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Evaluation & Management of Patients with a Liver or Biliary Mass

Description of the Activity	Surgical oncologists are expected to evaluate and manage patients who present with signs and symptoms of a liver or biliary mass. Surgical oncologists must be able to accurately and cost-effectively diagnose, treat, and provide appropriate surveillance for adult patients with hepatobiliary masses and recognize complex disease that requires multidisciplinary treatment.
Functions	❖ Nonoperative/Preoperative ➢ Synthesize essential information from a patient's records, history, physical examination, and initial diagnostic evaluations to develop a differential diagnosis. ▪ Identify pertinent clinical findings indicative of cirrhosis, portal hypertension, and physical manifestations of hepatobiliary disease. ▪ Identify patient history and pathologic findings suggestive of hereditary cancer syndromes. ▪ Identify pertinent patient history affecting the ability to perform an endoscopic evaluation or operative anatomy (eg, post bariatric surgery) ▪ Recognize imaging criteria indicative of a benign or indeterminate pathology that would impact the need for surgical intervention. ➢ Complete a cost-effective, evidence-based diagnostic or staging evaluation, including biochemical/serological testing and cross-sectional multiphase imaging studies as indicated. ▪ Critique the benefits and limitations of different cross-sectional imaging modalities (eg, magnetic resonance imaging versus computed tomography) in hepatobiliary tumors. ▪ Evaluate for variant vascular and biliary anatomy. ▪ Determine the necessity of tissue biopsy to establish the diagnosis. ▪ Determine when proceeding with surgery is indicated in the presence of an indeterminate or negative biopsy. ▪ Assess resectability status. ▪ Describe the indications for and interpret volumetric liver studies prior to major hepatectomy. ➢ Communicate a diagnosis and potential treatment options to the patient/caregiver(s) and consultants. Use shared decision-making to develop a treatment plan consistent with a patient's goals and beliefs. ➢ Participate in a multidisciplinary conference or discussion regarding treatment plans. ▪ Establish the diagnosis, staging, and treatment sequencing. ▪ Consider referral for liver transplantation instead of resection/liver-directed therapy when indicated. ▪ Describe the indications for preoperative liver volume augmentation (eg, portal vein embolization) before major hepatectomy. ▪ Debate the role of regional therapy and liver-directed therapies, such as hepatic artery infusion, embolization, ablation, and radiation. ➢ Collaborate with other specialties to manage comorbidities that will affect treatment (eg, chronic anticoagulation, cardiac disease, immunosuppression). ➢ Obtain informed consent with cultural humility. ▪ Describe the indications, risks, benefits, alternative therapies, and potential complications of the planned procedure, including those listed below, and incorporate a discussion of the goals of care. ▪ Ensure patient/caregiver comprehension using applicable language services and audio/visual aids as necessary.

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- Ensure that the patient/caregiver(s) can ask questions and address any expressed concerns, taking patient/caregiver preferences into account.
- Discuss potential limitations in desire for resuscitation (eg, do-not-resuscitate order) and how this will be addressed in the perioperative period.
- Document the consent discussion.

❖ Intraoperative

➢ Manage the perioperative environment, including room setup, equipment check, preprocedural time-out, specimen processing, counts, wound classification, and debriefing functions.

➢ Develop a safe anesthetic approach for the clinical situation in collaboration with in-office staff or the anesthesiology team, depending on the environment selected for the procedure.

➢ Create and maintain an intraoperative environment that promotes safety and patient-centered care.

➢ Position the patient to expose the operative field, taking precautionary measures to prevent iatrogenic injury.

➢ Confirm accessibility of necessary equipment. Coordinate with other members of the OR team to use specialized equipment or procedures.

➢ Perform the surgical procedures required to manage the liver or biliary mass:

- Localize the lesion and the associated vascular and biliary anatomy using preoperative imaging, intraoperative ultrasound, intraoperative findings, or a combination of these.
- Perform intraoperative assessment of resectability.
- Perform controlled hepatic parenchymal transection.
- Target intrahepatic lesions for intraoperative ablation as applicable.
- Perform portal lymphadenectomy when indicated.
- Proactively minimize hemorrhage, and obtain hemostasis and bile stasis.
- Perform reconstruction to restore biliary or enteric continuity as indicated.
- Maintain clear, closed-loop communication with the intraoperative team about pertinent surgical findings, such as resuscitation status, hemorrhage, hepatic inflow occlusion, or need for frozen section.
- Orient the resected lesion for a pathologic margin evaluation.
- Determine the need for drain placement.

