Is There an Association Between Gallbladder Dyskinesia and Idiopathic Acute Pancreatitis?

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Abstract

Objectives: The etiology of acute pancreatitis remains unclear in a significant number of patients. This study aimed to assess gallbladder dysfunction diagnosed using hepatobiliary iminodiacetic acid (HIDA) scan in patients recovering from idiopathic acute pancreatitis.

Methods: This retrospective observational study included 22 consecutive patients with clinical and laboratory evidence of idiopathic acute pancreatitis. A HIDA scan was performed 8-10 weeks after the episode of pancreatitis.

Results: Of the 22 patients, 14 (63.6%) were males. Their ages ranged from 18 to 79 years (mean, 47.5 ± 19.5). The co-morbid conditions observed were hypertension in eight patients, followed by diabetes in seven, ischemic heart disease in five, and miscellaneous in five. The HIDA scan revealed a gallbladder ejection fraction of less than 35% in seven (31.8%), suggesting a gallbladder dysfunction. Non-visualization of the gallbladder was observed in two patients. Biliary to the bowel transit time (BBTT) was 25.8 ± 8.7 minutes, and visualization of the gallbladder (n=20) was seen in 13.6 ± 11.4 minutes.

Conclusions: Some patients with idiopathic acute pancreatitis have gallbladder dysfunction as evidenced by a decreased gallbladder ejection fraction or lack of visualization on the HIDA scan. Gallbladder dyskinesia should be checked in these patients to plan further management including cholecystectomy.

Keywords: Cholescintigraphy; 99mTc HIDA; Acute pancreatitis; Gallbladder emptying; Biliary dyskinesia.

Introduction

Pancreatitis is an inflammatory process that occurs due to abnormal trypsin activation causing auto-digestion of the pancreas [1]. Several etiological factors are reported, with gallstones and alcohol being the most common. The rest includes biliary tract diseases, infection, trauma, hypercalcemia, autoimmunity, toxins, tumors, hypertriglyceridemia, pancreatic developmental disorders, some drugs, and more [2]. The etiology of acute pancreatitis remains unclear in about 12-35% of patients in different studies [3-5] and the term idiopathic acute pancreatitis is used for such cases.

Biliary dyskinesia is a condition in which the coordinated contraction of the gallbladder, bile ducts, or sphincter of Oddi is disrupted, leading to disruption of the process of emptying bile into the duodenum [6]. Cholescintigraphy, commonly known as HIDA (hepatobiliary iminodiacetic acid) scan, noninvasively assesses the anatomy and activity of the biliary system and liver via excretion of the radioactive tracer, the 99mTc-labeled iminodiacetic acid derivative disofenin [7]. It has been mainly used to diagnose acute cholecystitis, chronic hepatobiliary diseases, biliary dyskinesia, biliary obstruction, and biliary leaks [8]. Imaging shows radiotracer in the liver and biliary tract and then in the gallbladder and small bowel. After Cholecystokinin (CCK) or fatty meal provocation, the gallbladder contracts and empties, and the amount of tracer that comes out is calculated, referred to as the gallbladder ejection fraction (GBEF). A GBEF of less than 35 percent is considered an abnormal HIDA scan in most studies [9].

This study aimed to evaluate the presence of malfunctioning acalculous gallbladder with reduced ejection fraction on HIDA scan in patients recovering from idiopathic acute pancreatitis when no other precipitating etiological factor for acute pancreatitis could be identified on routine examinations.
Methods
This was a retrospective cross-sectional study that included all patients seen in one year both male and female, who had clinical and laboratory evidence of idiopathic acute pancreatitis, were older than 18 years at the time of presentation, and whose imaging studies revealed no evidence of gallstones. Acute pancreatitis was diagnosed by the presence of at least two of the following: acute epigastric pain; elevated serum lipase ≥ 3 times the upper normal limit; characteristic CT findings [10]. Exclusion criteria were patients with abdominal pain without clinical presentation of pancreatitis, pregnant women, patients with a history of alcohol consumption, trauma or toxin ingestion, patients with known cases of autoimmune pancreatitis, cystic fibrosis, and chylomicroemena, patients with gallstones or bile duct stones or gallbladder and biliary sludge as evidenced by imaging studies (ultrasound, CT, or MRCP), patients with ascariasis and post-cholecystectomy status. Idiopathic acute pancreatitis was defined as acute pancreatitis after excluding the above etiologies.

Radionuclide hepatobiliary scintigraphy was performed during the follow-up, 8-10 weeks after the acute episode. 5 millicuries mCi of Tc-99m DISIDA, given intravenously, and 1-hour anterior projection dynamic images were acquired. This was followed by sequential static images anteriorly after a meal for three hours. Briefly, dynamic images revealed the traveling of the bolus through cardiac chambers followed by large abdominal vessels and perfusion blush over the liver. The tracer was then taken up by the functioning hepatocytes. Activity in intrahepatic bile ducts was noticed. Sequential images revealed hepatocytic clearance of the tracer with the appearance of a gall bladder. Gallbladder visualization time (GBVT) and time for the tracer to flow into the intestinal loops (biliary bowel transit time, BBTT) were noticed. When the radioactivity was maximal in the gallbladder and minimal in the liver, a fatty meal was given. After the meal, the contraction of the gallbladder was recorded, and the gallbladder ejection fraction was calculated.

A proforma was prepared to record patient data, laboratory tests, abdominal ultrasound findings, CT scans, and gallbladder ejection fraction. The study was performed following the ethical standards laid down in the Declaration of Helsinki. All the diagnostic tests were part of the routine care provided at our hospital. The protocol of this retrospective observational study was approved by the Ethics Review Committee (ERC) of the University Hospital (Ref: 5250322HHMED). The informed consent requirement was waived by the ERC due to retrospective design.

