GASTRIC EMPTYING STUDY – SOLID (2hr Protocol)
5.1.1
Radiology Associates of Clearwater

Overview

The Gastric Emptying Study demonstrates the movement of an ingested bolus of solid from the stomach into the small intestine. Various physiologic parameters may be quantified.

Indications

- Diagnosis of functional gastric dysmotility (1-4).
- Diabetes
- Gastric outlet obstruction
- Weight Loss
- Abdominal pain
- Cachexia
- Unspecified functional disorders of the stomach
- Malabsorption
- Anorexia
- Nausea and Vomiting
- Abnormal GI X-rays

*Exams ordered for indications which are not listed above need to be discussed with the Nuclear Medicine Physician.

Examination Time

Approximately 2 hours.

Patient Instructions

Schedule in the morning or early afternoon, whenever possible as the gastric emptying time varies with the time of day (5). The patient must be NPO a minimum of 6-8 hours prior to imaging.

Patients with dentures should be advised to bring them.

Have the patient bring a list of all medications they are currently taking.

Anti-nausea medicine, such as Vistaril, Compazine, Tigan and Phenergan should be held if possible, 24 hours prior to the study.

Prokinetic medications such as Zelnorm and Cisapride (Propulsid) should be discontinued for 24 hours unless otherwise instructed.

NOTE: Try to have patients who are insulin dependent diabetics imaged earlier in the day.
Lab / Image Correlation

Have any prior gastric emptying studies available for comparison.

If the patient has had an upper GI, attempt to have the report available.

Equipment & Energy Windows

Gamma camera: Large field of view. Preferably dual head.

Collimator: Low energy, high resolution, parallel hole.

Energy window: 20% window centered at 140 keV.

Matrix 128x128.

Radiopharmaceutical, Dose, & Technique of Administration

Radiopharmaceutical: Tc-99m-sulfur colloid tagged to one scrambled egg.

NOTE: If the patient is allergic to eggs, use instant oatmeal (1 package, 100cal)+ 1pkg Sugar reconstituted with water.

Dose: 1 mCi (37 MBq) P.O.

Patient Position & Imaging Field

Patient position: Standing. If patient is unable to tolerate a 45degree upright position on a stretcher may be used. This must be clearly noted and the same position must be used throughout the study.

Imaging field: Upper abdomen. Distal esophagus, stomach and small bowel must be in the field of view.

Acquisition Protocol (14)

Place the patient in a sitting position or 45 deg supine, LAO to the camera (15,16). If a dual head camera is used image in the anterior / posterior position.

Have the patient ingest the test meal as quickly as possible, followed by 120cc of tap water.
Acquire serial 1 minute digital images at the following times: (immediate, 10, 15, 30, 45, 60, 75, 90, 105, and 120 minutes).

NOTE: The patient should remain quiescent between image acquisitions because exercise decreases gastric emptying times (17).

Acquire images until the counts in the gastric region of interest have fallen by more than 95%, but at least for 1 hour. (Gastric counts can be determined for each image while waiting to begin the next acquisition.)

Data Processing

1. Draw a region of interest around the entire stomach, but exclude as much small intestine as possible in each image. Do not use a background region of interest.
2. The processing software will correct the counts at each time period for radioactive decay. If a dual head camera is used enable the geometric mean processing.
3. The computer will plot the results on a graph with "Time" on the X-axis and "Gastric counts" on the Y-axis. The half emptying time will be calculated automatically. Generate raw and fitted curves.

NOTE: For Tc-99m-SCOL labeled scrambled eggs the normal T1/2 is <90 minutes (70-90 minutes will be considered borderline). Residual gastric activity of >15% is abnormal. For Tc-99m-SCOL Labeled oatmeal the normal T1/2 is <60 minutes.

Principle Radiation Emission Data - Tc-99m (30)

Physical half-life = 6.01 hours.

<table>
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<tr>
<th>Radiation</th>
<th>Mean % per disintegration</th>
<th>Mean energy (keV)</th>
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<tbody>
<tr>
<td>Gamma-2</td>
<td>89.07</td>
<td>140.5</td>
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</tbody>
</table>

Dosimetry - Tc-99m-Sulfur Colloid Solid Meal (31)

<table>
<thead>
<tr>
<th>Organ</th>
<th>rads/1 mCi</th>
<th>mGy/37 MBq</th>
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<tbody>
<tr>
<td>Large intestine</td>
<td>0.46</td>
<td>4.6</td>
</tr>
<tr>
<td>Small intestine</td>
<td>0.24</td>
<td>2.4</td>
</tr>
<tr>
<td>Stomach</td>
<td>0.24</td>
<td>2.4</td>
</tr>
<tr>
<td>Ovaries</td>
<td>0.08</td>
<td>0.8</td>
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<tr>
<td>Whole body</td>
<td>0.02</td>
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<tr>
<td>Testes</td>
<td>0.004</td>
<td>0.04</td>
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References

Normal Findings

NOTE: This procedure adheres to ACR standards 1997.
This procedure adheres to the Society of Nuclear Medicine Procedure Guidelines for Gastric Emptying and Motility. Version 1.0, 7 Feb 1999

JSM
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