An audit of the care of post-gastrectomy patients

S. L. BARLEY, MRCGP
General Practitioner, Sheffield

N. MATHERS, B.SC.
Medical Student, University of Sheffield

SUMMARY. The records of 26 patients in one practice who had had a partial gastrectomy were studied to see if a stated policy of follow-up had been successful. The policy aimed to detect by annual blood tests (birthday follow-up) the consequences of malabsorption of iron, folate, vitamin B12, and calcium. Of 198 possible tests (nine for each patient when seen for the first screening), only 87 (44 per cent) were done; 16 (18·2 per cent) were abnormal. At the 39 opportunities for annual follow-up, 71 per cent of the possible tests were done; 11 of the 62 tests (17·5 per cent) were abnormal. The most common abnormality was deficiency of iron (12 tests), followed by folate (four tests), serum B12 (two tests), and serum calcium (two tests). Appropriate action according to the review criteria was taken for 24 out of the 27 abnormalities found. The result of the review was to suggest a modified annual follow-up, with fewer than nine tests per year.

Introduction

THERE are many consequences and complications of a partial gastrectomy, malabsorption of iron being the commonest; a few patients also develop a vitamin B12 or folate deficiency anaemia, or calcium malabsorption presenting as osteomalacia or osteoporosis. Because the onset of deficiency states may be delayed for many years, it is important that patients are followed for the rest of their lives (Wright and Tilson, 1973).

Although a great deal of literature has been devoted to the postoperative complications of a partial gastrectomy (Stammers and Williams, 1963) it is not known how many general practitioners have devised a rational and practical method of follow-up. J. L. Stevens (personal communication, 1971) introduced the idea of a 'birthday follow-up', that is an annual blood test on the patient's birthday to look for evidence of malabsorption of iron, calcium, vitamins D and B12 and folic acid. An editorial in this *Journal* (1972) suggested the same kind of management.

Aim

The aim of our study was to see if the birthday follow-up scheme was a practical method of management by a general practitioner.

Method

The birthday follow-up scheme was started when S. L. B. joined the practice in April 1973; at that time there were 2,400 patients and two principals. At the time of audit five years later the practice consisted of 4,600 patients and three principals. Ninety-eight per cent of the patients live on a council housing estate built in the 1930s and nearly all have occupations classified by the Registrar General in social classes 4 and 5. Heavy drinking and cigarette smoking are extremely common amongst the men.

Since April 1973, the notes of every patient who has consulted the practice have been organized in the following way: hospital letters are put into chronological order, read, and if they refer to more than a single or minor episode of illness, a typed summary is made. The notes of patients with a partial gastrectomy are flagged with a small white label (long-term maintenance therapy) on the front of the envelope. A list of these patients is kept in the disease register. When new patients join the practice they are asked at the first consultation about their past medical history. Some gastrectomy operations have been discovered in this way, although

no such record exists in the notes. All these operations were done before vagotomy and pyloroplasty became fashionable; hence, when a patient said that he had had "a stomach operation for ulcer" in the 1940s, we assumed that the surgery had been a gastrectomy.

Management

When a patient was found to have had a partial gastrectomy, we explained that ill-effects were possible which an annual blood test would detect.

We took blood for a full blood count, serum iron, total iron binding capacity (TIBC), serum B12 and folate, red cell folate, serum calcium, serum phosphate, and alkaline phosphatase. The patient was asked to come back in two weeks and the blood samples were sent to the Northern General Hospital, Sheffield for a

Table 1. Results of tests at first screening.

Patient number	Sex	Full blood count	Serum iron	Total iron binding capacity	Serum B12	Serum folate	Red cell folate	Serum calcium	Serum phosphate	Alkaline phosphatase	Blood film
1	M	N	—	—	—	—	—	—	—	—	
2	M	N	L	—	N	L	—	N	N	N	Mixed deficiency
3	M	N	N	—	N	N	—	—	—	—	
4	M	L	—	—	—	—	—	—	—	—	
5	M	—	—	—	—	—	—	N	L	H	
6	M	—	—	—	N	N	—	N	N	N	
7	M	N	N	—	—	—	N	—	—	—	
8	M	N	N	—	—	—	—	N	N	N	
9	M	L	—	—	—	—	—	—	—	—	
10	M	N	L	—	—	—	—	—	—	—	Iron deficiency
11	M	N	—	—	—	—	—	—	—	—	
12	M	N	L	—	L	L	—	N	N	N	Mixed deficiency
13	M	N	—	—	—	—	—	—	—	—	
14	M	N	L	—	N	N	L	N	N	N	Mixed deficiency
15	M	No blood test									
16	M	No blood test									
17	M	N	L	—	N	N	N	N	N	N	Iron deficiency
18	M	N	N	—	N	N	—	N	N	N	
19	F	N	N	—	N	N	N	N	N	N	
20	F	N	—	—	—	—	—	—	—	—	
21	F	No blood test									
22	F	N	—	—	—	—	—	—	—	—	
23	F	No blood test									
24	F	N	N	—	N	N	—	N	N	N	
25	F	—	—	—	—	—	—	L	L	N	
26	M	N	—	—	—	—	—	N	N	H	
Total number of abnormals		2	5	—	1	2	1	1	2	2	

F Female M Male N Normal NR Result of test not recorded L Low H High — Not done

standard laboratory analysis (details from the authors).

Abnormalities were defined as values outside normal limits (Table 2). Treatment was as follows:

1. Iron deficiency—ferrous sulphate 200 mg and ascorbic acid 50 mg—one tablet of each after the main (meat) meal (modified from Cox *et al.*, 1963). A full blood count, serum iron and TIBC were repeated after three months.

