

Comparative evaluation of scintigraphy and upper gastrointestinal tract endoscopy for detection of duodenogastric reflux

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Duodenogastric reflux, the reflux of duodenal bile into stomach, when suspected clinically requires an objective evaluation for proper management. In this study hepatobiliary scintigraphy in 91 patients of different clinical conditions was evaluated for presence of duodenogastric reflux. Upper gastrointestinal endoscopy was also performed in 44 of these patients. On scintigraphy duodenogastric reflux was present in 26 (29%) of 91 patients. Upper gastrointestinal endoscopy revealed presence of refluxed bile in the stomach in 12 (27%) of 44 patients. In the same groups of patients scintigraphy detected reflux in 18 (41%) of 44 patients. This shows that hepatobiliary scintigraphy is superior to upper gastrointestinal endoscopy in detection of duodenogastric reflux and also has the advantage of being non-invasive and physiological.

Key words: duodenogastric reflux, hepatobiliary scintigraphy, endoscopy

INTRODUCTION

DUODENOGASTRIC REFLUX (DGR) is a clinical entity that may occur following a variety of gastric or biliary tract operations. It has been associated with gastric mucosal damage and may partly account for the persistence or fresh appearance of symptoms following cholecystectomy and gastrectomy.^{1,2} With the possible exception of obvious bilious emesis, the diagnosis is difficult to make on the basis of clinical symptoms only as most of these are nonspecific.

The various techniques employed to detect DGR are gastroduodenal intubation and direct sampling, gastric pH monitoring, endoscopy, gastric mucosal biopsy and hepatobiliary scintigraphy. The use of the intubation technique is considered nonphysiologic since it is invasive and thereby may spuriously provoke reflux. Gastric pH monitoring is cumbersome, entails the use of sophisticated instruments and is uncomfortable for the patients. Similarly endoscopy and biopsy is also invasive and is not

readily acceptable to all patients. On the other hand, scintigraphic documentation of DGR is technically easy, simple and physiologic as it is noninvasive.

The present study was undertaken with the objectives of finding the incidence of DGR by hepatobiliary scintigraphy in patients undergoing one or the other types of biliary surgery and to compare the findings with those of upper gastrointestinal endoscopy.

MATERIALS AND METHODS

A total of 91 patients undergoing hepatobiliary scintigraphy have been included in this study. Scintigraphy was performed prospectively in 44 patients (32 women, 12 men; mean age 45.4 years) which included 25 patients with gallstone disease who were studied preoperatively and 19 patients after choledochoduodenostomy. Scans of 47 other patients who had undergone hepatobiliary scintigraphy for postcholecystectomy problems were retrospectively evaluated for evidence of DGR.

The standard protocol for hepatobiliary scintigraphy was followed in all patients. After intravenous administration of 111–148 MBq (3–4 mCi) of Tc-99m BULIDA (parabutyl iminodiacetic acid), anterior abdominal images were taken under a large field of view gamma camera (Siemens Digitrac 75) coupled with a low energy all purpose parallel hole collimator. The images were

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Table 1 Incidence of DGR as detected by scintigraphy and upper gastrointestinal endoscopy

	Scintigraphy	Endoscopy
Gall stone disease (Preoperative) (n = 25)	4	2
Post choledochoduodenostomy (n = 19)	14	10
Post cholecystectomy (n = 47)	8	
Total (n = 91)	26	(n = 44) 12

Table 2 Comparison of scintigraphic and endoscopic detection of DGR

	Scintigraphy		Total
	Positive	Negative	
Endoscopy	Positive	12	12
	Negative	6	32
Total	18	26	44