➢ Adapt operative steps and the operative plan to information discovered intraoperatively.

❖ Postoperative

➢ Oversee postoperative care and resuscitation.

➢ Manage common early and late complications related to hepatobiliary procedures, including:

- Anastomotic leak
- Ascites
- Bile leak
- Biliary stricture

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	▪ Cardiovascular and pulmonary issues ▪ Cholangitis ▪ Hemorrhage ▪ Hepatic abscess ▪ Portal vein thrombosis ▪ Posthepatectomy liver failure ➢ Communicate a postencounter plan with a patient/caregiver(s) and other health care team members that considers intraoperative and pathologic findings, future treatment needs, postencounter needs, outcome expectations, and follow-up. ➢ Recognize and mitigate patient-specific barriers to care. ➢ Coordinate care with other specialties and ancillary care as needed (physical therapy, rehabilitation, nutrition services). ➢ Review intraoperative and pathologic findings in a multidisciplinary tumor board, and coordinate continued oncologic therapy and surveillance: ▪ Discussion of outcomes in patients who cannot return to intended oncologic therapy ▪ Referral for adjuvant therapy ▪ Surveillance and survivorship after cancer treatment
Scope	❖ In scope ➢ Diagnoses ▪ Choledochal cysts ▪ Colorectal liver metastasis ▪ Extrahepatic cholangiocarcinoma and gallbladder malignancies ▪ Focal nodular hyperplasia ▪ Gallbladder masses, including polyps and mucinous lesions ▪ Hepatic adenoma ▪ Hepatic cystic neoplasms ▪ Hepatic hemangioma ▪ Hepatocellular carcinoma ▪ Indeterminate liver mass ▪ Intrahepatic cholangiocarcinoma ▪ Other secondary liver tumors ▪ Primary liver neuroendocrine tumors ▪ Unresectable liver tumors ➢ Procedures

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- Appropriate referral to multidisciplinary specialists for definitive/adjuvant management, including liver-directed therapy and radiotherapy
- Bile duct resection with reconstruction
- Cholangiography
- Extended hepatectomy
- Hepatic ablation
- Hepatic arterial infusion chemotherapy
- Intraoperative hepatic ultrasound
- Major hepatectomy
- Partial hepatectomy
- Portal lymphadenectomy
- Radical cholecystectomy
- Surgical approach: open and minimally invasive techniques

➢ Populations
- All adult patients, including those with hereditary syndromes and congenital/acquired anatomic variations (eg, variant hepatic artery anatomy, post bariatric surgery)
- Patients with an indication for liver transplantation

❖ Out of scope

➢ Diagnoses
- Benign biliary obstruction, including gallstone disease and stricture
- Infectious hepatic lesions, including abscess and hydatid disease
- Primary sclerosing cholangitis
- Type V choledochal cyst (Caroli disease)

➢ Procedures
- Liver transplantation
- Pancreatectomy

Parhaps we should add knowledge of portal hypertension management prior to surgery (esopagheal varices ligation before surgery and B-blocker use), detailed hx regarding meds and HCV, HBV, MASH hx, use of Child-Pugh and MELD scores to guide therapy as well as the different systems for the staging of HCC/Cholangio. Finally, a discussion of genetic mutations in adenomas and CRC mets and their implications in therapy. In terms of loco-regional therapies, fellows must know the different modalities for TACE, Y-90, MWA, Cryo and SBRT. Bonus points for hte indication and contraindications for liver Tx in HCC, Cholangiocarcinoma and CRC/NET liver mets.

