Pigment GB Stones: MR Cholangiopancreatographic Evaluation with Emphasis on the Pitfalls

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Introduction
MR cholangiopancreatography reveals the biliary system and the pancreatic duct noninvasively. Many reports on MR cholangiopancreatography have described usefulness of assessing benign or malignant biliary diseases, pancreatic diseases, or both biliary and pancreatic diseases using various imaging techniques including gradient-echo (i.e., steady-state free-precession sequence) [1] or rapid acquisition with relaxation enhancement (RARE) or fast (or turbo) spin-echo sequences [2-3]. Although MR cholangiopancreatography showed excellent results in the diagnosis of choledocholithiasis, precise determination of among various gallbladder lesions (stone, adenoma, or adenocarcinoma) is not so reliable, especially from our previous results [2]. The sensitivity, specificity, accuracy, and specific diagnosis with a single-shot RARE and a multislice HASTE technique, were 75% / 83% / 80% / 50%, and 75% / 33% / 50% / 20%, respectively.

We aimed to define common pitfalls in evaluating pigment GB stones and to describe differentiating features from cancer or adenoma on MR cholangiopancreatography.

Materials & Methods
From retrospective review of radiologic reports, 57 patients from 79 consecutive patients with GB pathologies were evaluated: who were proved by surgery (n=55) and by both ultrasonography and CT images in two patients with GB stones. Axial, coronal, source and projectional images were assessed. First, we evaluated the number and cause of each false-positive and false-negative diagnosis. Then, assessed were following features of lesion size, multiplicity and wall attachment, presence of stalk and other associated diseases.

Results
Diagnoses proved were as follows: GB stones (n=28), cancer (n=15), adenoma (n=3) and others (n=11). GB stones were suggested in 33 out of 57 patients on MR cholangiopancreatography: there were eight false positive and three false negative reports, therefore, sensitivity 89 %, specificity 72 %, accuracy 81 %, positive predictive value 76 % and negative predictive value 88 % when we called GB stones as a disease. The causes of false positive reports were air (n=3); hemorrhagic and necrotic debris (n=2); and one each tubular adenoma, cholesterol polyp and bile duct cholangiocarcinoma invading into GB. The lesions leading to false negative diagnoses were GB cancer. Lesion size, multiplicity and wall attachment were significant features in distinguishing GB stones from adenoma or carcinoma (p<.05). The mean size of stones was 1.4 cm and that of cancer or adenoma was 3.5cm.

Conclusion
Pitfalls mimicking or missing GB stones were assessed with MR cholangiopancreatography. The size, multiplicity and wall attachment are useful features in distinguishing stones from neoplasms.

Table 1. Various Features on MR cholangiopancreatography Favoring GB Stone from GB Adenoma or Adenocancer.

<table>
<thead>
<tr>
<th>MR Features</th>
<th>Stone (n=28)</th>
<th>GB cancer (n=15)</th>
<th>Adenoma (n=4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiplicity</td>
<td>21 (75)*</td>
<td>1 (6)*</td>
<td>1 (25)</td>
</tr>
<tr>
<td>Wall attachment</td>
<td>2 (7)†</td>
<td>15 (94)*</td>
<td>3 (75)†</td>
</tr>
<tr>
<td>Smooth surface</td>
<td>19 (68)*</td>
<td>3 (19)*</td>
<td>3 (75)</td>
</tr>
<tr>
<td>Pedicle</td>
<td>2 (7)</td>
<td>2 (13)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Other stone diseases</td>
<td>8 (29)</td>
<td>1 (6)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Intramural halo</td>
<td>13 (46)</td>
<td>3 (19)</td>
<td>1 (25)</td>
</tr>
</tbody>
</table>

Number in the parenthesis means percentage.
* Significant difference between stone and cancer (p<.05).
† Significant difference between stone and adenoma (p<.05).

References