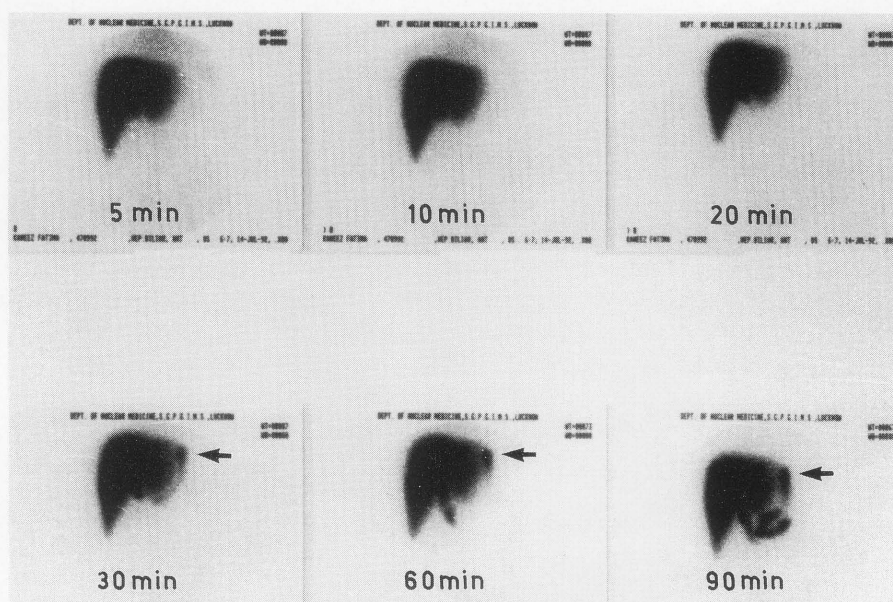


Fig. 1 Tc-99m BULIDA sequential scinti-images at various time intervals in a patient who underwent choledochoduodenostomy. Note the presence of radioactivity in stomach region (arrow) from 30 min onwards indicating significant DGR.

acquired at 5 min intervals for 40 min and thereafter at one and two hours after the radiotracer injection. Each image was of 400,000 counts and matrix size was 256×256 . At the end of the study approximately 2.035 MBq (55 μ Ci) of Tc-99m sulfur colloid was administered orally for exact localization of the stomach. All the images were stored in a microvax computer coupled to the camera. The images were interpreted qualitatively as well as quantitatively by at least two nuclear physicians for the presence of DGR and its severity.³ DGR was considered significant if marked reflux into the body and fundus of the stomach or up the esophagus was present.³

In 44 of 91 patients (25 with gallstones preoperatively and 19 after choledochoduodenostomy), upper gastrointestinal endoscopy was performed for the detection of bile in the stomach and its sequelae, i.e., mucosal edema, erythema, friability and erosion.⁴

RESULTS

As depicted in Table 1, 26 (29%) of the total 91 patients analyzed in this study revealed significant DGR. Of the 44 patients evaluated prospectively, 4 of 25 patients with gallstones and 14 of 19 after choledochoduodenostomy had evidence of DGR. Eight of 47 post cholecystectomy patients also revealed the presence of DGR on retrospective evaluation.

The upper gastrointestinal endoscopy performed in 44 patients revealed evidence of bile reflux in 12 patients (the presence of bile in all, mucosal edema in 3 and mucosal edema and erythema in 1). All these 12 patients were positive for DGR on biliary scintigraphy. Endoscopy did not reveal any evidence of bile or any gastric mucosal changes in another 6 patients who were shown on scintigraphy to have DGR. The detailed results are shown in Table 2. The scinti-images representing typical findings of positive and negative DGR are shown in Figures 1 and 2, respectively.

