

# Update on barium x-ray examinations of the gastro-intestinal tract

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*This summary has been adapted from a section in the Goodfellow Unit Internet CME Club. Further information, including Patient Information Sheets that can be printed off as pdf files, can be found on the Club site. Access to the Club site is free to all GPs. To join, visit the site at <http://cmeclub.auckland.ac.nz>, click on the icon "join the club" and then fill out the registration form and submit it (please make a note of your user name and password).*

*As well as providing updates on various investigative procedures, the site contains interactive self-marking quizzes based on guidelines, PreMeC Bulletins and other resources. Most courses qualify*

*doctors for two RNZCGP MOPS (Maintenance of Professional Standards) points, and GPs print off their certificate on completion of a course. New ones are added about monthly. The Club also contains virtual courses which link to medical resources and other interesting sites on the Internet. Other features include case studies in sports medicine, a section on investigative procedures, a toolbox of useful medical resources on the Internet, tips from Goodfellow CME courses, and the Journal Review Service with electronic ordering of journal articles that are then distributed by post from the Philson Library.*

with barium liquid while x-ray images are taken. It is usually performed on an outpatient basis.

The patient is positioned on an x-ray fluoroscopy table and images are obtained during and after the ingestion of barium sulphate. Depending on the indication the examination will include images of the oropharynx, oesophagus, stomach and small bowel, particularly the duodenum. The patient will be examined in erect and supine/prone positions and may be given a gas forming mixture for a double contrast examination.

Indications for barium swallow include assessment of dysphagia or pain on swallowing, assessment of tracheo-oesophageal fistula in children and assessment of the site of a perforation.

Indications for barium meal include investigation for dyspepsia, reflux, weight loss, an upper abdominal mass, a gastrointestinal haemorrhage or unexplained iron deficiency anaemia, partial obstruction or a suspected hiatus hernia.

There are a number of advantages to performing a barium swallow/meal. In comparison to gastroscopy, barium swallow is safer. The examination is useful for functional

## Barium studies

Barium studies (x-rays) of the bowel are used to diagnose abnormalities of the gastrointestinal tract, such as tumours, ulcers and other inflammatory conditions, polyps, hernias, and obstructions (strictures). Studies consist of either upper gastrointestinal tract examinations (barium swallow or meal) or lower gastrointestinal tract examinations (barium enema). Barium studies involve x-rays of the

GI tract taken in conjunction with the use of a diluted barium sulphate solution lining the area of the bowel under examination. Barium sulphate is a radio-opaque metallic contrast medium. Often the studies are termed double contrast by virtue of use of gas as a second contrast medium.

## Barium swallow/meal

A barium swallow involves partially filling the oesophagus and stomach



Above: Corkscrew oesophagus  
Top right: Erosive gastritis  
Right: Gastric ulcer

assessment as it allows the assessment of motility, reflux and distension. It is difficult to compare costs between barium studies and gastroscopy and they may be of comparable cost. However, in some centres barium studies are much more accessible to GPs and may be arranged with much less delay for the patient than gastroscopy.

There are also a number of disadvantages in performing the procedure. It is not as comprehensive or accurate a method for diagnosis of some conditions as gastroscopy. Furthermore, it is not possible to

take samples or provide treatment as part of the procedure. There are also considerations with respect to radiation exposure. The dose received from a barium swallow is 2–3 millisieverts compared with a chest film 0.06 millisieverts and background radiation of 2 millisieverts per year. Users of ionising radiation are required to inform all women of childbearing age about the risks of radiation in pregnancy. Pregnancy is a relative contraindication to the use of radiation unless the urgency is such that an alternative investigation is not available.

There are several potential difficulties that may arise out of a barium swallow/meal referral. Air insufflation can cause discomfort for patients. Poor tolerance of swallowed gas mixture can make for poor stomach and oesophageal distension. Where buscopan injection is used to relax bowel for better pictures, patients may experience some blurring of vision. There is also a tendency of barium to cause constipation in the days following the procedure. Patient co-operation is important and there is therefore a need for an interpreter in non-English speaking patients.

Less commonly performed upper gastro-intestinal barium studies include the modified barium swallow which involves the patient eating various barium-coated foods and requires specialist input from a speech language therapist. The barium meal follow-through is time-consuming and is now a relatively uncommon procedure.

#### Barium enema

A barium enema involves filling the large intestine with barium liquid while x-ray images are taken. This may involve either single or double contrast images. For single contrast procedures, the colon is filled with barium liquid and x-ray images reveal any significant abnormalities in the large intestine, although this procedure is largely used to detect obstructing lesions in the acute setting. With double contrast, which is usually the barium study of choice, a smaller quantity of thicker barium liquid is introduced to the large intestine, followed by air. This allows the barium to form a film on the inner surface, allowing smaller surface abnormalities of the large intestine to be detected and assessment of the state of the bowel mucosa.

