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# Nursing Management and Clinical Implications of Hepatic Biloma in Adult Patients

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## Abstract

**Background:** Hepatic biloma is an uncommon but clinically significant condition resulting from disruption of the biliary tree and subsequent bile leakage into intrahepatic or extrahepatic spaces. It occurs most frequently following iatrogenic hepatobiliary procedures and trauma, and delayed recognition may lead to infection, sepsis, or organ compression.

**Aim:** This article aims to review the etiology, pathophysiology, clinical presentation, evaluation, management strategies, and nursing implications of hepatic biloma in adult patients, with emphasis on early recognition and multidisciplinary care.

**Methods:** A comprehensive narrative review of existing clinical literature, observational studies, case series, and imaging-based reports was conducted to synthesize current knowledge regarding hepatic biloma. Emphasis was placed on diagnostic modalities, therapeutic approaches, and patient outcomes relevant to clinical and nursing practice.

**Results:** Bilomas most commonly arise after laparoscopic cholecystectomy, endoscopic retrograde cholangiopancreatography, liver ablation, and transplantation. Clinical manifestations are often nonspecific, ranging from mild abdominal discomfort to sepsis. Imaging, particularly ultrasound and computed tomography, remains the cornerstone of diagnosis. Management is individualized; small, asymptomatic bilomas may resolve with observation, while larger or symptomatic collections typically require image-guided percutaneous or endoscopic drainage. Early intervention is associated with favorable outcomes and low recurrence rates.

**Conclusion:** Hepatic biloma requires a high index of suspicion, particularly following biliary interventions. Prompt imaging, timely drainage, and coordinated multidisciplinary management are essential to prevent complications. Nurses play a pivotal role in early detection, monitoring, patient education, and post-intervention care.

**Key words:** Hepatic biloma, bile leak, biliary injury, percutaneous drainage, nursing management, imaging diagnosis

## Introduction

Gould and Patel first introduced the concept of biloma in 1979 to denote a localized, encapsulated accumulation of bile occurring outside the liver as a consequence of bile leakage into the peritoneal cavity [1]. Since its initial description, the meaning of the term has expanded in clinical practice and academic literature. It is now broadly applied to any clearly demarcated collection of bile within the abdominal cavity that exists outside the normal biliary system. Such collections may arise within the hepatic parenchyma or in extrahepatic locations following disruption of the biliary tree. Although early definitions emphasized encapsulation, contemporary understanding recognizes that a biloma does not require complete encapsulation to meet diagnostic criteria [2]. The presence of a defined margin distinguishes biloma from continuous bile leakage or the diffuse presence of bile within the peritoneal cavity. Conditions described as choleperitoneum or biliary ascites refer to free bile within the abdomen without localization. Despite these conceptual distinctions, some publications continue to use these terms interchangeably with biloma, which may contribute to diagnostic ambiguity in both clinical and research settings [3][4]. The most frequent etiological factors associated with biloma formation are iatrogenic injuries and blunt or penetrating


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abdominal trauma, both of which can compromise the integrity of the biliary tract and allow bile to escape into surrounding tissues. Clinically, bilomas are not benign entities. They are commonly linked to secondary infection, persistent bile leakage, and compressive effects on adjacent organs. When diagnosis or intervention is delayed, these complications can progress and lead to substantial morbidity and, in severe cases, increased mortality [2]. Early identification therefore plays a critical role in patient outcomes. Imaging modalities are central to this process, as they facilitate both detection and therapeutic planning. Ultrasonography, computed tomography, magnetic resonance imaging, magnetic resonance cholangiopancreatography, and hepatobiliary cholescintigraphy are all employed to confirm the presence of biloma and to delineate its extent [5][6][7]. These techniques also support minimally invasive management strategies, which have become integral to contemporary care.

