# The appropriate use of diagnostic services: (x) Investigating intra-abdominal disease; reducing X-ray wastage

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## Introduction

The clinical investigation of gastrointestinal symptoms represents a large proportion of hospital-based diagnostic services including radiological imaging.

Though technological advances have made it possible in many instances to come to a more accurate diagnosis, often more quickly, these advances have understandably led to some confusion among referring clinicians as to which test or sequence of tests is more appropriate. When confusion occurs, this often leads to wasted radiological investigations either due to in appropriate requests, duplication of tests or a combination of both.

## Clinical problems

We have chosen to highlight a few of the more common clinical problems, and make suggestions as to how the resources of the Radiology Department may best be used to minimise waste.

*The acute abdomen.*

Abdominal films, as well as a chest film, are frequently requested in both the erect and supine positions. While this is sensible when perforation is suspected or where there are clinical signs or symptoms suggesting intestinal obstruction, there is no indication for an erect abdominal film in any other clinical situation[1]. If the acute abdomen is thought to be due to either renal or biliary colic then a supine film will suffice for the initial search for an opaque calculus.

The diagnostic yield of plain abdominal radiography in cases of haematemesis or melaena is so small that its use is not justified. Similarly, if there is a firm clinical diagnosis of acute appendicitis then abdominal radiography will not be helpful and should not be requested.

*Non-acute gall bladder disease*

Plain films of the abdomen are of little use in the definitive diagnosis of non-acute gall bladder disease. In a minority of patients are gallstones sufficiently calcified to be shown on plain X-rays. Opaque gallstones may be seen in 10% of men and 20% of women between the ages of 55 and 65 years with or without symptoms related to the biliary tract[2]. Calcified lymph nodes are often seen in the right upper quadrant of the abdomen. These opacities are often fairly characteristic in shape but may sometimes have a very similar radiographic appearance to that of a calcified gallstone. Putting these two facts together it becomes clear that demonstration of opacities in the right upper quadrant which look like gallstones is rarely useful.

Both oral cholecystography and ultrasound are highly accurate in detecting calculi[3]. In patients suspected of non-acute gall bladder disease it is best to make a local decision in each hospital as to which of these should be the primary investigation. Where the ultrasound Department is well equipped and staffed ultrasound is now regarded as the most appropriate primary investigation as there is no radiation, and no need to ingest contrast medium. On the other hand, when these conditions do not exist, oral cholecystography remains a highly accurate investigation[3] despite some claims to the contrary. Only in the occasional case in which the primary investigation is equivocal should there be any requirement for a second imaging investigation. Acalculous adenomyomatosis, though representing a small proportion of patients with gall bladder pathology, is presently most reliably diagnosed by oral cholecystography.

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Some clinicians wish to know whether this condition is present, and those who do will need to develop a specific investigative protocol with their radiologists[3].

*Jaundice*

Bile ducts may be visualised by intravenous cholangiography, ultrasound, direct cholangiography (either through a percutaneous approach or by ERCP), nuclear medicine (99m Tc HIDA)* or CT. Choosing from this range of investigations may present a baffling number of options. But a simple pathway in technique selection can be made.

There is now no place for intravenous cholangiography in investigating the biliary tract. Ultrasound readily visualises the bile ducts, is cheap, non-invasive and accurate, and should be the first imaging procedure. If duct dilatation is demonstrated and more detail as to the cause is required then direct cholangiography may be needed. If an ERCP service is available this is probably the method of choice, as in many cases there are benefits in imaging the pancreatic ducts as well as the bile ducts. Where ERCP is not available, or fails, thin-needle percutaneous cholangiography is a simple and accurate alternative. CT can be considered for those cases in which ultrasound suggests a mass in relation to the bile ducts.

The advisability of choosing between ERCP and CT can be decided by discussion between the radiologist and the clinician; choice of technique may well be influenced by the option of performing a CT guided biopsy of a mass.

*Acute cholecystitis*

It is now simple to confirm or exclude the clinical suspicion of acute cholecystitis using either ultrasound or nuclear medicine (HIDA). Both are highly accurate, and both have their protagonists[4,5]. It is important that claims by the different protagonists should not lead to unnecessary confusion and thus duplication of investigations. Both examinations are swift and inexpensive, and either is suitable as the first line investigation in most patients. Nevertheless, a preference can be stated. In certain well defined groups of patients there is a significant false positive rate for HIDA scanning. These groups include alcoholics, patients on total parenteral nutrition, those with acute pancreatitis, and patients who have recently eaten a meal. For these reasons and because of the simplicity and immediacy of ultrasound in our department we advise our clinicians to request ultrasound as the first investigation, and we rarely need to proceed to a HIDA scan. It needs to be emphasised that whichever examination is preferred in a particular hospital, both are highly accurate but there is no need to request both investigations except in exceptional circumstances.

*Upper gastrointestinal symptoms*

Endoscopy has had a major impact on the accuracy of upper gastrointestinal tract diagnosis, and has stimulated radiologists to improve their barium radiology mainly through the introduction of double contrast techniques. The single contrast barium meal has been shown to be unacceptably inaccurate[6,7]. However, Laufer[8], using endoscopy as the final arbiter, found the error rate with a double contrast technique to be 6% compared with 22% for the single contrast examination. Moreover, it is important to note that Salter found the endoscopic yield from X-ray negative dyspepsia was 'minimal'[9].

