Is a 15-Minute Collection of Duodenal Secretions After Secretin Stimulation Sufficient to Diagnose Chronic Pancreatitis?

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Background: Standard hormonal stimulation tests of pancreatic function use a 60- to 90-minute collection of pancreatic secretions. A shorter 15-minute collection time has been proposed to increase the feasibility of the secretin stimulation test. The accuracy of this brief collection period for the diagnosis of chronic pancreatitis has not been well defined.

Methods: We retrospectively evaluated the accuracy of a 15-minute collection period by comparing the results of 633 complete standard secretin tests (60 minutes) to the result using only the first 15 minutes of the same test. The gold standard used for the diagnosis of chronic pancreatitis was the final result of the complete 60-minute secretin stimulation test.

Results: The specificity of the first 15-minute collection was 34.8% (95% CI, 30.0%-39.2%). The positive predictive value was 64.9% (95% CI, 40.5%-49.3%). The accuracy was 57.3% (95% CI, 53.0%-61.6%).

Conclusions: Using only the first 15-minute collection period in a standard 60-minute secretin test is inadequate for the diagnosis of chronic pancreatitis.

Key Words: secretin stimulation test, chronic pancreatitis

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The diagnosis of chronic pancreatitis is based on the detection of abnormal structure or function of the diseased pancreas. The most accurate way to evaluate pancreatic function is the administration of a hormone stimulation test such as the secretin stimulation test. The reliability of the secretin stimulation test in detecting chronic pancreatitis has been evaluated against histology in more than 100 patients by Hayakawa et al. In this study, the peak bicarbonate (HCO3) concentration of pancreatic secretion was the most accurate parameter for the diagnosis of chronic pancreatitis. Our extensive clinical experience with the secretin test at the University of Florida also indicates that the peak bicarbonate concentration is the best parameter to evaluate.

Although the secretin stimulation test has been accepted as the most sensitive and specific test to diagnose pancreatic exocrine insufficiency, it is not currently widely used. The procedure is labor and time intensive and requires trained personnel and a designated laboratory. A package of a large (26 French) enteraloduodenal tube is required. The tube has to remain in place for more than 1 hour because the standard secretin stimulation test requires collection of pancreatic secretions for 60 minutes after injection with secretin. During the insertion of the tube and during sample collection, sedation is not used because it may interfere with the test result. The lack of sedation makes the performance of the secretin stimulation test uncomfortable for patients. The degree of discomfort is usually not great, but occasionally a patient may not tolerate the test. One proposed way to improve the feasibility of the secretin stimulation test is a shorter collection time. Some authors have suggested a 15-minute collection of pancreatic secretions instead of the standard 60 minutes. Collection of pancreatic secretion can be accomplished with a standard enteraloduodenal tube, intraduodenal placement of a catheter at the time of endoscopic retrograde cholangiopancreatography (ERCP), standard endoscopy, or transnasal passage of small-caliber endoscope. It has been standard practice during the performance of the intraduodenal secretin test at the time of ERCP to evaluate a period of 15 minutes or shorter. It has not been desirable to leave a catheter in the pancreatic duct for a long period of time.

The availability of synthetic porcine secretin and soon-to-be-available synthetic human secretin and the increased appreciation that painful small duct chronic pancreatitis may be diagnosed by the secretin test in the setting of normal radiographic tests (computed tomography, ERCP, endoscopic ultrasound). It is probable that the secretin test will be used more frequently via many different techniques.
The diagnostic accuracy of 15-minute collection of pancreatic secretions after stimulation with secretin for the diagnosis of chronic pancreatitis in a large patient population. The gold standard used for the diagnosis of chronic pancreatitis was the final result of the complete 60-minute secretion stimulation test.

METHODS

The secretion stimulation test was done by placement of a Drelling tube orally to the second portion of the duodenum. Fluoroscopy was used to guide the tube into position. The Drelling tube has ports for simultaneous aspiration of gastric and duodenal contents. To decrease dilution of pancreatic secretions, 15 minutes of continuous aspiration of duodenal content was performed before intravenous biologic porcine secretin administration at a dose of 1 UI/kg. Immediately following secretin bolus, duodenal juice was collected by continuous aspiration in 15-minute aliquots for a total of 90 minutes. The 4 samples (15, 30, 45, and 60 minutes) were analyzed for bicarbonate concentration. The highest concentration of bicarbonate among the 4 aliquots was reported as peak bicarbonate concentration. Peak HCO₃⁻ <80 mEq/L is diagnostic of chronic pancreatitis in our laboratory.

We retrospectively reviewed 633 secretion stimulation tests performed at the University of Florida. All secretion stimulation tests were done in patients with clinical suspicion of chronic pancreatitis based on clinical presentation as well as laboratory and radiologic tests. The data extracted were the patient age and gender. HCO₃⁻ concentration during the first 15-minute collection and the peak HCO₃⁻ concentration for the complete 60-minute secretion stimulation test.

