Abdom Imaging 19:291–292 (1994)

Abdominal Imaging

Invited Editorial

The Present Status and the Future of Gastrointestinal Radiology

A. R. Margulis
Department of Radiology, University of California at San Francisco, San Francisco, CA 94143, USA

There has been a significant reduction of barium sulfate examinations of the gastrointestinal tube, starting about 15 years ago and progressing to this day [1, 2]. The reduction has occurred throughout the industrialized world and has affected barium examinations of all areas of the intestinal tube with the exception of the mesenteric small bowel. The decrease varies between 70 and 90%. The referrals for the remaining 10 to 30% of the old volume come from computed tomography (CT) and the older generation of surgeons who still like to hang films on view boxes in the operating room in order to get information about the lesion they are operating on. Internists only rarely refer patients for barium studies. Endoscopy has made tremendous strides in the last 15 years. Combined with superb resolution color television cameras in the probe, it has provided excellent detail of the gut mucosa and capability for biopsy of lesions and excision of pedunculated polyps. During the same period, barium studies significantly improved and both single- and particularly double-contrast barium examinations when meticulously performed gave results approaching those of endoscopy. Besides the reductions due to the introduction of endoscopy, another cause for the decrease of barium examinations is the advent of CT. High-quality CT not only depicts other masses, whether solid or cystic displacing the gastrointestinal tube, but also determines the organ from which they arise and their location. With CT the thickness of the bowel wall as well as of mural lesions is clearly shown. CT capabilities eliminated the need for barium studies conducted to ascertain the location of extramural masses. As CT is increasingly becoming the screening examination for symptomatic patients with abdominal complaints, barium studies, if at all performed, must follow the CT exam as barium causes streak artifacts in CT images.

The question then arises whether the enormous decrease of barium studies is justified on grounds of diagnostic accuracy, sensitivity, and specificity as well as cost and safety [3–6]. It is difficult to obtain these data from the literature which generally show the natural bias of the authors whether endoscopists or radiologists [7–9]. The physicians who perform both endoscopy and barium studies should generally be more likely to be objective. In Japan, gastroenterologists usually perform both, the barium examinations as well as endoscopy. In rare instances, in the western world, radiologists perform both examinations.

An inquiry to Drs. P. Slezak (the head of Gastrointestinal Radiology at Karolinska Hospital in Stockholm), G. Stevenson (Chairman of Radiology at McMaster University in Hamilton, Ontario, Canada), and M. Maruyama (Cancer Institute Hospital of the Japanese Foundation for Cancer Research), institutions where both barium examinations and endoscopies are performed in the same department, revealed interesting facts. It becomes clear that neither endoscopy nor barium studies are infallible. The number of misses of small cancers in the colon, however, is higher for barium enemas but it is not negligible for colonoscopy. When both approaches are analyzed, most of the mistakes occur in the sigmoid colon, and one of the strategies that appears logical for examining patients at high risk for colon cancer is to first perform flexible sigmoidoscopy to the 60 to 90 cm level and if no polyps are found proceed with a high-quality double-contrast barium enema. If polyps are encountered on flexible sigmoidoscopy, colonoscopy should be performed in order to search, biopsy, or remove polyps that are likely to be found more proximally. Colonoscopy should also be performed for bleeding or following up on tumors. For suspicion of inflammatory bowel disease, either colonoscopy or a double-contrast barium study has its advantages and disadvantages.

As for the examination of the esophagus and stomach, either endoscopy or the well-performed barium biphasic study appears to be equal in the discovery of abnormalities. Endoscopy has the advantage of biopsy but it is more invasive and expensive and neither it nor the biphasic barium study is foolproof. The number of misses are again higher for the barium studies although generally not by very much. With the increasing atten-

tion being paid to costs and self-referral, it is very likely that barium studies will experience an increase and that endoscopy will be performed only for biopsy, confirmation of doubtful findings, and special indications.

In examining the small bowel, enteroclysis with barium and methylcellulose is a precise test showing even minute lesions, although it is less informative about disturbed motility.

It is important for radiology to provide the best small bowel examinations and, therefore, radiologists should be trained in its performance and be equipped with the proper tubes and infusion pumps which make this test safe and easy to complete [10, 11].