There are, however, important differences in opinion relating to technique selection. Some endoscopists claim that there is no place for upper gastrointestinal radiology where an endoscopic service is available. We take a different view and suggest that for most patients with dyspepsia in most hospitals where good double contrast radiology is performed, endoscopy should be the second line examination to assess problem cases.

In this regard it has been estimated that about 1% of patients on the list of an urban general practice present each year with dyspepsia of more than two weeks duration[10]. This represents a vast number of patients, and one question which needs to be addressed is 'do I refer patients for accurate endoscopy or accurate barium radiology?' Of course, if good double contrast radiology is not provided in a hospital, endoscopy should be the examination of choice. But though endoscopy may still be more accurate (though only slightly so) the sheer number of these referrals means that in those institutions which

provide state of the art barium techniques, the barium examination will often (and arguably quite properly) be the first investigation. If the barium study is positive, subsequent routine endoscopy for the same condition is unnecessary except more accurately to diagnose. oesophagel lesions and take a biopsy of gastric ulcers and masses. Local circumstances will dictate policy but it is most important to avoid haphazard investigation.

There are, however, several clinical circumstances where endoscopy should be the first investigation: examination of the stomach after partial gastrectomy, follow-up of duodenal ulcer disease where this is clinically indicated, assessment of gastric ulcers, and in acute upper gastrointestinal bleeding.

But, perhaps the foregoing is merely deciding which coloured cart to put before the horse. We must also ask which dyspeptic patients should the clinician refer for investigation? Two recent surveys suggest ways in which the number of patients referred might be reduced. Davenport et al.[11] in a British study found that preliminary screening using an interviewer who had no medical qualifications could separate a group at low risk who will require investigation only if their symptoms do not resolve and a group at high risk requiring urgent outpatient consultation. The authors suggested that cautious wider usage of their protocol was indicated and could lead to a more effective use of investigational techniques. In another survey from the USA Marton et al.[12] suggested that application of a simple rule would have led to a decrease in the number of inappropriately ordered tests without significantly compromising care. This rule specified four criteria which identified 95% of patients who subsequently had an abnormal barium examination: a history of previous peptic ulcer, age more than 50 years, relief of abdominal pain by food or milk, abdominal pain occurring within an hour after eating. Perhaps the application of either or both of these two policies would reduce significantly the number of patients referred for investigation. In any case, clinicians would be reassured that if they subsequently referred their patients for a barium meal a highly accurate test would be available to them.

*Large bowel symptoms*

There are many reported series documenting the accuracy of barium enemas in detecting small colonic lesions (i.e. polypi) [13] [14]. This accuracy is solely related to the double contrast examination which requires meticulous attention to detail, both in colon preparation as well as barium technique[15]. It should be emphasised that the few false negative diagnoses which do occur on good quality double contrast examinations are often due to errors of observation, and it has been stressed that accuracy depends on satisfactory films well reviewed[13]. A double contrast barium enema is sufficiently accurate to be the initial screening technique in the common clinical situations of change in bowel habit, bleeding per rectum, and left iliac fossa pain. If doubt persists, either clinically or because of an equivocal radiological finding, then colonoscopy should of course be used as the second line procedure.

*Abdominal masses: high technology first?*

In some situations it is preferable for the clinician to request an apparently sophisticated radiological procedure at a very early stage in the clinical investigations. A mass in the abdomen falls into this category. Choosing an apparently expensive investigation in preference to a more conventional radiographic protocol of (for instance) an IVP and a barium enema, may in fact produce substantial savings in both time and money. If a patient has an abdominal mass then ultrasound (not expensive and surely no longer high technology) should arguably be the first imaging examination requested. In 107 consecutive patients referred for ultrasound investigation of a palpable abdominal mass, in 97% the ultrasonic diagnosis was correct[16]. In institutions where CT scanning facilities are available, a similar early or even first use of CT should be considered. There is good evidence that CT scanning can come to a swift and accurate diagnosis in many situations, thus excluding other apparently simpler, but in effect more time-consuming tests[17]. It is time that CT was regarded as just another item of basic imaging equipment essential to any large general hospital. Discussion with the radiologist in regard to the use of CT in patients with abdominal masses would lead to the recommendation that it be used as a very early examination, even on occasion ahead of ultrasound.

## Conclusions

1. Unnecessary duplication of diagnostic investigations is to be rigourously avoided.

2. Policies for the selection of the appropriate imaging investigation should be made by the referring clinician in consultation with the radiologist. Individual case consultations will be required when there is doubt.

3. Local circumstances including the equipment available and technical expertise on site may dictate which mode of investigation becomes the first choice.

4. Rapid development of new equipment, techniques and skills means that established diagnostic pathways will require regular and periodic revision. On occasion many standard investigations can be bypassed and a high technology examination (e.g. CT) might well be the appropriate first choice investigation. There are instances where this is indicated both clinically and economically. The new techniques must however be assessed by well conducted surveys and not embraced uncritically just because they are fashionable.

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