

Republic of Iraq
Ministry of Higher Education
Al-Mustaqbal University
Radiology Techniques Department
Second Stage \ Special Radiological Procedures-1



Lecture No. (3&4)

Barium Meal

&

Barium Follow-Through

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Barium Meal

Barium Meal is radiological examination of the stomach.

Methods

1. **Double contrast.** The method to demonstrate mucosal pattern.
2. **Single contrast.** Uses include the following:
 - (a) **Children**—since it usually is **not** necessary to **demonstrate mucosal pattern**.
 - (b) To demonstrate **gross pathology** only, typically very **frail patients** **unable** to swallow gas granules

Indications

1. **Failed upper gastrointestinal endoscopy** or **patient unwilling** to undergo endoscopy
2. **dyspepsia**
3. **Gastro-oesophageal reflux disease** where lifestyle changes and empirical therapies are ineffective
4. **gastric ulcer**

Contraindications

Complete large-bowel obstruction.

Contrast Medium

1. **Barium** (E-Z HD 250% w/v 135 mL)
2. **Carbex** granules (**double contrast** technique)

Patient Preparation

1. Nil orally (**fasting**) for **6 h prior** to the examination
2. **Assess contraindications to the pharmacological agents used**

Preliminary Image

None.

Technique

The **double contrast** method:

1. A **gas**-producing agent is swallowed. (Double contrast)
2. The patient then **drinks** the barium while lying on the left side, supported by their elbow. This position **prevents** the barium from **reaching the duodenum too quickly**, thus obscuring the greater curve of the stomach.
3. The patient then lies supine and slightly on the right side (RPO), to bring the barium up against the **gastro-oesophageal junction**. This manoeuvre is screened to check for reflux, which may be revealed by asking the patient to **swallow** water and **cough** while in this position (the 'water siphon' test).
4. An i.v. injection of a **smooth muscle relaxant** (Buscopan 20 mg or glucagon 0.3 mg) may be given to **better distend the stomach** and to **slow down the emptying of contrast** into **duodenum**.

*The administration of **Buscopan** has been shown to not affect the detection of gastro-oesophageal reflux or hiatus hernia.

5. The patient is asked to roll onto the **right side** and then quickly over in a **complete circle**, to finish in an **RAO position**. This roll is performed to coat the gastric **mucosa** with barium.

*Good coating has been achieved if the **areae gastricae** in the antrum are visible.

Images




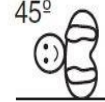




Comprehensive documentation of the examination is provided by the following:

1. Spot exposures of the **stomach (lying)**:

- (a) **RAO** ➡ to demonstrate the **antrum** and **greater curve**
- (b) **Supine** ➡ to demonstrate the **antrum** and **body**
- (c) **LAO** ➡ to demonstrate the **lesser curve en face**
- (d) **Left lateral tilted, head up 45 degrees** ➡ to demonstrate the **fundus**

***From the left lateral position, the patient returns to a supine position and then rolls onto the left side and over into a prone position.**

This sequence of movements is required to avoid barium flooding into the duodenal loop, which would occur if the patient were to roll onto the right side to achieve a prone position.

Image	RAO	Supine	LAO	Left lateral tilted head up
Position				
Image				
Demonstrates	Antrum + greater curve	Antrum + body	Lesser curve en face	Fundus

Stomach (lying):

2. Spot image of the **duodenal loop** (lying):

- (a) **Prone**—The patient lies on a compression pad to prevent barium from flooding into the duodenum.

*An additional view to demonstrate the **anterior wall of the duodenal loop** may be taken in an **RAO position**.

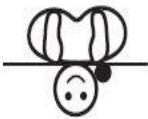
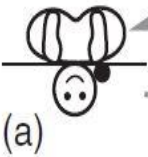


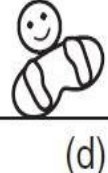

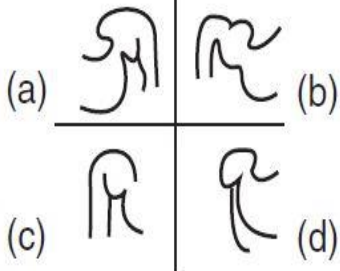
3. Spot images of the **duodenal cap** (lying):

(a) **Prone**

(b) **RAO**—The patient attains this position from the prone position by rolling first onto the left side, for the reasons mentioned previously.