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Level	Nonoperative/Preoperative	Intraoperative	Postoperative
1 **Limited Participation** **Demonstrates understanding of information and has very basic skills.** **Framework:** **Performs at the general surgery resident level, lower than expected for a typical residency graduate. Has some experience with simple cases but has been an observer of complex cases.**	• Synthesizes essential information from a patient's records, H&P, family history, and initial diagnostic evaluations to develop a differential; includes assessment of functional status and underlying hepatocellular disease • Needs assistance when evaluating cross-sectional imaging; identifies the lesion and arrives at a limited differential but is unable to characterize it relative to etiology, vascular anatomy, and resectability • Completes a diagnostic/staging workup, including tumor markers and viral serologies as indicated, but requires prompting to evaluate residual liver volumes and future liver function • Reviews preop pathology (if available) but requires guidance to develop a multidisciplinary treatment plan, including indications for liver-directed therapy, regional therapy, transplantation, and palliation • Needs assistance to determine indications for preop biliary drainage and consideration of management approaches • Needs assistance to determine indications for preoperative biopsy and the need for additional imaging or diagnostic studies	• Lists common intraop complications and general strategies for management • Lists potential intraop findings (eg, unidentified metastatic disease, invasion into hepatic vasculature) but is unable to articulate how this would change the surgical plan • Needs prompting to assess resection margins • Discusses the need for intraop staging (palpation, intraop ultrasound) but requires prompting to modify the preop surgical plan • Requires assistance when performing cholangiography or intraop ultrasound to identify and characterize a lesion • Requires assistance to safely use energy devices to assist with parenchymal transection • Needs guidance to understand the relationship of a liver tumor to associated liver segments, vasculature, and biliary anatomy • Describes the steps of major and minor liver resections, biliary resection, reconstruction options, and portal lymph node dissection	• Describes intraop and pathologic findings but requires guidance to determine and coordinate continued oncologic therapy • Demonstrates knowledge of and manages routine postop care following hepatobiliary surgery, including postop resuscitation • Recognizes indications for adjuvant therapies • Documents postop care but may omit nuances of progress or minor complications; may choose an inappropriate means of communication (eg, paging for minor details or email for urgent issues)

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	• Considers the role of a multidisciplinary tumor board and participates in but cannot lead a case discussion; needs guidance to develop a multidisciplinary treatment plan • Records information in a patient's record but may omit some important information or include some extraneous information; requires correction or augmentation of documentation of services; may need prompting for timeliness	• Creates a basic operative note but omits some important information; may need prompting for timeliness	
2 **<u>Direct Supervision</u>** **Manages cases at the level of a newly graduated general surgery resident. Manages less complicated cases independently but needs active guidance for complex cases.** **<u>Framework:</u>** **The learner can manage simple or straightforward cases.** **The learner may require guidance in managing multidisciplinary care**	• Discriminates the quality of relevant information to determine if additional information (diagnostics) is needed • Participates in a multidisciplinary tumor board discussion to develop a treatment plan but needs assistance to guide the discussion; demonstrates awareness of multidisciplinary treatment options but needs guidance to formulate multimodality treatment • Evaluates cross-sectional imaging with minimal assistance and arrives at a focused differential but is unable to independently characterize the tumor relative to etiology, vascular anatomy, and resectability • Demonstrates knowledge of surgically relevant anatomic variations • Interprets preop imaging but requires prompting to understand its implications	• With assistance, recognizes and manages common intraop complications • Identifies intraop findings such as unidentified metastatic disease or invasion into hepatic vasculature but requires redirection when encountering unanticipated intraop findings • Requires assistance to assess resection margins • Performs intraop staging (palpation, intraop ultrasound) but requires guidance to modify the preop surgical plan based on intraop findings • Inconsistently demonstrates careful tissue handling • Identifies the appropriate plane but requires redirection to maintain dissection in the optimal tissue plane	• Discusses the implications of intraop and pathologic findings but requires assistance to formulate a postop care plan • Demonstrates management of routine postop care but needs assistance to recognize and manage complex postop care, including a complication-specific management plan following hepatobiliary surgery • Applies details of pathologic staging to describe a general oncologic surveillance plan • Thoroughly documents a patient's postop progression and the presence of any complications with a plan for management

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(eg, planning neoadjuvant treatment or postoperative chemotherapy). **During surgery, the attending gives active help throughout the case to maintain forward progression.**	on surgical planning, including indications for nonoperative management • Demonstrates organized diagnostic and therapeutic reasoning through notes in a patient's record; demonstrates timely and efficient use of the EHR to communicate with the health care team	• Describes and performs the steps of minor liver resections but requires assistance to perform major liver resections, some biliary resections and reconstructions, and portal lymph node dissection • Performs cholangiography and uses intraop ultrasound to identify and characterize a lesion in a straightforward case but needs assistance to characterize a lesion and manage biliary resection and reconstruction in a more complex case (eg, previously treated or stented) • Creates an operative note with a complete description of the procedure	
3 **<u>Indirect Supervision</u>** **Can do a basic operation but will not recognize abnormalities and does not understand the nuances of an advanced case.** **Manages multidisciplinary care of straightforward cases. Seeks assistance in managing complex cases.** **<u>Framework:</u>**	• Integrates oncologic information and anatomic considerations with patient-specific factors to design a plan for diagnosis and further evaluation in a common scenario but may require assistance in a more complex or rare case • Leads a discussion of routine cases at an interdisciplinary cancer care conference, incorporating multimodality treatment options to formulate a treatment plan, including indications for liver-directed therapy, regional therapy, transplantation, and palliation; requires assistance to develop a plan for a complex case or when conflicting opinions exist	• Independently recognizes and manages intraop complications and develops a plan for avoidance of common complications • With assistance, refines the preop surgical plan based on information discovered intraoperatively, such as unidentified metastatic disease, invasion into hepatic vasculature, or suspicious lymphadenopathy not seen on imaging • Independently assesses resection margins but may need assistance to modify the operative plan • Independently performs intraop staging (palpation, intraoperative ultrasound)	• Formulates a postop plan of care without assistance in a common case but may require assistance in a more complex case • Independently manages complex postop care and complications, creating a complication-specific management plan following hepatobiliary surgery • With assistance, determines the need for and coordinates adjuvant therapies as indicated • Selects direct (telephone, in-person) and indirect (progress notes, secure text messages) forms of communication based on context and urgency

