The use of barium meals by general practitioners and hospital doctors

A. P. HAINES, MRCP, MRCGP, R. ASHLEIGH, B.SC, R. BATES, B.SC, and L. KREEL, MD, FRCP, FRCR

SUMMARY. A random sample of the records of patients having barium meal examinations at a district general hospital was reviewed. In both males and females, there was no significant difference in the proportions of abnormalities between referrals from hospital doctors and general practitioners. Younger males were less likely to show abnormalities than older males, but there was no age difference in the proportions of abnormal barium meals in females. There was a smaller proportion of major abnormalities (19 per cent) in female than male patients (28 per cent). This study does not suggest that any reduction of direct access barium meal examinations for general practitioners is necessary.

Introduction

THERE has been a steady increase in the number of requests for radiological investigations in recent years. Between 1967 and 1972 the number of radiologists and radiographers in the National Health Service increased by 15 per cent and 17 per cent respectively, but the radiological workload rose by 30 per cent (Raison, 1976). Previous studies have suggested that some types of radiological investigation yield a small proportion of abnormal findings. In addition, many abnormal x-rays appear to contribute little to patient management. In a study of 130 hypertensives undergoing intravenous pyelography, only six had renal abnormalities thought to be causing hypertension and all of these had abnormalities other than on the urogram (for example, raised blood urea or positive urine cultures) suggesting a lesion within the urinary tract (Kreel *et al.*, 1974). In this study a similar percentage of abnormalities was found in urograms on outpatients (29 per cent) and general practitioner referrals (26 per cent), although, as was expected, there was a higher proportion of abnormalities in inpatients (42 per cent).

A. P. Haines, MRC/DHSS Epidemiology and Medical Care Unit, Northwick Park Hospital, Harrow, Middlesex; R. Ashleigh and R. Bates, Medical Students, University College Hospital Medical School, London; L. Kreel, Division of Radiology, Clinical Research Centre, Northwick Park Hospital, Harrow, Middlesex.

Aim

Barium meal examinations constitute a considerable workload in departments of radiology, and we wished to determine the 'yield' of barium meal examinations, and whether there was a difference in the proportions of abnormal and normal barium meals in hospital and general practice referrals. If the proportion of abnormal findings were much lower for general practice referrals than for patients referred by hospital doctors (particularly from outpatients) it could be argued that direct access to barium meal examinations for general practice patients should be curtailed in the interests of economy.

We have therefore examined the records of a random sample of patients for whom barium meals were requested at Northwick Park Hospital by general practitioners or hospital doctors.

Method

Records of a one in three random sample of the patients who had barium meal examinations during 1974 at Northwick Park Hospital were taken from the files of the Division of Radiology of the Clinical Research Centre, Northwick Park Hospital. The x-ray report form was reviewed for all patients in the sample, and the hospital records were also reviewed for those patients in whom the barium meal request was made by a hospital doctor. In those cases where the request came directly from the general practitioner, he or she was contacted and asked to supply further information on the patient. There are 107 general practitioners in the health district and 99 of these used the direct access barium meal service in 1974. Ninety-eight per cent (328/334) of hospital notes were traced and reviewed and information

was received from general practitioners in 94 per cent (174/185) of cases. The patients' notes were reviewed after a minimum period of 18 months had elapsed following the barium meal examination. This comparatively long period of follow-up allowed us to detect any changes in diagnosis or management which occurred a considerable period after the initial investigation.

Information from the hospital and general practitioner sources was coded onto forms by two of us (R.A. and R.B.). At the beginning of the study, 30 sets of hospital notes were coded independently by the two investigators; no significant differences in coding were observed. The information recorded included the age and sex of the patients, whether they were inpatients, outpatients, or general practitioner referrals, results of all barium meal examinations up to the time of review of the records, the final diagnosis and the management, taking into account all investigations performed. When patients had more than one type of abnormality, a maximum of two diagnoses was coded for each barium meal. Sixty-three of the 535 patients (12 per cent) had more than one barium meal within the study period; the result of the first barium meal performed in 1974 was used in the analysis.