**Etiology**

Biloma most often develops after disruption of the biliary tree. This disruption may occur as a result of medical intervention or physical injury. Iatrogenic causes represent the dominant source of bile leakage that leads to biloma formation. Procedures involving direct or indirect manipulation of the hepatobiliary system increase this risk. These include laparoscopic cholecystectomy endoscopic retrograde cholangiopancreatography radiofrequency ablation transcatheter arterial chemoembolization liver transplantation hepatic resection and liver biopsy [8][9][10][11]. Although rare spontaneous rupture of the biliary tree has been reported and may occur in association with malignant disease [12][13][14]. The widespread adoption of laparoscopic cholecystectomy over the last three decades has resulted in a measurable rise in bile duct injuries. The incidence of biliary injury during laparoscopic cholecystectomy ranges from 0.6% to 1.5%. This rate exceeds that reported for open cholecystectomy which ranges from 0.2% to 0.3% [15]. Bile leakage following laparoscopic cholecystectomy most commonly arises from injury to the common bile duct failure of cystic duct closure or unrecognized anatomical variation. Accessory bile ducts are a frequent source of postoperative bile leakage [16]. The ducts of Luschka are present in a significant proportion of patients and are located within the gallbladder fossa. Their small size and variable anatomy place them at risk during gallbladder removal [17]. Postoperative fluid collections are more common than often assumed. Evidence from early observational studies demonstrated that small volumes of bile leakage occurred in up to 44% of patients following laparoscopic cholecystectomy. Despite this finding most of these cases resolved without the need for intervention. Only a minority progressed to clinically significant biloma formation [18]. Subsequent work supported these observations. Kang et al reported that more than half of patients undergoing ultrasound imaging within 24 hours of surgery demonstrated small fluid collections. These findings did not alter clinical management, and routine imaging was not recommended [19]. Most postoperative bile leaks remain small and asymptomatic. Many likely go undetected. However persistent leakage and localized bile accumulation must be considered when recovery is delayed or complicated [4]. What clinical features should prompt early suspicion in such patients.

Endoscopic procedures also contribute to biloma development. Perforation of the common bile duct during endoscopic retrograde cholangiopancreatography has been documented as a direct cause [20][21]. A large prospective multicenter study involving over five thousand patients reported a perforation rate of 0.4%. Identified risk factors included precut sphincterotomy and underlying malignancy [21]. These findings highlight the need for careful patient selection and procedural planning. Biloma formation has also been observed following thermal and vascular interventions for hepatocellular carcinoma. Radiofrequency ablation carries a reported biloma incidence of 3.3%. Most cases are clinically minor. Only a small proportion require drainage due to infection or mass effect [22]. Thermal ablation techniques are associated with bile leaks in up to 12% of cases. Prior transarterial chemoembolization and proximity of the tumor to the biliary tree increase this risk [9]. Transarterial chemoembolization itself has been linked to biloma formation with an incidence slightly above 1% in large patient cohorts [23]. Liver transplantation represents another significant setting for biloma development. Biloma is part of the broader category of posttransplant cholangiopathy. This complication remains a major challenge in transplant medicine. Proposed mechanisms include ischemia reperfusion injury bile salt toxicity and immune mediated damage. Bilomas may arise from anastomotic leaks or from nonanastomotic strictures that lead to bile duct necrosis and intraparenchymal bile leakage [11]. Hepatic resection similarly predisposes patients to biloma through disruption of intrahepatic ducts [24]. Trauma is a less common but recognized cause. Blunt injury to the upper abdomen accounts for most reported cases. Posttraumatic biloma may not be evident immediately and can develop over one to two days following injury [25][26]. Spontaneous rupture of the biliary tree remains rare. When it occurs it is often linked to ductal wall weakness due to gallstones cholangiocarcinoma hepatic abscess or tuberculosis [27]. This diagnosis is usually reached after exclusion of other causes [28]. Biloma has also been described in patients with sickle cell disease where hepatic infarction may play a role [29]. Bile leakage may also occur without direct biliary injury such as leakage from the duodenal stump after Billroth II surgery.