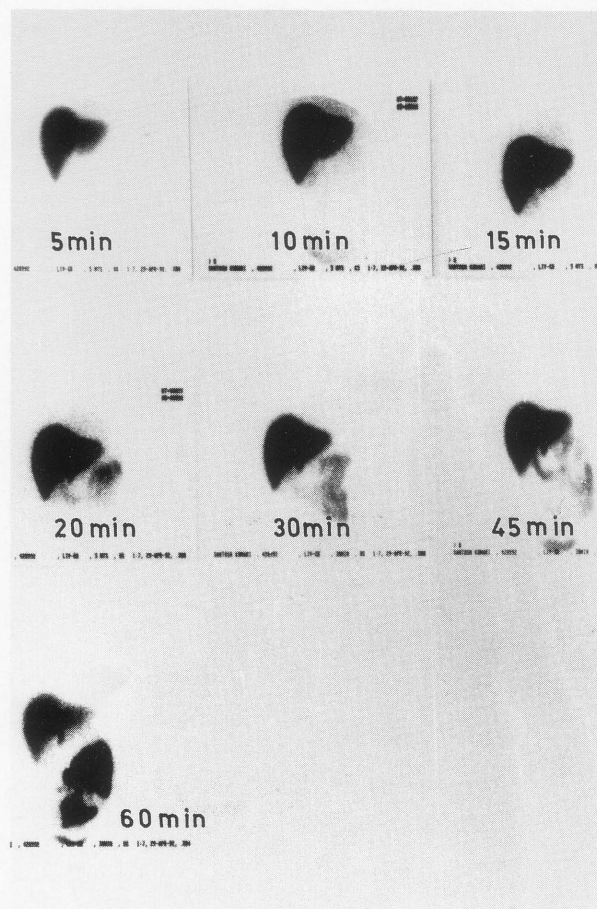


Fig. 2 Tc-99m BULIDA hepatobiliary scintigraphy showing normal clearance of radiotracer into small intestine. At no time activity is noticed in stomach region.

DISCUSSION

Reflux of duodenal bile into the stomach, the duodeno-gastric reflux, in a milder form, may be present in asymptomatic subjects particularly in the postprandial state when it is not considered pathologic. But it is unusual in the fasting state with intact gastroduodenal functional integrity.^{5,6} A higher incidence or a more severe form of DGR is commonly noticed in acute or chronic gall bladder disease and in postoperative states such as cholecystectomy or gastroenterostomy.⁵⁻¹⁰ This has been implicated in the pathogenesis of gastritis, gastric ulcer, esophagitis and post cholecystectomy syndromes.^{5,6} DGR has been reported in 12% to 35% of patients undergoing hepatobiliary scintigraphy.⁷⁻⁹ The proposed mechanisms of this entity are irritation of the duodenum by an adjacent inflamed gall bladder, the unregulated flow of bile into the duodenum in the absence of a functioning gallbladder or lack of an intact pyloric sphincter.^{6,8,9}

In an uncomplicated case of DGR, scintigraphically one can detect refluxed bile activity in the usual location of the stomach, i.e., lateral to the left lobe of the liver and

superior to the jejunal activity. Occasionally jejunal activity may mimic gastric reflux and can be verified by taking an upright image which shows the change in the position of the jejunum due to gravity. The visualization of DGR may be enhanced by the injection of cholecystokinin as it causes the ejection of more bile into the duodenum. Morphine augmented biliary scintigraphy has also been regarded as increasing DGR detection sensitivity.¹¹ Many authors have also tried to quantify DGR by using different techniques.^{3,10-12}

In the present study no significant difference was found in the incidence of DGR before and after cholecystectomy. This finding is similar to that reported by Lorusso et al.¹³ but contradicts that by other authors.¹⁴ A higher incidence of DGR has been reported in patients who undergo a concomitant biliary drainage procedure along with cholecystectomy.¹³ This finding is similar to that in the present study which shows a higher incidence of DGR in patients with choledochoduodenostomy.