During the year of the study about 87 per cent of the barium meals performed were of the standard type and 13 per cent were double contrast meals. The proportions were similar in hospital and general practice referrals.

We have classified abnormalities on the barium meal as 'major' or 'minor' depending on whether their detection leads to specific treatment. Hiatus hernia with or without oesophageal reflux has been classified as a minor abnormality. The detection of a hiatus hernia on a barium meal, even when it is accompanied by reflux, does not necessarily mean that the hiatus hernia is causing the patient's symptoms. The presence of peptic oesophagitis, which can be more reliably detected by endoscopy than barium meal, is an indication that the patient's symptoms may be caused by the hiatus hernia. A previous study showed that less than 50 per cent of patients who have a hiatus hernia on barium meal have evidence of reflux oesophagitis on endoscopy (Cotton, 1973). Most patients who do have symptoms caused by hiatus hernia are treated symptomatically, and the radiological detection of hiatus hernia rarely results in any important changes in the management of patients. Only one patient in the random sample subsequently had a hiatus hernia repair. Other findings which have been classified as minor abnormalities include: gastric and duodenal diverticula, gastric atrophy, delayed gastric emptying, excess resting juice, cascade deformity of the stomach, poor peristaltic activity, slight asymmetry of the duodenal cap, and kinking or extrinsic impressions on the upper gastrointestinal tract in those patients where no definite diagnosis was made as a result of the barium meal examination. In addition, in 13 cases major abnormalities were thought to be present on the barium meal which on further investigation turned out to be of little clinical importance and they have been classified as minor abnormalities. They are discussed in more detail later.

Major abnormalities, defined as those which lead to

Table 1. Characteristics of patients in the study.

	Male	Female
Inpatients		
Mean age	56.4	56.0
Number	59	51
Outpatients		
Mean age	48.5	50.0
Number	103	121
General practice referrals		
Mean age	42.5	53.4
Number	98	88
Total		
Mean age	47.7	52.0
Number	260	260

Twelve patients were of unknown age and in three patients the referral category was unknown.

Table 2. Minor abnormalities detected on barium meal.

Hiatus hernia without reflux	57
Hiatus hernia with reflux	54
Oesophageal reflux without hernia and other benign disorders of the oesophagus	15
Duodenal diverticulum	12
Gastric diverticulum	2
Gastric atrophy	5
Various lesions not confirmed on further investigations*	13
Miscellaneous*	49
	207

*See text for description.

Table 3. Major abnormalities detected on barium meal.

Duodenal ulcer	43
Gastric ulcer	28
Duodenal or gastric scarring	23
Carcinoma of stomach	8
Duodenitis	3
Oesophageal ulcer	3
Carcinoma of pancreas	3
Malabsorption	2
Crohn's disease	2
Miscellaneous	9
	124

specific treatment, include: duodenal and gastric ulcer, gastric cancer, malabsorption, Crohn's disease, and pancreatic cancer. Duodenal and gastric scarring have been included as major abnormalities, although they may not always lead to specific treatment, because patients who have evidence of past gastric and duodenal ulceration are likely to be at a higher risk of developing active ulceration in the future than patients in whom no such lesion has been demonstrated.

Results

Table 1 shows the characteristics of the 535 patients in the study. The male patients referred by general practitioners were younger than the male outpatients, who were in turn younger than the male inpatients. The differences between the ages of the female patients in the three categories were much smaller, and the age of the female general practice referrals was intermediate between the age of the female inpatients and the female outpatients. Tables 2 and 3 show the numbers and types of minor and major abnormalities found. Thirteen patients had suspected lesions which on follow-up by endoscopy or barium meal were found to be of minor importance and did not require specific treatment. These included: suspected gastric ulcer (five patients), suspected duodenal ulcer (four patients) and suspected gastric carcinoma (two patients). Although these lesions, if present, are of course major abnormalities, they were not classified as such because they were not confirmed by further tests. They are included in Table 2 with other minor abnormalities.