**Epidemiology**

Epidemiological data on biloma remain limited due to its relative rarity and its frequent association with medical and surgical interventions rather than primary disease processes. Most reported cases arise secondary to iatrogenic injury of the biliary tree. As a result the observed incidence of biloma is closely linked to the volume and type of hepatobiliary procedures performed within a given population. Increases in minimally invasive and interventional techniques have influenced detection rates rather than reflecting a true rise in disease occurrence. Biloma is most commonly identified in older adults with the majority of cases reported among individuals between 60 and 70 years of age. This age distribution appears to correlate with the higher likelihood of undergoing biliary surgery endoscopic procedures or oncologic interventions rather than an inherent biological susceptibility to bile leakage. Conditions such as gallstone disease hepatobiliary malignancy and chronic liver disorders are more prevalent in this age group and often necessitate invasive management which increases the risk of biliary disruption. Available evidence does not demonstrate a difference in biloma incidence between male and female patients suggesting that sex does not play a significant role in disease development [30]. Instead procedural exposure and underlying pathology remain the dominant determinants. Spontaneous biloma formation is exceptionally uncommon. The existing literature consists almost entirely of isolated case reports. A review by Ahktar et al documented only 27 reported cases of spontaneous biloma over a period of nearly three decades following the initial description in 1979 [31]. This rarity underscores the importance of considering alternative causes before attributing biloma to spontaneous biliary rupture.

**Pathophysiology**

Biloma develops as a direct consequence of disruption to the biliary tree with subsequent leakage of bile into surrounding tissues. The escape of bile from its normal anatomical confines initiates a localized inflammatory response that plays a central role in biloma formation. The process of encapsulation varies according to the rate and volume of bile leakage. In most cases bile leaks slowly. This gradual exposure of surrounding tissues to bile acids induces a mild but persistent inflammatory reaction within the liver parenchyma or adjacent abdominal structures. Over time this inflammation stimulates fibroblast activity and collagen deposition which results in the formation of a fibrous capsule around the bile collection. The irritant nature of bile acids contributes to this process through their detergent effect and capacity to disrupt cellular membranes leading to low grade tissue injury [32]. When bile leakage occurs rapidly or in large volumes the pathophysiological response differs. Sudden bile extravasation may overwhelm local containment mechanisms and lead to biliary peritonitis. In such cases patients often present with acute symptoms before encapsulation has fully developed. Despite this the peritoneal cavity retains some capacity for containment. The omentum and mesentery may adhere to inflamed surfaces and form localized inflammatory barriers that limit the spread of bile and promote eventual encapsulation [2]. The extent of this response depends on the balance between the rate of bile leakage and the absorptive capacity of surrounding tissues.

The size and anatomical location of a biloma are influenced by several interacting factors. These include the site and mechanism of biliary injury the volume and duration of bile leakage and the degree of bile reabsorption by the liver parenchyma or peritoneal lining [26]. Extravasated bile tends to track along established anatomical planes within the abdomen. Its distribution is shaped by surrounding structures such as the liver surface diaphragm mesentery and transverse mesocolon. As a result, bilomas often assume irregular but well defined contours that reflect these boundaries. Extrahepatic bilomas most commonly accumulate in the right upper quadrant given its proximity to the biliary system. However, bile may migrate across the anterior surface of the liver. Approximately forty percent of cases demonstrate extension into the left subphrenic or left subhepatic spaces [2][31]. The formation of multiple bilomas within the same patient is not unusual particularly in the setting of extensive biliary injury or ongoing leakage. The contents of a biloma are typically composed of greenish yellow bile. In certain circumstances the collection may contain blood inflammatory exudate or necrotic debris. Secondly, bacterial contamination transforms a sterile bile collection into an infected focus. This progression can trigger a systemic inflammatory response with the potential for sepsis and abscess formation. The natural course of untreated bile collections therefore often involves transition from sterile accumulation to infection emphasizing the importance of early recognition and intervention [4].

