GASTROINTESTINAL BLEEDING STUDY
5.2.1
Radiology Associates of Clearwater

Overview

The Gastrointestinal Bleeding Study detects the extravasation of radiolabeled red blood cells from the vascular space into the gastrointestinal lumen. The subsequent movement of the extravasated red blood cells within the gastrointestinal lumen secondary to peristalsis allows localization of the site of bleed along the gastrointestinal tract.

Indications

Localization of gastrointestinal bleeding sites (1-3).

Localization of non-gastrointestinal bleeding sites (4).

Examination Time

Standard imaging is for one hour but depends on whether and when the site of bleeding is identified.

The study may be terminated as soon as the bleeding site is identified by the physician.

Imaging can be performed for up to 36 hours with a single injection of radiopharmaceutical. Usually the patient will not tolerate lying under the camera for more than 3 hours at a time. However, imaging may be stopped and restarted.

Patient instructions / Scheduling

No special instructions to patients.

The GI blood loss study must always be available on a STAT basis, when patient fits clinical guidelines set by MEC for night call. The patient involved must be actively bleeding.

Test should be scheduled to begin as soon as possible after request has been made (this test is always STAT).

Length of study is usually 90-120 minutes.

Lab / Image Correlation
Lab: Hematocrit and hemoglobin, if available, should be checked.

Image Correlation: No specific image correlation is necessary. If the patient has had an endoscopic procedure, however, copies of the report would be useful for comparison.

**Patient Preparation**

None.

**Equipment & Energy Windows**

- Gamma camera: Large field of view.
- Collimator: Low energy, high resolution, parallel hole.
- Energy window: 20% window centered at 140 keV.
- Computer.

**Radiopharmaceutical, Dose, & Technique of Administration**

When venous access is adequate, use Mallinckrodt ultra-tag kit for in vitro red cell labeling with 30 mCi Tc-99m Pertechnetate (10).

If venous access is difficult, and I.V. Service is unavailable to assist, label red cells in vivo with (8,9):

- 1.7 mg stannous chloride and 6.0 mg sodium pyrophosphate, given intravenously (direct injection rather than through reseal). (PYP) Double dose w/flush, if I.V. access is necessary.

- Tc-99m Pertechnetate, 30 mCi (1.11 G Bq) given intravenously, 20 minutes later.

Technique of administration: Standard intravenous injection.

**Patient Position & Imaging Field**

With the patient supine, position the gamma camera over the abdomen so that the entire abdominal cavity is within the field of view. Position so that only the Apex is in the field of view. Avoid cardiac blood pool.

Imaging field: Usually abdomen and pelvis; may exclude uppermost abdomen. (Occasionally position over a different part of the body depending on suspected
Acquisition Protocol

Start the acquisition just before or simultaneously with injection of the radiopharmaceutical.

Acquire serial 15 sec/frame dynamic digital images in a 128 x 128 matrix for 15 minutes. (2,5). Restart the dynamic acquisition every 15 minutes, until a site of bleeding is accurately localized, or until four sequential dynamic image sets (total of 60 minutes) have been obtained.

If the patient moves his bowels during the examination, image the stool for the presence of radioactivity. Do not allow the patient to urinate into the bedpan, as the urine will contain free Pertechnetate.

An additional 30 minutes of imaging will be acquired at the request of the nuclear medicine physician.

Periodically show the images to the nuclear medicine physician on the computer display using the cine mode (11).

Continue image acquisition until:
1. The site of bleeding is localized.
2. The patient will no longer lie under the camera.
3. The patient is needed elsewhere for another study.
4. The gamma camera and/or computer are needed for other studies.
5. The nuclear medicine physician terminates the imaging session.

Imaging may be resumed without an additional radiopharmaceutical injection for up to 36 hours (1).

When a 24 hour image shows activity within the intestine and active bleeding is suspected, but not obvious, a second injection of Tc-99m-RBCs can improve detectability (12).

Data Processing

None.

Principle Radiation Emission Data - Tc-99m (18)

Physical half-life = 6.01 hours.

<table>
<thead>
<tr>
<th>Radiation</th>
<th>Mean % per disintegration</th>
<th>Mean energy (keV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gamma-2</td>
<td>89.07</td>
<td>140.5</td>
</tr>
</tbody>
</table>
Dosimetry - Tc-99m-Labeled Red Blood Cells (19)

<table>
<thead>
<tr>
<th>Organ</th>
<th>rads/25 mCi</th>
<th>mGy/925 MBq</th>
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</thead>
<tbody>
<tr>
<td>Heart</td>
<td>2.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Liver</td>
<td>1.8</td>
<td>18.0</td>
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<tr>
<td>Spleen</td>
<td>1.5</td>
<td>15.0</td>
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<tr>
<td>Lungs</td>
<td>1.4</td>
<td>14.0</td>
</tr>
<tr>
<td>Kidneys</td>
<td>1.4</td>
<td>14.0</td>
</tr>
<tr>
<td>Blood</td>
<td>1.4</td>
<td>14.0</td>
</tr>
<tr>
<td>Red marrow</td>
<td>0.8</td>
<td>8.0</td>
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<tr>
<td>Whole body</td>
<td>0.4</td>
<td>4.0</td>
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</tbody>
</table>

References


Normal Findings

JSM
PROTOCOL\05-2-1
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Note:

1. This procedure complies with the Society of Nuclear Medicine procedure guidelines, Gastrointestinal Bleeding/Meckel's Diverticulum Scintigraphy 1.0 Approved February 7, 1999.
2. This procedure adheres to the ACR Standards, 1997.