

Managing Incidental Findings on Abdominal and Pelvic CT and MRI, Part 4: White Paper of the ACR Incidental Findings Committee II on Gallbladder and Biliary Findings

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This white paper describes gallbladder and biliary incidental findings found on CT and MRI. Recommendations for management are included. This represents the fourth of 4 such papers from the ACR Incidental Findings Committee II, which used a consensus method based on repeated reviews and revisions and a collective review and interpretation of relevant literature. Topics include the management of a variety of gallbladder abnormalities and biliary dilation. A table is provided for reference.

Key Words: Incidental findings, incidentaloma, ACR, consensus, CT, MRI, gallbladder, biliary

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FOREWORD

This white paper does not comprehensively review the interpretation and management of gallbladder and biliary conditions but provides general guidance for managing such incidental findings on CT and MRI, appreciating that individual care will vary depending on each patient's specific circumstances, the clinical environment, available resources, and the judgment of practitioners. Also, the term *guidelines* is not used in this or the prior white papers to avoid the implication that these represent components of the ACR Practice Guidelines and Technical Standards (which represent official ACR policy, having undergone a rigorous drafting and review process culminating in approval by the ACR Council) or the ACR Appropriateness Criteria[®] (which use a formal consensus-building approach using a modified Delphi

technique). This white paper, which represents the collective experience of the ACR Incidental Findings Committee II, was developed through a less formal process of repeated reviews and revisions of the draft document and does not represent official ACR policy. For these reasons, this white paper should not be used to establish the legal standard of care in any particular situation.

INTRODUCTION

Please refer to the overview of the work of the Incidental Findings Committee II [1] for a description of the purposes, structure and process, and the conventions used in these 4 white papers, of which this is the fourth. The authors of this white paper represent the gallbladder and biliary subcommittee membership as listed in the appendix, and the roster of the entire Incidental Findings Committee II is listed in the appendix of the overview of this project <http://dx.doi.org/10.1016/j.jacr.2013.05.012> [1].

INCIDENTAL FINDINGS OF THE GALLBLADDER AND BILIARY TRACT

The third National Health and Nutrition Examination Survey indicated that an estimated 6.3 million men and 14.2 million women aged 20 to 74 years in the United States have gallbladder disease [2]. Consequently, findings involving the gallbladder are commonly identified on CT and MRI that are unrelated to the reasons for the examinations [3]. Most incidentally detected gallbladder

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Table 1. Summary of diagnosis and evaluation of incidental findings of the gallbladder and bile ducts (see text for details)

Finding	Finding/Diagnosis	Action
Gallstones, no mass	Gallstones	If symptomatic, ultrasound
Gallbladder wall calcification, no mass	Focal wall calcification or diffuse (porcelain gallbladder)	No follow-up recommended; if followed, use postcontrast CT
Dense gallbladder contents (20-100 HU)	Sludge, excreted contrast, hemorrhage, gallstones	No evaluation or follow-up recommended specifically for this finding
Diffuse gallbladder wall thickening >3 mm, no mass	Hepatitis, congestive heart failure, liver disease, pancreatitis, hypoproteinemia	No evaluation or follow-up recommended specifically for this finding
Focal gallbladder wall thickening or mass	Polyp, gallbladder cancer, cholesterosis, adenomyomatosis	Evaluation and follow-up depends on mass size, other clinical factors; ultrasound may have specific features for adenomyomatosis
Gallbladder polyp ≤ 6 mm	Benign polyp	No evaluation or follow-up recommended
Gallbladder polyp 7-9 mm	Benign polyp, adenoma vs small cancer	Follow yearly with ultrasound; surgical consult if polyp grows
Gallbladder polyp ≥ 10 mm, mass	Benign polyp, adenoma vs small cancer	Surgical consult
Pericholecystic fluid	Gallbladder perforation, other collection	Individual assessment
Distended gallbladder	Fasting, obstruction	If asymptomatic, no evaluation
Ductal dilation >6 mm, if no cholecystectomy or >10 mm if gallbladder absent	Obstruction, postcholecystectomy	If laboratory results normal, no evaluation; if abnormal, ERCP, EUS, MRCP, or CT cholangiography as appropriate

Note: ERCP = endoscopic retrograde cholangiopancreatography; EUS = endoscopic ultrasound; MRCP = MR cholangiopancreatography.

abnormalities are benign and include gallstones, cholesterosis, and adenomyomatosis. However, one of the most important objectives of evaluating incidental findings is to differentiate benign from malignant conditions.

Incidental findings include calcified or noncalcified gallstones, diffuse or focal gallbladder wall thickening, distended gallbladder, gallbladder wall polyp or mass, gallbladder wall calcifications, hyperdense gallbladder contents, and biliary ductal dilation. Although cholelithiasis, acute and chronic cholecystitis, carcinoma of the gallbladder [4], and other serious gallbladder conditions are often symptomatic, they may occasionally be detected incidentally.

Many potentially symptomatic conditions involving the biliary tract may also be found incidentally on CT or MRI, including focal, multifocal, or generalized biliary dilation; calculi; neoplasms (primarily cholangiocarcinoma and gallbladder carcinoma); and postoperative changes.