The sensitivity, specificity, and accuracy for the first 15-minute HCO₃⁻ collection and the probability of a secretion stimulation test consistent with chronic pancreatitis given a HCO₃⁻ <80 mEq/L during the first 15-minute collection were determined. The Student t test was used to compare age or gender as a predictor of congruency between the first 15-minute collection and the final result of the secretion stimulation test.

RESULTS

Of the 643 patients, 490 subjects had HCO₃⁻ <80 mEq/L during the first 15-minute collection (Table 1). Of these 490 subjects, only 220 (true positives) also had a complete secretion stimulation test consistent with chronic pancreatitis. The retraining 270 (false positives) subjects had a HCO₃⁻ <80 mEq/L during the first 15-minute collection and had a normal complete secretion test (Table 1).

Of the 633 patients 143 (true negatives) had HCO₃⁻ >80 mEq/L during the first 15-minute collection and normal complete secretion stimulation test (Table 1). There were no false-negative results since, by definition, if the 15-minute HCO₃⁻ is >80 mEq/L, the complete standard secretion test is normal (Table 1).

The sensitivity of the 15-minute HCO₃⁻ test is 220/220 = 100% (by definition), and the HCO₃⁻ of the first 15-minute collection is >80 mEq/L, the standard secretion test is normal.) The specificity of the 15-minute HCO₃⁻ test is 143/413 = 34.62% (95% CI, 30.03%–39.71%). In our population, the probability of a standard secretion test consistent with chronic pancreatitis given a 15-minute HCO₃⁻ <80 mEq/L is 220/490 = 44.90% (95% CI, 40.56%–49.30%). The accuracy of the first 15-minute collection of pancreatic secretions for the diagnosis of chronic pancreatitis is 57.34% (95% CI, 51.01%–63.45%). It was not statistically significant difference between concordant subjects or discordant subjects with respect to age or gender (Table 2). P values were 0.58 for age and 0.48 for gender.

DISCUSSION

Our results demonstrate that using only the first 15-minute collection period of a standard secretion test does not

<table>
<thead>
<tr>
<th>TABLE 1. Peak HCO₃⁻ of Secretion Stimulation Test</th>
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<tbody>
<tr>
<td>Test 15-min HCO₃⁻ Concentration</td>
</tr>
<tr>
<td>&lt;80 mEq/L Positive test</td>
</tr>
<tr>
<td>&gt;80 mEq/L Negative test</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>Positive</td>
</tr>
<tr>
<td>False positive</td>
</tr>
<tr>
<td>True negative</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>220</td>
</tr>
<tr>
<td>270</td>
</tr>
<tr>
<td>143</td>
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<tr>
<td>490</td>
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*If the 15-minute HCO₃⁻ was <80 mEq/L, then the peak HCO₃⁻ of the secretion stimulation test was >80 mEq/L, by definition of the secretion stimulation test.
TABLE 2: Examination of the Covariates Age and Gender

<table>
<thead>
<tr>
<th></th>
<th>Age (mean ± SD)</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>563</td>
<td>48 ± 15.2</td>
<td>12</td>
</tr>
<tr>
<td>Discontinuity</td>
<td>270</td>
<td>49 ± 15.5</td>
<td>8</td>
</tr>
</tbody>
</table>

\[ P < 0.04 \quad \text{and} \quad \chi^2 > 4.8 \]

*Control: subjects with a 15-minute HCO₃⁻: 40 ml/L and a peak ERCP of 15-minute HCO₃⁻: 40 ml/L.

**Discontinuity: subjects with a 15-minute HCO₃⁻: 40 ml/L and a peak ERCP of 15-minute HCO₃⁻: 40 ml/L.

accurately measure overall pancreatic function or diagnose chronic pancreatitis. Our findings further support the data that the maximal effect of secretin on bicarbonate concentration may not occur for 30-60 minutes after injection. In a recent study, convolutional analysis of intraduodenal collection of pancreatic secretions in isolated patients to evaluate pancreatic function in patients with chronic abdominal pain. The first 15-minute duodenal collection appeared to distinguish between patients with chronic pancreatitis and patients with chronic abdominal pain and negative or equivocal studies (computed tomography, ERC, and endoscopic ultrasound). The 15-minute collection was unable to distinguish between patients with chronic abdominal pain and risk factors for chronic pancreatitis (previously patients with early tumor progression) and those with pain and no risk factors (pre-malignant patients with no pancreatic lesions). There are no reports of patients that might be distinguishable with the secretin stimulation test done for 60 minutes. Not surprisingly, in concordance with our data, the endoscopy-secretin test was able to distinguish the latter groups at 30 (p = 0.028) and 90 (p = 0.016) minutes. The authors speculate that a single aspiration between 30 and 60 minutes after secretin injection appears to be an effective screening test for chronic pancreatitis when the diagnostic studies are normal and short (15-minute) collection of duodenal secretions after injection with secretin is an inadequate method to diagnose chronic pancreatitis.

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REFERENCES