**History and Physical**

Biloma most commonly presented with nonspecific upper abdominal symptoms that arise after disruption of the biliary tree due to iatrogenic intervention or traumatic injury. Patients frequently report a sensation of abdominal fullness accompanied by discomfort or pain in the right upper quadrant. Associated gastrointestinal symptoms such as nausea and vomiting are common. Fever may develop particularly when secondary infection of the bile collection occurs. In some cases, jaundice is observed. This finding usually reflects external compression of the bile ducts by the expanding biloma rather than intrinsic biliary obstruction. The clinical history therefore plays a central role in raising suspicion for this condition. A thorough assessment must focus on prior procedures involving the hepatobiliary system. Recent laparoscopic

cholecystectomy endoscopic retrograde cholangiopancreatography liver biopsy or other abdominal interventions should be specifically explored. A history of blunt or penetrating abdominal trauma is also relevant. Underlying hepatobiliary disease further increases vulnerability to bile leakage and subsequent biloma formation [2]. The temporal relationship between an intervention and the onset of symptoms often provides a key diagnostic clue. The clinical presentation of biloma varies widely. Some patients present in a critically ill state with features of sepsis or septic shock. Others remain minimally symptomatic or entirely asymptomatic. This broad spectrum of presentation complicates timely diagnosis. Although bile peritonitis represents a recognized manifestation of significant bile leakage and large biloma formation it is relatively uncommon. Evidence suggests that most patients do not develop dramatic peritoneal signs. Lee et al demonstrated that delayed diagnosis occurred in the majority of patients with postoperative bile collections following laparoscopic cholecystectomy. In this cohort marked abdominal pain and tenderness were present in only a small proportion of cases [4]. Importantly early peritoneal irritation did not correlate with disease severity. Many patients with mild initial symptoms progressed to serious complications.

Physical examination findings are often subtle. Abdominal distention localized tenderness or vague discomfort may be the only detectable signs. Guarding and rebound tenderness are usually absent unless infection or widespread bile peritonitis has developed. Following surgical or traumatic insult clinicians should maintain vigilance for persistent bloating anorexia or unexplained discomfort. A delayed or atypical postoperative recovery particularly after laparoscopic cholecystectomy should prompt consideration of bile leak and biloma formation. Although biloma remains an uncommon diagnosis it carries substantial risk when overlooked. Other gastrointestinal and hepatobiliary conditions may present similar symptoms and should be evaluated. However, in patients with recent biliary intervention bile leak and biloma must remain key differential diagnoses. Early recognition based on careful history taking and physical examination is essential given the potential for significant morbidity and mortality associated with delayed management [2][4].

**Evaluation**

The evaluation of biloma requires integration of clinical assessment laboratory investigations and imaging findings. Laboratory testing may provide supportive evidence but is often nondiagnostic. Inflammatory markers may be elevated particularly in the presence of infection or systemic response. Leukocytosis neutrophilia and raised C reactive protein are commonly reported findings. Despite this, a substantial proportion of patients demonstrate normal laboratory values. Vazquez et al reported that forty percent of patients with confirmed bilomas had no abnormal blood test results at presentation [26]. This variability limits the reliability of laboratory studies as screening tools and reinforces the need for a high index of clinical suspicion. Liver function tests may show abnormalities when the biloma exerts extrinsic pressure on the biliary system. Elevations in bilirubin alkaline phosphatase and transaminases may reflect impaired bile flow rather than intrinsic hepatic disease. Infected bilomas frequently result in bacteremia. Blood cultures in such cases often identify gram negative organisms. Wurstle et al documented positive blood cultures in the majority of patients with bilomas following iatrogenic biliary injury. Enterobacteriaceae were the most commonly isolated pathogens followed by Enterococcus species. Notably multidrug resistant organisms were identified in a quarter of biloma fluid cultures highlighting the importance of microbiological evaluation to guide antimicrobial therapy [33].