The Incidental Findings Committee II's recommendations for managing gallbladder and biliary incidental findings are summarized in Table 1. The committee's detailed recommendations for managing incidental findings involving the gallbladder and biliary tract are as follows.

Gallbladder Findings

Gallstones With No Mass on CT. If there are one or more visible gallstones with no associated ductal dilation, mass, or clinical symptoms, no additional workup is recommended. Gallbladder ultrasound may be indicated when symptoms such as biliary colic develop.

Gallbladder Wall Calcification With No Mass on

CT. Although gallbladder wall calcification (porcelain gallbladder) had been long thought to be associated with a substantially increased risk for gallbladder carcinoma, large retrospective studies have shown that the risk is approximately 5% to 7%. One study of 25,900 gallbladder specimens found that calcification was present in 44 of the specimens. One hundred fifty of 25,900 patients had gallbladder carcinoma, but only 2 of the 44 patients with gallbladder wall calcifications were among the 150 patients who had carcinoma [5]. Also, these 2 cases were in gallbladders with focal, mucosal, but not diffuse calcification. Another series of >10,000 cases showed only 15 patients with gallbladder wall calcification, and none had gallbladder carcinoma [6]. In the general population, on the basis of these surgical series, the risk for gallbladder cancer in cholecystectomy patients is about 0.6% to 0.8%, and when there is a partially calcified wall, the risk is as high as 7%.

No data are available to indicate the value of follow-up or new incidence on a yearly basis, but it is likely to be <1% per year, on the basis of the low prevalence in these series. Furthermore, the probability of identifying such a newly developed cancer is not certain, and identifying it when intervention could change the course of the disease is even smaller. Accordingly, the probability of benefit for yearly follow-up to patients is most likely a small fraction of 1%. Therefore, the committee generally does not recommend follow-up in patients with gallbladder wall calcifications. However, if the referring physician desires follow-up, this should be individualized on the basis of the patient's comorbidities and life expectancy. Ultrasound may not be worthwhile for following asymptom-

atic gallbladder wall calcifications, particularly when concentric, because this would obscure the gallbladder contents. Furthermore, a gallbladder mass may be nearly isoattenuating on noncontrast CT, so when follow-up is performed, contrast-enhanced CT is recommended.

Dense Gallbladder Contents of 20 to 100 Hounsfield Unit Attenuation on CT. If the nature of these findings is not known from recent abdominal sonography, this may represent gallbladder sludge, biliary excretion of intravascularly administered contrast (iodine or gadolinium based), hyperconcentrated bile, hemorrhage, or noncalcified gallstones. The patient's clinical history should help narrow the differential diagnosis. Generally, in the absence of other findings such as wall thickening and pericholecystic changes, hyperattenuating gallbladder contents do not warrant further prompt evaluation or follow-up.

Diffuse Gallbladder Wall Thickening >3 mm Without a Mass on CT or MRI. In the absence of secondary causes of gallbladder wall thickening, such as hepatitis, congestive heart failure, acute or chronic liver disease, pancreatitis, or hypoproteinemia, a primary cause should be excluded by clinical history. If the thickening is uniform or nearly so, the risk for an underlying gallbladder carcinoma is negligible. There are no data suggesting value in following generalized gallbladder wall thickening, so the committee recommends no specific further evaluation or follow-up for such a finding.

Focal Gallbladder Wall Thickening of >3 mm, Polyp, or Mass on CT or MRI. If not diagnosed from prior ultrasound, differential diagnosis of focal gallbladder wall thickening >3 mm includes benign gallbladder polyp, neoplasm, cholesterosis, adenomyomatosis, or xanthogranulomatous cholecystitis. Adenomyomatosis may be found incidentally, and findings include multiple small polyps or segmental thickening. This condition has a more characteristic ultrasound appearance, with multiple "comet-tail" reverberation artifacts [3]. No further evaluation or follow-up is recommended unless the patient is symptomatic.

A recent study [7] reviewed 346 patients with gallbladder polyps incidentally discovered on ultrasound. Although one polyp 7 to 9 mm in size and two polyps ≥ 10 mm had adenomatous or metaplastic features, no malignant polyps were identified. Therefore, the authors suggested that further evaluation or follow-up for polyps ≤ 6 mm is not necessary.

Another retrospective study of 467 patients who underwent follow-up for gallbladder polyps found that only 6.6% of polyps grew, and 3.7% were malignant or had malignant potential, including benign adenomatous and dysplastic polyps [8]. Only 0.7% were frankly malignant. The combination of growth and size >10 mm was the strongest predictor of malignancy, and the authors recommended resection for such polyps. They also recommended follow-up for polyps 5 to 10 mm in size.

The evidence for managing gallbladder polyps is inconclusive, but it is rare for small gallbladder polyps to be malignant. Much of the evidence is based on ultrasound data, but the committee believes that these data are likely to also apply to CT and MRI. On the basis of the evidence available, the committee recommends that no further evaluation or follow-up be performed for polyps of ≤ 6 mm. We recommend that polyps of 7 to 9 mm be followed yearly with ultrasound. Cholecystectomy should be considered for polyps ≥ 10 mm, and if this is not performed, they should be followed yearly, preferably with ultrasound.