The examinations of the liver and pancreas, which were only up through the mid 1970s indirectly assessing size by the opacified bowel displacement, are constantly improving and have become more specific with cross-sectional imaging. Advances in CT have continued and have made it the screening modality for the examination of the whole abdomen, with spiral and electron-beam CT additionally capable of providing three-dimensional information, with images reformatted in any desired plane. The fast imaging stops peristalsis, and intravenous contrast injection allows excellent depiction of the vascular tree. The addition of color Doppler to ultrasound is broadening the applications of ultrasound to the alimentary tract and the fast, breath-holding MR sequences may completely alter the use of this modality in the abdomen. At present, MR imaging of the alimentary tube even with gadolinium enhancement is limited to the rectosigmoid colon and even there it is at present, competing with endorectal ultrasound. The MR endorectal coil is painful in patients with annular lesions. As ultrasound is a much shorter procedure it has an advantage over endorectal MR.

Endoluminal ultrasound is an imaging procedure that demonstrates the tissue layers of the alimentary tube with exquisite detail.

Without doubt as ultrasound transducers become ever smaller, they will be fitting on the tip of tubes making the procedure simpler and less expensive as endoscopy will not be required in combination with endoluminal ultrasonography. The transducer located on the tip of the tubes will be localizable by fluoroscopy.

If gastrointestinal radiology is to remain a viable and attractive subspeciality, young radiologists entering it must be proficient and expert in all imaging modalities applicable: CT, MR, barium sulfate studies, and ultrasound including endoluminal.

Simpler interventional procedures, such as transhepatic cholangiography with the placement of stents and drainage of intraabdominal abscesses, will most likely be performed by gastrointestinal radiologists. More sophisticated interventions, such as transjugular intrahepatic portosystemic shunts (TIPS), will remain the domain of the interventional radiologists who will be competing with videoscopic surgeons for much of the abdominal turf.

Endoscopy in general will most likely remain in the hands of gastroenterologists and they will become highly expert at it. With the increasing realization that costs, possible complications, and values of procedures must be reassessed, the whole of gastrointestinal radiology will most likely undergo a period of renaissance. It is important that our training programs recognize the trends of the future and address them properly. It would be unconscionable to abandon any part of gastrointestinal radiology as our imaging modalities are informative, safe, and cost-effective [16].

Acknowledgment. I am deeply indebted to Drs. M. Maruyama, P. Slezak, and G. Stevenson for generously sharing their unpublished data with me.

References

1. Gelfand DW, Ott DJ. Declining volume of gastrointestinal flouroscopies: a survey of 18 hospitals. *Gastrointest Radiol* 1982;7:227–230
2. Gelfand DW, Ott DJ, Chen YM. Decreasing numbers of gastrointestinal studies: report of data from 69 radiologic practices. *AJR* 1987;149:1133–1136
3. Gelfand DW, Dale WJ, Ott DJ. The location and size of gastric ulcers: radiologic and endoscopic evaluation. *AJR* 1984;143:755–758
4. Evans E, Harris O, Dickey D, Hartley L. Difficulties in the endoscopic diagnosis of gastric and oesophageal cancer. *Aust N Z J Surg* 1985;55:541–544
5. Shahmir M, Schuman BM. Complications of fiberoptic endoscopy. *Gastrointest Endosc* 1980;26:86–91
6. Relertsen O, Skjoto J, Jacobsen CD, Rosseland AR. Complications of fiberoptic gastrointestinal endoscopy: five years experience in a central hospital. *Endoscopy* 1987;19:1–6
7. Winawer SJ. Colorectal cancer screening comes of age. *N Engl J Med* 1993;328:1416–1417
8. Gelfand DW, Chen YM, Ott DJ. Benign colorectal neoplasm undetected by colonoscopy. *Gastrointest Radio* 1992;17:344–346
9. Laufer I, Smith NCW, Mullens J. The radiological demonstration of colorectal polyps undetected by endoscopy. *Gastroenterology* 1976;70:167–170
10. Thoeni RF. Radiology of the small bowel and enteroclysis. *Invest Radiol* 1987;22:930
11. Maglinte DT. Balloon enteroclysis catheter. *AJR* 1984;143:761
12. Torres GM. Endoscopic ultrasonography. In: Gore RM, Levine MS, Laufer I, eds. *Textbook of gastrointestinal radiology.* WB Saunders, 1994:127–139
13. Tio TL. Endosonography of the esophagus. In: *Alimentary tract radiology.* 1994:264–271
14. Botet JI, Lightdale CJ. Endosonography: normal anatomy and techniques of examination of the stomach and duodenum. In: *Alimentary tract radiology.* 1994:311–317
15. Bartram CI, Beynon J. Endosonographic staging of rectal cancer. In: *Alimentary tract radiology.* 1994:813–823
16. Levine MS, Laufer I. The upper gastrointestinal series at a crossroads. *AJR* 1993;161:1131–1137