The data was analyzed using the SPSS software package (IBM SPSS Statistics 20; Chicago, IL, USA). Descriptive statistics were calculated, presenting means and standard deviations for continuous variables, and numbers with percentages for categorical variables. Pearson’s correlation coefficient was employed to examine the relationships between variables, providing insight into the strength and direction of associations.

Results
Of 22 patients, 14 (63.5%) were males. The ages ranged from 18 to 79 with a mean age of 47.5 ± 19.5 years. 13 patients were of age above 50 or above. Body mass index (BMI) ranged between 16.8 to 32.2 (mean 23.3 ± 3.7). Six patients had a BMI greater than 25 kg/m2. The most common comorbidities were hypertension in eight patients, diabetes in seven, and ischemic heart disease in five. Other comorbidities included chronic obstructive pulmonary disease, chronic kidney disease, hypothyroidism, psychiatric disorder, and G6PD deficiency in one each. The laboratory investigations have been mentioned in (Table 1).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender: male: female</td>
<td>14:8</td>
</tr>
<tr>
<td>Age, years: median (range)</td>
<td>51 (18-79)</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>23.3 ± 3.7</td>
</tr>
<tr>
<td>Comorbidity</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>8 (36.3%)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>7 (31.8%)</td>
</tr>
<tr>
<td>Ischemic heart disease</td>
<td>5 (22.7%)</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>5 (22.7%)</td>
</tr>
<tr>
<td>Laboratory investigations (mean ± S.D.)</td>
<td></td>
</tr>
<tr>
<td>Bilirubin (mg/dL)</td>
<td>0.98 ± 1.00</td>
</tr>
<tr>
<td>Alanine aminotransferase level (IU/L)</td>
<td>44.5 ± 64.4</td>
</tr>
<tr>
<td>Aspartate aminotransferase (IU/L)</td>
<td>51.9 ± 60.4</td>
</tr>
<tr>
<td>Gamma-glutamyl transferase (IU/L)</td>
<td>121.5 ± 195.5</td>
</tr>
<tr>
<td>Alkaline phosphatase (IU/L)</td>
<td>168.8 ± 178.5</td>
</tr>
<tr>
<td>Albumin (g/dL)</td>
<td>3.8 ± 0.3</td>
</tr>
<tr>
<td>Amylase (IU/L)</td>
<td>1188.2 ± 1113.1</td>
</tr>
<tr>
<td>Lipase (IU/L)</td>
<td>1964.0 ± 2383.8</td>
</tr>
<tr>
<td>Cholesterol (mg/dL)</td>
<td>181.6 ± 78.3</td>
</tr>
<tr>
<td>Triglyceride (mg/dL)</td>
<td>182.3 ± 125.1</td>
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<tr>
<td>Cholestaticigraphy</td>
<td></td>
</tr>
<tr>
<td>Non-visualized gallbladder</td>
<td>2 (9.1%)</td>
</tr>
<tr>
<td>Time to visualize gallbladder (minutes) (n=20)</td>
<td>13.6 ± 11.4</td>
</tr>
</tbody>
</table>
Gallbladder dyskinesia is a condition characterized by abnormal gallbladder motility, which can lead to impaired bile flow and increased risk of acute pancreatitis. This study aimed to investigate the association between gallbladder dyskinesia and idiopathic acute pancreatitis.

Methods:

- A retrospective observational study was conducted in a single hospital on patients without a control group for gallstone pancreatitis.
- The study sample consisted of 22 patients, with a sample size of 20 patients included in the analysis.
- The biliary to bowel transit time (BBTT) was calculated as 25.8 ± 8.7 minutes in this study. There was a correlation between BBTT and gallbladder visualization time (GBVT) (p = 0.015 by Pearson correlation test).
- No correlation of ejection fraction with BBTT or GBVT was found.

Results:

- The HIDA scan performed at the follow-up visit revealed a gallbladder ejection fraction of less than 35% in seven (31.8%), suggesting a gallbladder dysfunction.
- Visualization of the gallbladder was seen in two patients. Visualization of the gallbladder visualization time (GBVT) could be found.
- There was a correlation between GBVT and BBTT (p=0.015).

Discussion:

- The objective of this study was to document the presence of the malfunctioning gallbladder diagnosed by HIDA scan in patients recovering from idiopathic acute pancreatitis.
- The etiology of acute pancreatitis remains unknown in a significant number of patients.
- It has been shown that the changes detected by the biliary scintigraphy done during the acute phase can be transient as some of these patients show reversibility.
- We demonstrated the presence of malfunctioning acalculous gallbladder with reduced ejection fraction on HIDA scan in one-third of patients recovering from idiopathic acute pancreatitis.
- Further studies are needed to examine its possible implications for the management of idiopathic acute pancreatitis.

Conclusion:

- We demonstrated the presence of malfunctioning acalculous gallbladder with reduced ejection fraction on HIDA scan in one-third of patients recovering from idiopathic acute pancreatitis.
- The sample size of 22 patients, while small, is appropriate for a retrospective observational study.
- The study has a clear and specific research objective. The etiology is obvious, a HIDA scan is usually not indicated. We could not find any patients with gallstone pancreatitis who had the HIDA scan. However, our study suggests a causal relationship between gallbladder dyskinesia and idiopathic acute pancreatitis.
Disclosure statement

All authors declare that they have no conflict of interest.

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None

References