A barium enema is usually performed on an outpatient basis. To prevent obscuring of the image, it is necessary for the large bowel to be emptied of faeces prior to the exami-

nation. This is vital as faecal residue can mimic the appearance of a polyp. Bowel preparation involves the patient drinking clear fluids during the preceding day, using a laxative and having nil by mouth for some hours prior to the procedure. The patient ideally needs to be passing clear stools prior to the commencement of the study.

The patient is positioned on an x-ray table and the barium liquid introduced per rectum via an enema tube. During double contrast imaging, the colon is also inflated with air through the same rectal tube with a small hand pump.

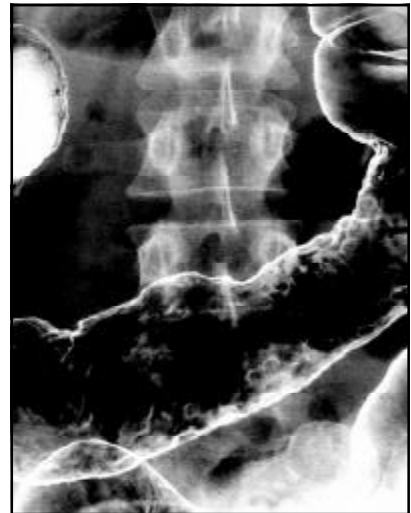
Indications for barium enema include the investigation of abdominal pain, bleeding from the rectum or melena, change in bowel habit, chronic diarrhoea or constipation, unexplained weight loss or anaemia, palpable mass (with suspicion that it arises from the bowel) or unusual bloating.

In comparison to colonoscopy, barium enema is safer. The perforation rate for barium enema is

1:25000, compared with 1:1700 for colonoscopy. Again, it is difficult to compare costs between barium studies and endoscopy and they may be of comparable costs. However in some centres barium studies are much more accessible to GPs and may be arranged with much less delay for the patient than colonoscopy.

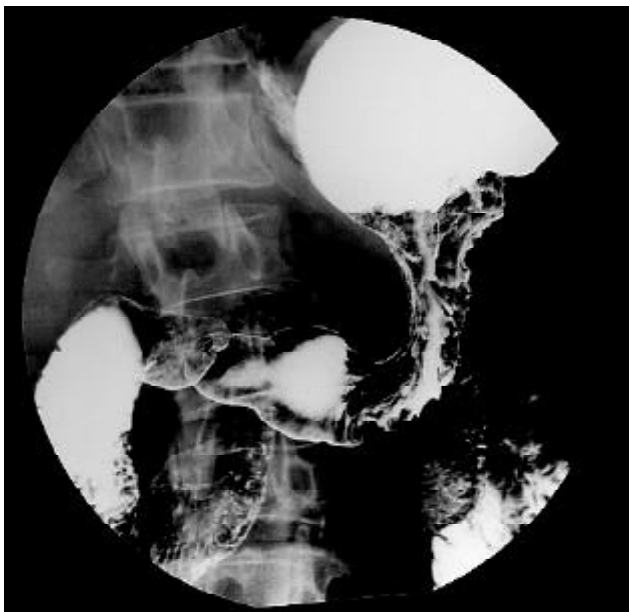
The disadvantages of barium enema are similar to those of barium swallow/meal. It is not possible to take samples or provide treatment as part of the procedure. The radiation exposure dose is 5–10 millisieverts compared with chest film 0.06 millisieverts and background radiation of 2 millisieverts per year. Users of ionising radiation are required to inform all women of childbearing age about the risks of radiation in pregnancy. Pregnancy is a relative contraindication to the use of radiation but generally in the context of the barium enema the urgency may be such that it is not acceptable to delay or choose an alternative investigation.

Barium enema is not as comprehensive or as accurate a method for



*Above: Crohn's disease*

diagnosis of some conditions in comparison to colonoscopy. For example, one study found that barium enema x-ray missed 60% of adenomatous polyps detected using a colonoscope. It can be a dangerous examination to perform in the presence of toxic megacolon but this condition would in all likelihood be suspected by clinical presentation,



*Above: Stomach cancer*

*Right: Normal enema*





*Above: Colon polyp*

*Right: Colon carcinoma*



plain x-ray or preliminary film, or during filling with barium and prior to pumping in air.

There are a number of potential difficulties that may arise out of a barium enema referral. The bowel preparation is reasonably arduous and can make frail, elderly people feel quite unwell. People who are prone to constipation are occasionally not cleared adequately on the usual preparation and need an extra day.

Rolling around/lying on the table is hard and uncomfortable (patients need to be able to roll through 360 degrees and lie prone and supine). A good indication is that a person who can climb on to an examination couch without too much assistance can generally tolerate a double contrast study.

As with barium swallow, the discomfort of air insufflation can trou-

ble some patients, and where buscopam injection is used to relax bowel for better pictures, patients may experience some blurring of vision. As patients need to be able to follow instructions, there is a need for an interpreter in non-English speaking patients. There is also a tendency for barium to cause constipation in the days following the procedure.

## References

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