Small gallbladder carcinomas are usually focal but usually ≥ 1 to 2 cm in size. It is unusual for relatively small gallbladder carcinomas to metastasize; however, larger lesions may further be associated with adjacent liver invasion, liver metastases, periportal lymphadenopathy, biliary ductal dilation, and carcinomatosis.

Pericholecystic Fluid (Outside the Wall) on CT or MRI. Pericholecystic fluid may occur from gallbladder wall perforation or necrosis and is usually symptomatic and therefore not an incidental finding. Gallbladder wall edema usually has no specific clinical importance but may be mistaken for pericholecystic fluid. However, truly pericholecystic fluid may be an unexpected finding in patients with multiple injuries or altered mental status. In the absence of symptomatic causes of pericholecystic fluid, further evaluation should be individualized on the basis of the patient's condition and the specific nature of the finding.

Distended Gallbladder (>4 cm Transversely and >9 cm Longitudinally) on CT or MRI. In the absence of right upper quadrant symptoms, physiologic distention secondary to fasting is most likely. Otherwise, acute obstruction should be considered. Prompt further evaluation should depend on the patient's symptoms and laboratory findings.

Biliary Ductal Dilation

When measuring a bile duct, short-axis measurements are the most accurate on CT and MR because a tubular structure may seem larger when seen obliquely. Biliary ductal dilation is defined as a common bile duct or common hepatic duct >6 mm in a patient <60 years of age with the gallbladder present or a common duct >10 mm with the gallbladder absent. A diameter >7 mm suggests bile duct obstruction in patients without previous cholecystectomy [9]. Because biliary dilation is often chronic and asymptomatic, liver function tests can help assess the importance of this imaging finding. Mild dilation is unlikely to be clinically important when alkaline phosphatase and bilirubin are normal, and no further imaging evaluation is recommended in these circumstances.

If clinical suspicion for biliary duct stone is intermediate or high, preoperative endoscopic retrograde cholan-

giopancreatography, endoscopic ultrasound, or MR cholangiopancreatography may be performed [10]. If there is suspicion of biliary tract mass, MR cholangiopancreatography or CT cholangiography may be performed. However, if the suspected biliary tract mass is in the lower third of the common bile duct, endoscopic ultrasound or endoscopic retrograde cholangiopancreatography–guided fine-needle aspiration is preferred as the first option.

ACKNOWLEDGMENTS

The authors thank David Kurth of the ACR staff, who helped support and coordinate the activities that led to this report, and Drs Joel Platt and Mark Baker for review and suggestions.

APPENDIX

Committee Members

Incidental Findings Committee II: Lincoln L. Berland, MD (chair).

Gallbladder and Biliary System Subcommittee: Sunit Sebastian, MD (chair), Cyrillo Araujo, MD, Jeffrey D. Neitlich, MD.

Ex Officio: James A. Brink, MD (chair), ACR Body Imaging Commission.

REFERENCES

1. Berland LL. Overview of white papers of the ACR Incidental Findings Committee II on ovarian and paraovarian, vascular, splenic, nodal, gallbladder, and biliary findings. *J Am Coll Radiol* 2013;10:672-674.
2. Everhart JE, Khare M, Hill M, Maurer KR. Prevalence and ethnic differences in gallbladder disease in the United States. *Gastroenterology* 1999; 117:632-9.
3. Levy AD, Murakata LA, Abbott RM, Rohrmann CA Jr. From the archives of the AFIP. Benign tumors and tumorlike lesions of the gallbladder and extrahepatic bile ducts: radiologic-pathologic correlation. *Radiographics* 2002;22:387-413.
4. Catalano OA, Sahani DV, Kalva SP, Cushing MS, Hahn PF, Brown JJ, Edelman RR. MR imaging of the gallbladder: a pictorial essay. *Radiographics* 2008;28:135-55.
5. Stephen AE, Berger DL. Carcinoma in the porcelain gallbladder: a relationship revisited. *Surgery* 2001;129:699-703.
6. Towfigh S, McFadden DW, Cortina GR, et al. Porcelain gallbladder is not associated with gallbladder carcinoma. *Am Surg* 2001;67:7-10.
7. Corwin MT, Siewert B, Sheiman RG, Kane RA. Incidentally detected gallbladder polyps: is follow-up necessary? Long-term clinical and US analysis of 346 patients. *Radiology* 2011;258:277-82.
8. Cairns V, Neal CP, Dennison AR, Garcea G. Risk and cost-effectiveness of surveillance followed by cholecystectomy for gallbladder polyps. *Arch Surg* 2012;147:1078-83.
9. Bowie JD. What is the upper limit of normal for the common bile duct on ultrasound: how much do you want it to be? *Am J Gastroenterol* 2000; 95:897-900.
10. Yeh BM, Liu PS, Soto FA, Corvera CA, Hussain HK. MR imaging and CT of the biliary tract. *Radiographics* 2009;29:1669-88.



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