Given the nonspecific clinical presentation radiological imaging represents the cornerstone of biloma diagnosis. Several imaging modalities are available and often used in combination. Ultrasound computed tomography magnetic resonance imaging, and hepatobiliary iminodiacetic acid scanning are the primary tools. Ultrasound is typically the first investigation performed particularly in patients presenting with right upper quadrant pain or postoperative abdominal discomfort. This modality readily detects cystic lesions and may demonstrate internal debris or blood products within the collection. Findings range from small well defined intrahepatic collections to extensive multiloculated fluid accumulations throughout the abdomen. The presence of thick septations or complex internal echoes has been associated with infection. While ultrasound is sensitive for detecting fluid collections it often lacks specificity and usually necessitates further imaging [2][34]. Computed tomography provides improved anatomical detail and allows accurate localization of the biloma. On CT imaging bilomas usually appear as well circumscribed hypoattenuated collections with attenuation values below twenty Hounsfield units [26][35]. A defined capsule may be present but is not mandatory for diagnosis [2]. CT is valuable in assessing the relationship between the biloma and surrounding structures and in planning interventional procedures. However, CT findings alone cannot reliably distinguish biloma from other postoperative or traumatic fluid collections such as seroma hematoma abscess lymphocele or cystic lesions [36]. As a result, additional imaging or direct sampling is often required.

Magnetic resonance imaging offers superior soft tissue contrast and further characterization of bile collections. Bilomas typically demonstrate low signal

intensity on T1 weighted sequences and high signal intensity on T2 weighted images. Contrast enhancement within the biloma cavity is uncommon although peripheral rim enhancement may occur due to inflammatory changes. Infected bilomas may exhibit enhancing internal septations. Magnetic resonance cholangiopancreatography can be particularly useful in identifying the source of bile leakage. Thin slab MRCP sequences may directly visualize communication between the biliary tree and the collection [37]. Hepatobiliary cholescintigraphy using Tc 99m iminodiacetic acid is highly sensitive for detecting bile leaks. This functional imaging modality confirms active bile extravasation and assists in treatment planning. Although it lacks detailed anatomical resolution single photon emission computed tomography can enhance localization and improve procedural guidance. Invasive imaging techniques such as endoscopic retrograde cholangiopancreatography and percutaneous transhepatic cholangiography provide both diagnostic and therapeutic options [2][28]. When imaging findings remain equivocal image guided aspiration of the biloma with biochemical and microbiological analysis may be required to establish a definitive diagnosis [2].

**Treatment / Management**

Management of biloma is individualized and depends on clinical status laboratory findings and radiological characteristics of the collection. The principal management strategies include conservative observation image guided percutaneous or endoscopic drainage and surgical intervention. Selection among these approaches is influenced by several factors including the presence of an ongoing bile leak in the size and anatomical location of the biloma evidence of superimposed infection and overall patient fitness [2]. In carefully selected cases small asymptomatic collections may resolve spontaneously through gradual reabsorption and can be managed with close clinical and radiological monitoring. However, the natural history of larger collections is less favorable. Lee et al demonstrated that bilomas exceeding four centimeters in diameter were unlikely to undergo spontaneous resolution and that clinical deterioration could not be reliably predicted at presentation [4]. Radiologically guided percutaneous drainage represents the cornerstone of biloma management and is successful in the majority of patients. In many cases definitive repair of the underlying biliary injury is not required [24][35]. Ultrasound or computed tomography guidance may be used to access the collection. Ultrasound guidance is often preferred due to real time visualization absence of ionizing radiation and the ability to identify and avoid vascular structures using Doppler imaging. Percutaneous catheter placement allows continuous drainage and promotes collapse of the cavity facilitating resolution of symptoms and inflammation.