Table 4 shows the numbers and proportions of major and minor abnormalities according to whether the patients were inpatients, outpatients, or general practice referrals. There is a suggestion of a smaller proportion of abnormalities (mainly minor ones) in the male general practice referrals than in the hospital patients, but in terms of normality or type of abnormality (minor or major) in the three male referral groups, this difference is not statistically significant. The proportions of minor and major abnormalities in the female outpatients and general practice referrals were very similar; the female inpatients had a slightly higher proportion of major abnormalities but this was not statistically significant.

The types of major abnormalities were similar in the three referral groups except that a higher proportion of the general practice barium meals showed a duodenal or gastric scar (12/40) than inpatients (3/32) and outpatients (8/52).

Table 5 shows the numbers and proportions of normal barium meals and those showing minor and major abnormalities classified by age and sex. In males, the higher proportion of abnormalities with increasing age is statistically significant ($p < 0{\cdot}001$), but there is no such association in females.

Inpatients waited four days on average for their barium meals after the request had been made by a clinician. Outpatients waited 26 days on average and general practice referrals 35 days.

Table 4. Results of barium meals by referral category (percentages in brackets).

	Males				Females			
	Normal	Minor abnormality	Major abnormality	Total	Normal	Minor abnormality	Major abnormality	Total
Inpatients	17 (29)	25 (42)	17 (29)	59	19 (33)	23 (41)	15 (26)	57
Outpatients	32 (31)	41 (39)	31 (30)	104	50 (41)	52 (42)	21 (17)	123
General practitioner referrals	47 (47)	28 (28)	25 (25)	100	36 (40)	38 (43)	15 (17)	89
	96 (37)	94 (36)	73 (28)	263	105 (39)	113 (42)	51 (19)	269

Table 5. Results of barium meals by age and sex (percentages in brackets).

	Males				Females			
Age group	Normal	Minor abnormality	Major abnormality	Total	Normal	Minor abnormality	Major abnormality	Total
One to 29	28 (61)	8 (17)	10 (22)	46	20 (50)	14 (35)	6 (15)	40
30 to 39	24 (59)	6 (15)	11 (24)	41	8 (36)	10 (45)	4 (18)	22
40 to 49	10 (22)	25 (56)	10 (22)	45	13 (48)	9 (33)	5 (23)	27
50 to 59	10 (20)	21 (43)	18 (37)	49	24 (45)	19 (36)	10 (19)	53
60 to 69	13 (24)	23 (43)	18 (33)	54	18 (35)	25 (48)	9 (17)	52
70 plus	10 (40)	8 (32)	7 (28)	25	15 (23)	39 (59)	12 (18)	66
	95 (37)	91 (35)	74 (28)	260	98 (38)	116 (45)	46 (18)	260

Discussion

In both males and females, there was no significant difference in the proportions of barium meals showing major abnormalities between patients referred by hospital doctors and general practitioners. There was a lower proportion of minor abnormalities in male referrals from general practice than in hospital patients, but the male general practice referrals were younger than both the inpatients and outpatients, and the proportion of abnormalities was lower in young men than in older men.

A lower proportion of major abnormalities was detected in females than in males in all referral categories. This sex difference is not surprising as males have a higher incidence of duodenal and gastric ulcers (Brown *et al.*, 1976) and gastric carcinomas (Waterhouse *et al.*, 1976), than females. The relatively low proportions of major abnormalities in inpatients is perhaps surprising, but this may be because many of them were undergoing investigations for systemic diseases, and their symptoms were not primarily related to the upper gastro-intestinal tract. In fact, only 40 per cent had a final diagnosis of a lesion in the upper gastro-intestinal tract.

The low proportions of gastric and duodenal scars detected in inpatients compared with general practice referrals and outpatients may be due to the fact that inpatients had shorter waiting times for their barium meals than general practice referrals and outpatients. It is likely that healing of some active ulcers occurred whilst the patients were waiting for x-ray. In addition, inpatients tend to be more seriously ill than other patients and thus are more likely to have active lesions.