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The learner can perform the operation in straightforward circumstances. The attending gives passive help. This help may be given while scrubbed for more complex cases or during check-in for more routine cases.	• With assistance, identifies surgically relevant anatomic variations and alters patient management accordingly • Concisely integrates all relevant data from outside systems and prior encounters and reports diagnostic and therapeutic reasoning in a patient's record	but may require guidance to modify the preop surgical plan based on intraop findings in a complex case • Consistently demonstrates careful tissue handling • Visualizes the tissue plane and identifies and dissects relevant normal anatomy • Describes and performs the steps of minor and major liver resections, biliary resection and reconstruction, and portal lymph node dissection with minimal assistance • Performs cholangiography and uses intraop ultrasound to identify and characterize a lesion but may need assistance to characterize a lesion and manage biliary resection and reconstruction in a more complex case (eg, previously treated or stented) • Creates an operative note with a complete description of the procedure, including key intraop findings; documents anatomic or disease variants in a thorough and understandable way	
4 **Practice Ready** **Manages complex disease presentations and performs complex**	• Leads a multidisciplinary cancer care conference to synthesize patient care plans for routine and complex cases, resolving conflict when needed; independently coordinates multidisciplinary care	• Independently anticipates and avoids common intraop complications, including parenchymal/vascular hemorrhage, bile leaks, and bowel injuries	• Independently formulates a postop plan of care for common and more complex cases • Anticipates and provides intervention for early postop complications,

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operations independently. Guides a multidisciplinary approach to complex cases. Performs as an expert consultant in surgical oncology. **<u>Framework</u>:** **The learner can treat all common variations of the disease and has a strong understanding of surgical and medical options for different presentations.** **The attending is available at the request of the learner but is not routinely needed for common presentations, though input may be needed for more complex or unusual presentations.**	• Independently integrates oncologic information and anatomic considerations with patient-specific factors to design a plan for diagnosis and further evaluation in common and more complex or rare cases • Independently identifies surgically relevant anatomic variations on imaging and alters patient management accordingly • Communicates diagnostic and therapeutic reasoning clearly, concisely, promptly, and in an organized written form, including anticipatory guidance; written or verbal communication (patient notes, email) serves as an example for others to follow	• Independently refines the preop surgical plan based on information discovered intraoperatively, such as peritoneal disease, additional liver lesions not visible on imaging, bilobar liver lesions, aberrant biliary anatomy, or features of underlying liver disease • Independently assesses resection margins and modifies the surgical plan if needed • Independently performs intraop staging (palpation, intraop ultrasound) and modifies the preop surgical plan based on intraop findings in straightforward and complex cases • Adapts tissue handling based on tissue quality (eg, fatty liver, post-ablation); independently and fluidly performs all parts of a hepatic parenchyma resection, visualizing tissue planes and identifying and dissecting relevant abnormal vascular or biliary anatomy • Describes and independently performs the steps of minor and major liver resections, biliary resection and reconstruction, and portal lymph node dissection • Creates an operative note with a complete description of the procedure, a rationale for modifications of the	including engaging consultative services when needed for a complication-specific management plan following hepatobiliary surgery (eg, hemorrhage, bile leak, anastomotic leak, hepatic abscess, cholangitis, portal vein thrombosis, ascites, cardiovascular and pulmonary issues) • Independently develops a care plan for subacute complications following hepatobiliary surgery (eg, biliary stricture, posthepatectomy liver failure) • Independently determines the need for and coordinates adjuvant therapies as indicated • Communicates clearly, concisely, promptly, and in an organized written form, including anticipatory guidance so the postop plan of care is clear to other members of the care team

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		operative plan, and documentation of anatomic or disease variants	