Access to extrahepatic bilomas may occasionally require transhepatic approaches when safe alternative windows are not available. In recent years endoscopic techniques have expanded management options. Endoscopic ultrasound guided drainage has been reported as an effective alternative particularly for bilomas located adjacent to the gastrointestinal tract. Shami et al described successful endoscopic drainage of bilomas using EUS guidance in anatomically favorable cases [38]. Further advances include the use of metal stents. Tonozuka et al reported effective management of infected bilomas and hepatic abscesses using EUS guided metal stent placement with favorable outcomes [39]. When no ongoing bile leak is present, percutaneous or endoscopic drainage is typically definitive and recurrence is uncommon. Persistent bile leakage requires additional intervention aimed at addressing the source of leakage. Endoscopic stent placement within the biliary tree can reduce intraductal pressure and promote healing of the leak. In some cases percutaneous transhepatic cholangiography is necessary to delineate biliary anatomy and identify the site of disruption. Percutaneous transhepatic biliary drainage may also be required to decompress the biliary system or gallbladder when endoscopic access is not feasible [2]. Lee et al advocate early drainage of bilomas following laparoscopic cholecystectomy particularly in patients who are symptomatic or clinically unstable rather than delaying intervention in anticipation of spontaneous resolution [4].

Surgical management is reserved for selected cases. Indications include failure of percutaneous or endoscopic drainage multiloculated bilomas not amenable to catheter drainage and ongoing bile leaks that cannot be controlled using less invasive methods. Bilomas identified intraoperatively during cholecystectomy or those associated with complex biliary injuries often require surgical repair. Such cases are best managed in specialized tertiary centers with expertise in hepatobiliary surgery [40]. Due to the relative rarity of biloma robust randomized data on management strategies are lacking. Most evidence is derived from case reports and small case series. Despite this available data consistently demonstrate high success rates with minimally invasive drainage techniques and favorable outcomes. When diagnosed promptly and managed appropriately patients with biloma generally have an excellent prognosis with low rates of recurrence and long term complications.

**Differential Diagnosis**

Biloma is an uncommon condition, and its clinical presentation overlaps with a wide range of abdominal and hepatobiliary disorders. Right upper quadrant pain abdominal fullness and vague gastrointestinal symptoms lack specificity and frequently occur in more prevalent diseases. For this reason biloma should be considered primarily in

patients with a recent history of biliary surgery endoscopic intervention or abdominal trauma that could plausibly disrupt the biliary tree. In such contexts failure to consider biloma may delay diagnosis and expose patients to avoidable complications. Once clinical suspicion arises timely radiological evaluation becomes essential to distinguish biloma from other entities with similar imaging appearances. Following imaging several conditions must be carefully differentiated. Hepatic abscess represents a major alternative diagnosis particularly when patients present with fever leukocytosis or sepsis. Abscesses often demonstrate internal septations gas formation or thick irregular walls on imaging although these features may overlap with infected bilomas. Hepatic cysts typically present as well defined fluid filled lesions with thin walls and no inflammatory features. They are usually congenital or incidental findings and lack the clinical history of biliary disruption. Hepatic pseudocysts are uncommon but may develop after trauma or inflammation and can resemble bilomas on cross sectional imaging. Hepatic lymphoceles may also occur after surgery and can appear as fluid collections near operative sites.

In the postoperative setting seroma and hematoma must be considered. Seromas usually consist of sterile serous fluid and often resolve spontaneously without intervention. Hematomas may show variable density on imaging depending on age of bleeding and are frequently managed conservatively. Accurate differentiation is critical because management strategies differ substantially. Bilomas often require drainage due to the caustic nature of bile and the risk of infection whereas many hematomas and seromas do not require invasive treatment [2][4]. Misclassification may therefore lead to unnecessary procedures or harmful delays in care. Definitive diagnosis often requires correlation between clinical history imaging findings and in selected cases aspiration of the collection with biochemical analysis. The presence of bile confirms biloma and guides appropriate management. Maintaining a structured diagnostic approach ensures that biloma is neither overlooked nor overdiagnosed in patients presenting with nonspecific abdominal symptoms.