It may be that a higher proportion of abnormalities could be detected using endoscopy rather than barium meal (Fisher *et al.*, 1977). However, the yield from the newer double contrast barium meal technique is probably similar to that from endoscopy (Herlinger *et al.*, 1977). Endoscopy has the obvious advantage that a biopsy can be taken. Whichever method of investigation is used, it seems likely that many patients referred by both general practitioners and hospital doctors will have normal findings or minor abnormalities.

The value of a particular investigation cannot be fully assessed by merely recording the proportion showing abnormal findings, since this does not indicate the effect of the findings on patient management, or the extent to which some abnormalities are missed on x-ray. There is also no doubt that a normal investigation may be of great importance both for the reassurance of the patient and in diagnosis (Gorry *et al.*, 1978). For instance, a normal barium meal examination in an elderly patient with vague gastro-intestinal symptoms and weight loss would greatly lower the probability of the patient having gastric carcinoma and suggest the likelihood of other causes for the symptoms. However, in 1974 about one per cent of the adult population (aged over 15) of the Harrow Health District had a barium meal, of which slightly less than one quarter showed a major abnormality. It is difficult to determine whether this represents excessive use of radiological resources, but a previous study has shown that in patients under 50 the yield of important abnormalities from barium meal examination in those who present with dyspepsia is likely to be low (Mead *et al.*, 1977), and it is perhaps in this group that some reductions in requests could occur without prejudicing patient management.

Conclusion

This study does not suggest that any reduction of direct access barium meal examinations for general practitioners is necessary.

References

Brown, R. C., Langman, M. J. S. & Lambert, P. M. (1976). Hospital admissions for peptic ulcer during 1958-72. *British Medical Journal,* **1**, 35-37.

Cotton, P. B. (1973). Fibreoptic endoscopy and the barium meal—results and implications. *British Medical Journal,* **2**, 161-165.

Fisher, J. A., Surridge, J. G., Vartan, C. P. & Loehry, C. A. (1977). Upper gastrointestinal endoscopy—a G.P. service. *British Medical Journal,* **2**, 1199-1201.

Gorry, G. A., Pauker, S. G. & Schwartz, W. B. (1978). The diagnostic importance of the normal finding. *New England Journal of Medicine,* **298**, 486-489.

Herlinger, H., Glanville, J. N. & Kreel, L. (1977). An evaluation of the double contrast barium meal against endoscopy. *Clinical Radiology,* **28**, 307-314.

Kreel, L., Elton, A., Habershon, R., Mason, A. M. S. & Meade, T. W. (1974). Use of intravenous urography. *British Medical Journal,* **4**, 31-33.

Mead, G. M., Morris, A., Webster, G. K. & Langman, M. J. S. (1977). Use of barium meal examination in dyspeptic patients under 50. *British Medical Journal,* **1**, 1460-1461.

Raison, J. C. A. (1976). Medical and legal aspects of the increasing demand for diagnostic radiology. *Proceedings of the Royal Society of Medicine,* **69**, 755-756.

Waterhouse, J., Muir, C., Correa, P. & Powell, J. (Eds) (1976). *Cancer incidence in five continents,* Volume 3. Lyons: WHO International Agency for Research on Cancer.

Acknowledgements

We would like to thank Dr T. W. Meade for his helpful comments and Mrs P. Howlett for typing the manuscript.

Epilepsy

The difficulty in controlling the fits in three of the four patients attending hospital compared with the 48 patients cared for in general practice shows the danger of generalizing from hospital experience of epilepsy. An important lesson underlined by this audit was the good prognosis associated with one or two epileptic manifestations in early life even when the original diagnosis was supported by electro-encephalographic abnormalities.

Reference

Zander, L. I., Graham, H., Morrell, D. C. & Fenwick, P. (1979). Audit of care for epileptics in a general practice. *British Medical Journal,* **2**, 1035.