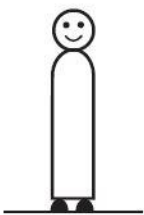
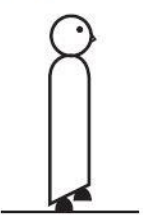
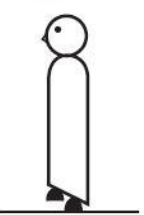
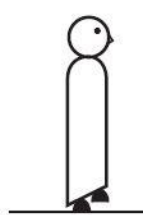


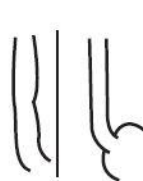
(c) **Supine**

(d) **LAO**

Image	Prone	Spot views of cap			
		Prone	RAO	Supine	LAO
Position					
Image					
Demonstrates	Duodenal loop	Caps			

4. Additional views of the **fundus** in an **erect position** may be taken at this stage, if there is suspicion of a **fundal lesion**.

5. Spot images of the oesophagus are taken, while barium is being swallowed, to complete the examination.

Image	Erect	Erect caps RAO	Steep LAO	Swallow RAO
Position				
Image				
Demonstrates	Fundus	Caps		Oesophagus

Aftercare

1. The patient should be advised to **eat** and **drink normally** **but** **with extra fluids** to avoid barium impaction. Occasionally **laxatives** may also be required.
2. The patient must **not drive** until any **blurring of vision** produced by the **Buscopan** has resolved. usually occurs within **30 minutes**.
3. The patient should be **warned that their bowel motions will be white** for a few days after the examination and may be **difficult to flush away**.

Complications

1. **Leakage** of **barium** from an **unsuspected perforation**
2. **Aspiration**
3. Conversion of a **partial large bowel obstruction** into a **complete obstruction** by the **impaction of barium**
4. **Barium appendicitis**, if barium impacts in the appendix (very rare)
5. Side effects of the pharmacological agents (**drugs**) used.

Barium Follow-Through

Barium Follow-Through is radiological examination of the small bowel.

Methods

1. Single contrast
2. With the addition of an effervescent agent (double contrast)
3. With the addition of a pneumocolon technique (double contrast)

Indications

1. Pain with **weight loss**
2. **Diarrhoea**
3. Transfusion dependent anaemia/**gastrointestinal bleeding**
unexplained by colonic or gastric investigation
4. **Malabsorption**
5. **Partial obstruction**
6. Small bowel **adhesive obstruction** (water soluble contrast)

Contraindications

1. **Complete or high-grade obstruction** is better evaluated by **CT** examination; **without oral** contrast, the intraluminal fluid caused by the obstruction functions as a natural contrast agent.
2. Suspected **perforation** is better evaluated by **CT**.

Contrast Medium

1. Barium: **E-Z Paque 100% w/v 300 mL** usually given divided over **20 min.**
2. Water soluble contrast if patient with small bowel **adhesive obstruction**

*The **transit time** through the small bowel is **reduced** by the addition of 10 mL of Gastrografin to the barium, improving **distension** and reducing flocculation.

*In children, 3–4 mL kg⁻¹ is a suitable volume.

*An **exception** is in **adhesional small bowel obstruction**, where **investigation** and ‘**treatment**’ with water-soluble contrast agents (frequently Gastrografin) may **reduce** the need for **surgical intervention**. In **this case** limited images are usually acquired **at 1, 4 and 24 h**, stopping once contrast is seen in the **colon**.

Patient Preparation

Metoclopramide (Maxolon) 20 mg **orally** may be given before or during the examination to **enhance gastric emptying**.

Preliminary Image

If **vomiting**, a plain abdominal film should be performed to **exclude high-grade small bowel obstruction**.

Technique

*The aim is to deliver a **single continuous column** of barium into the small bowel. This is **achieved by** the addition of 10 mL of Gastrografin to the barium solution and the patient lying on their **right** to enhance **gastric emptying**.

*If a **follow-through** examination is **combined** with a **barium meal**, glucagon can be used for the duodenal cap views rather than Buscopan, **because** it has a **short length of action** and does **not interfere with the SBT** (small bowel transit time).

Images

1. Prone PA images of the abdomen are taken every 15–20 min during the **first hour**, and subsequently every 20–30 min until the **colon is reached**.

*The prone position is used because the **pressure on the abdomen** helps separate the loops of the small bowel.

2. Each image should be reviewed and spot supine fluoroscopic views, using a **compression device** or **pad** if appropriate, may be considered.
3. Dedicated spot views of the **terminal ileum** are routinely acquired.

Additional Images

1. **To separate loops of the small bowel:**
 - (a) compression with fluoroscopy
 - (b) with x-ray tube angled into the pelvis
 - (c) obliques—in particular with the right side raised for terminal ileum views, or
 - (d) occasionally with the patient tilted head down
 - (e) pneumocolon—gaseous **insufflation of the colon via a rectal tube** after **barium arrives in the caecum**, which often results in **good-quality double-contrast** views of the terminal ileum.
2. Erect image—Occasionally used to **reveal** any **fluid levels** caused by contrast medium retained within diverticula.

Aftercare

As for barium meal.

Complications

As for barium meal.