**Prognosis**

The prognosis of biloma depends largely on its size anatomical location underlying cause and the presence or absence of an ongoing bile leak. Uncomplicated bilomas that are small localized and not associated with continued bile extravasation generally have a favorable outcome. In asymptomatic patients with stable imaging findings conservative management with observation may be sufficient and often leads to resolution [2]. These cases rarely progress to serious complications when appropriately monitored. Symptomatic bilomas carry a higher risk of morbidity but outcomes remain favorable when prompt intervention is undertaken. Image guided percutaneous drainage has proven highly effective in relieving symptoms of controlling infection and preventing progression to sepsis. Most patients respond well to this approach and experience full recovery without long term sequelae [2][24]. Lee et al demonstrated that early drainage of symptomatic bilomas significantly reduces morbidity and mortality while also decreasing the likelihood of secondary infection and complex complications [4]. This finding underscores the importance of timely recognition and decisive management. Recurrence after successful percutaneous drainage is uncommon particularly when no persistent bile leak is present. Patients generally regain baseline functional status with minimal impact on long term health. In contrast extensive bile leakage into the peritoneal cavity carries a less favorable prognosis. Large volume leaks are associated with significant physiological stress infection risk and prolonged hospitalization. These cases often necessitate urgent invasive intervention and may require multidisciplinary management including endoscopic or surgical repair [4]. Overall prognosis remains excellent in most patients provided diagnosis is not delayed. Outcomes deteriorate primarily when biloma is unrecognized or when treatment is postponed. Early imaging targeted intervention and careful follow up are therefore central to achieving optimal results.

**Complications**

Biloma may lead to a range of local and systemic complications particularly when diagnosis or treatment is delayed. Infection represents the most common and serious complication. Sterile bile collections frequently become secondarily infected due to bacterial translocation. Once infection occurs patients may develop systemic inflammatory response sepsis or septic shock. Local progression may result in abscess formation with associated tissue destruction and prolonged recovery. Mechanical complications also occur. Expanding bilomas may compress adjacent structures leading to cholestasis through extrinsic biliary obstruction. This can manifest as jaundice abnormal liver function tests and worsening hepatic dysfunction. Lee et al described additional complications including pancreatitis respiratory failure and transdiaphragmatic bile fistulation in patients with abdominal bile collections [4]. These outcomes reflect the potential for bile to track across anatomical planes and provoke inflammatory damage beyond the hepatobiliary system. Interventional management itself carries inherent risks. Percutaneous drainage may result in bleeding infection or injury to nearby organs particularly when access routes are complex. Drain malfunction or incomplete evacuation may lead to treatment failure and persistent symptoms. Despite these risks percutaneous drainage remains safe and effective in experienced hands [2]. When bile leakage continues despite drainage further intervention

becomes necessary. Endoscopic stenting or surgical repair may be required to definitively control bile flow and prevent recurrence. The likelihood of complications increases with biloma size delayed presentation and ongoing bile leakage. Early recognition of appropriate imaging and timely intervention significantly reduce complication rates. Careful monitoring following treatment is essential to detect recurrence or progression and to ensure complete resolution.

**Conclusion:**

Hepatic biloma represents a rare but potentially serious consequence of biliary tract disruption, most commonly resulting from iatrogenic procedures such as laparoscopic cholecystectomy, endoscopic interventions, and hepatic ablation therapies. Its clinical significance lies in the nonspecific nature of presentation, which often contributes to delayed diagnosis and increased risk of infection, sepsis, and organ compression. As demonstrated in the reviewed literature, early recognition through detailed clinical history and appropriate imaging is critical to improving patient outcomes. Advances in diagnostic imaging and minimally invasive techniques have significantly improved the management and prognosis of biloma. Image-guided percutaneous or endoscopic drainage has emerged as the cornerstone of treatment, offering high success rates with low morbidity. Surgical intervention is now reserved for selected complex cases or when conservative measures fail. Importantly, most patients recover fully when intervention is timely, and bile leakage is adequately controlled. From a nursing perspective, vigilant postoperative assessment, prompt recognition of atypical recovery patterns, early escalation of care, and patient education are essential components of effective management. Ongoing monitoring for complications, adherence to infection prevention measures, and coordination within the multidisciplinary team further reduce morbidity. Ultimately, early diagnosis combined with targeted intervention and skilled nursing care ensures an excellent overall prognosis for adult patients with hepatic biloma.

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