Stein et al. have reported that upper gastrointestinal endoscopy has lower accuracy and predictive value than scintigraphy or gastric pH monitoring in the assessment of DGR.¹⁵ In our study upper gastrointestinal endoscopy had detected DGR in 12 of 44 patients. On the other hand, isotope scans in addition to confirming the above endoscopic findings detected bile reflux in another six patients in whom the endoscopy report was normal. From this it can be inferred that hepatobiliary scintigraphy is superior to upper gastrointestinal endoscopy in the detection of DGR and also has the advantage of being non-invasive and physiological. In addition, the severity of DGR as assessed in upper gastrointestinal endoscopy is subjective and operator dependent, whereas scintigraphy documents the same in an objective manner without any subjective bias.^{3,10,16} A good correlation has also been shown between the severity of mucosal changes on histology and the presence of DGR on scintigraphy,^{3,15} which is not so with upper gastrointestinal endoscopy.¹

The findings in the present study along with the observations in literature lead to the conclusion that scintigraphy is the most appropriate method for the diagnosis of DGR.

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REFERENCES

1. Ritchie WP. Alkaline reflux gastritis: A critical appraisal. *Gut* 5: 5-16, 1984.
2. Astikin JR, Lyon DT, Shull SD, Wagner CJ, Soloway RD. Factors affecting delivery of bile to the duodenum in man. *Gastroenterology* 74: 560-565, 1978.
3. Thomas WEG, Cooper MJ, MecMortenSen NJ, Burton Pa, Davies ER. The clinical assessment of DGR by scintigraphy

- and its relation to histological changes in gastric mucosa. *Scand J Gastroenterol* (Suppl 92) 19: 195–199, 1984.
4. Tytgat GN. Endoscopic gastritis and duodenitis. *Endoscopy* 24: 34–40, 1992.
 5. Shaffer EA, McOrmond P, Duggan H. Quantitative cholecintigraphy: assessment of gall bladder filling and emptying and duodenogastric reflux. *Gastroenterology* 79: 899–904, 1980.
 6. Kennedy NSJ, Campbell FC, Cullen PT, et al. Gall bladder function and fasting enterogastric bile reflux. *Nucl Med Commun* 10: 193–198, 1989.
 7. Shih WJ, Fockele DS. Enterogastric reflux demonstrated by radionuclide hepatobiliary scintigraphy. *Semin Nucl Med* 20: 367–369, 1990.
 8. Colletti PM, Barakos JA, Siegel Me, et al. Enterogastric reflux in suspected acute cholecystitis. *Clin Nucl Med* 12: 533–535, 1987.
 9. Shih WJ, Coupal JJ, Domstad PA, et al. Disorders of gall-bladder function related to duodenogastric reflux in technetium- 99m DISIDA hepatobiliary scintigraphy. *Clin Nucl Med* 12: 857–860, 1987.
 10. Drane WE, Karvelis K, Johnson DA, et al. Scintigraphic evaluation of duodenogastric reflux: problems, pitfalls, and technical review. *Clin Nucl Med* 12: 377–384, 1987.
 11. Oates E, Achong DM : Incidence and significance of entero-gastric reflux during morphine augmented cholescintigraphy. *Clin Nucl Med* 12: 926–928, 1992.
 12. Tolin RD, Malmud LS, Stelzer F, et al. Enterogastric reflux in normal subjects and patients with Billroth 11 gastro-enterostomy. *Gastroenterology* 77: 1027–1033, 1979.
 13. Lorusso D, Montesani C, Giorgio P, Caruso L, Cavallini A, et al. Duodenogastric reflux and gastric histology after cholecystectomy with or without sphincteroplasty. *Br J Surg* 77: 1305–1307, 1990.
 14. Svensson JO, Gelin J, Svanvik J. Gall stones, cholecystectomy, and duodenogastric reflux of bile acid. *Scand J Gastroenterol* 21: 181–187, 1986.
 15. Stein HJ, Sinyrk TC, DeMeester TR, Rouse J, Hinder RA. Clinical value of endoscopy and histology in the diagnosis of duodenogastric disease. *Surgery* 112: 796–804, 1992.
 16. Borsato N, Bonavina L, Zanco P, Saitta B, et al. Proposal of a modified scintigraphic method to evaluate duodenogastric reflux. *J Nucl Med* 32: 436–440, 1991.