associated with adverse outcome.<sup>1,8-10</sup> Perineural invasion is also useful for distinguishing carcinoma from primary sclerosing cholangitis.

#### References

1. Albores-Saavedra J, Scoazec JC, Wittekind C, Sripa B. Carcinoma of the gallbladder and extrahepatic bile ducts. In: Hamilton SR, Aaltonen LA, eds. *World Health Organization Classification of Tumours. Pathology and Genetics. Tumours of the Digestive System*. Lyon: IARC Press; 2000:203-217.
2. Henson DE, Albores-Saavedra J, Corle D. Carcinoma of the extrahepatic bile ducts. *Cancer*. 1992;70:1498-1501.
3. Greene FL, Page DL, Fleming ID, et al, eds. *AJCC Cancer Staging Manual*. 6<sup>th</sup> ed. New York: Springer; 2002.
4. Sobin LH, Wittekind C, eds. *UICC TNM Classification of Malignant Tumours*. 6<sup>th</sup> ed. New York: Wiley-Liss; 2002.
5. Wittekind C, Compton CC, Greene FL, Sobin LH. Residual tumor classification revisited. *Cancer*. 2002;94:2511-2516.
6. Wittekind C, Henson DE, Hutter RVP, Sobin LH, eds. *TNM Supplement. A Commentary on Uniform Use*. 2<sup>nd</sup> ed. New York: Wiley-Liss; 2001.
6. Ogura Y, Takahashi K, Tabata M, Mizumoto R. Clinicopathological study on carcinoma of the extrahepatic bile-duct with special focus on cancer invasion on the surgical margins. *World J Surg*. 1994;18:778-784.
7. Suzuki M, Takahashi T, Ouchi K, Matsuno S. The development and extension of hepatohilar bile duct carcinoma. *Cancer*. 1989;64:658-666.
8. Bhuiya MR., Nimura Y, Kamiya J, et al. Clinicopathologic studies on perineural invasion of bile duct carcinoma. *Ann Surg*. 1992;215:344-349.
9. Davis RI, Sloan JM, Hood JM, Maxwell P. Carcinoma of the extrahepatic biliary tract: a clinicopathological and immunohistochemical study. *Histopathology*. 1988;12:623-631.

10. Yamaguchi K, Chijiwa K, Saiki S, Shimizu S, Takashima M, Tanaka M. Carcinoma of the extrahepatic bile duct: mode of spread and its prognostic implications. *Hepatogastroenterology*. 1997;44:1256-1261.

### Bibliography

- Albores-Saavedra J, Henson DE, Klimstra D. *Tumors of the Gallbladder and Extrahepatic Bile Ducts. Atlas of Tumor Pathology. 3rd Series*. Washington, DC: Armed Forces Institute of Pathology; 1999.
- Gertsch P, Thomas P, Baer H, Lerut J, Zimmermann A, Blumgart LH. Multiple tumors of the biliary tract. *Am J Surg*. 1990;159:386-388.
- Kayahara M, Nagakawa T, Ueno K, Ohta T, Takeda T, Miyazaki I. Lymphatic flow in carcinoma of the distal bile duct based on a clinicopathologic study. *Cancer*. 1993;72:2112-2117.
- Kozuka S, Tsubone M, Hachisuka K. Evolution of carcinoma in the extrahepatic bile ducts. *Cancer*. 1984;54:65-72.
- Longnecker DS, Guay Terhune P. The case for parallel classification of biliary tract and pancreatic neoplasms. *Mod Pathol*. 1996;9:828-837.
- Ludwig J. Surgical pathology of the syndrome of primary sclerosing cholangitis. *Am J Surg Pathol*. 1989;13(suppl 1):43-49.
- Maxwell P, Davis RI, Sloan JM. Carcinoembryonic antigen (CEA) in benign and malignant epithelium of the gallbladder, extrahepatic bile ducts, and ampulla of Vater. *J Pathol*. 1993;170:73-76.
- Ouchi K, Suzuki M, Hashimoto L, Sato T. Histologic findings and prognostic factors in carcinoma of the upper bile duct. *Am J Surg*. 1989;157:552-556.
- Tompkins RK, Thomas D, Wile A, Longmire, WP Jr. Prognostic factors in bile duct carcinoma. *Ann Surg*. 1981;194:447-455.
- Wanebo JH, Grimes OF. Cancer of the bile ducts: the occult malignancy. *Am J Surg*. 1975;130:262-268.