2. Vitamin B12 deficiency—1,000 micrograms of hydroxocobalamin by intramuscular injection every three months indefinitely with yearly serum B12 measurements.

3. Folate deficiency—folic acid tablets (5 mg) one daily with return in three months for serum folate and red cell folate measurements.

4. Hypocalcaemia or raised alkaline phosphatase not accounted for by other diseases—one calcium and vitamin D tablet BPC (BNF) once a day and check in one month.

If no abnormalities were found the patient was asked to return on his next birthday, unless this was less than nine months away. It was the responsibility of the patient to remember to come back.

The audit

This was undertaken by N. M. as a project during his undergraduate attachment to general practice. The notes and hospital letters of all patients on the gastrectomy list were searched to see if the management plan had been followed. Other details recorded were: the age and birthday of the patients, the date of the operation, the indications for doing it and the surgeon's follow-up plans, and what tests the patient had had done and when. This audit was extremely laborious, since it entailed making lists of patients and the above details, and then looking at the notes to see that each test had been appropriately followed up.

Results

There are 26 names on the disease register—19 men and seven women. The mean age of the men was 63·4 years (range 35 to 84) and of the women 68·1 years (range 57 to 77). The incidence of partial gastrectomy is 0·6 per cent of the 1977 list. Nineteen operations were for peptic ulceration, two for carcinoma of the stomach, and one for duodenal narrowing and Crohn's disease. There was no indication for surgery in the records of four patients although they all claimed to have had 'ulcers' before operation. The mean time between operation and audit for women was 17·7 years (range 0 to 30 years) and for men 16·4 years (range 0 to 32 years). Apart from the two patients with cancer, all had been discharged from follow-up by the surgeons.

First screening

Since the birthday follow-up scheme was started, 22 patients have received a blood test. The mean delay between first consultation (that is, when the doctor should have learned about the gastrectomy and started the management plan) and the first blood test is 7·7 months. The remaining four patients had not had any blood test at all (Table 1).

Of the 198 possible tests (nine for each of the 22 patients seen) 87 were done (44 per cent), of which 16 (18 per cent) were abnormal. The major abnormality was of serum iron, five of the 11 serum iron estimations being low (46 per cent) (Table 2). Three of the five abnormal serum iron tests contributed to a mixed deficiency anaemia. The abnormalities detected are shown in Tables 1 and 2. Fourteen of the 16 abnormalities were appropriately treated (88 per cent). The remaining two patients had not been treated at the time of audit.

Birthday follow-up

There were 39 opportunities for birthday follow-up of the 26 patients (351 possible blood tests). Table 3 shows that on 10 of these occasions blood samples were taken and that 62 of the possible tests were done (71 per cent). Eleven of these were abnormal (18 per cent) and again the most common abnormality was of serum iron (88 per cent). The abnormalities detected in birthday follow-up are shown in Table 4. Appropriate action was taken for all patients except one (91 per cent) who had not been treated at the time of audit.

Table 2. Results of first blood test (26 possible results for each test).

	Full blood count	Serum iron	Total iron binding capacity	Serum B12	Serum folate	Red blood cell folate	Serum calcium	Serum phosphate	Alkaline phosphatase
Normal range	—	12-25 uMol/l	45-80 uMol/l	160-900 ng/l	3-15 ug/l	160-700 ug/l	2.12-2.62 mMol/l	0.8-1.4 mMol/l	8-13 KA Units
Number of blood tests	19	11	None	9	9	4	11	12	12
Percentage of tests abnormal	*10.5*	*45.5*	—	*11.1*	*22.2*	*25.0*	*9.1*	*16.6*	*16.6*

Discussion

In the five years since the birthday follow-up scheme was started, approximately 95 per cent of all the patients in the practice will have attended for consultation (Howie, 1977). It is therefore probable that we have found most, if not all, of the patients in the practice who have had a partial gastrectomy.

The introduction of the scheme was reasonably successful: 85 per cent of the partial gastrectomy patients had received a first screening test of some sort, although the mean delay between presentation and testing was 7·7 months. The remaining four patients (15 per cent) had received no blood test at all for the following reasons: two patients were operated on less than one year before the audit; a third patient, a woman of 65,

Table 3. Results of tests at second screening.

Patient number	Sex	Full blood count	Serum iron	Total iron binding capacity	Serum B12	Serum folate	Red cell folate	Serum calcium	Serum phosphate	Alkaline phosphatase	Blood film
1	M	N	L	—	NR	N	—	N	N	N	NR
2	M	N	—	—	—	—	—	—	—	—	—
3	M	—	—	—	—	—	—	—	—	—	—
4	M	—	—	—	—	—	—	—	—	—	—
5	M	—	—	—	—	—	—	—	—	—	—
6	M	—	—	—	N	N	—	N	N	N	—
7	M	—	—	—	—	—	—	—	—	—	—
8	M	—	—	—	—	—	—	—	—	—	—
9	M	—	—	—	—	—	—	—	—	—	—
10	M	N	L	—	N	—	—	N	N	N	—
11	M	—	L	N	—	—	—	N	L	H	—
12	M	N	L	—	L	L	—	N	N	N	NR
13	M	NR	L	—	N	L	—	N	N	N	NR
14	M	—	—	—	—	—	—	L	L	—	—
15	M	No blood test									
16	M	No blood test									
17	M	N	L	—	N	N	N	N	N	N	N
18	M	—	—	—	—	—	—	—	—	—	
19	F	—	—	—	—	—	—	—	—	—	
20	F	—	—	—	—	—	—	—	—	—	
21	F	No blood test									
22	F	N	L	—	N	N	—	N	N	N	
23	F	No blood test									
24	F	—	—	—	—	—	—	—	—	—	
25	F	N	N	N	N	N	N	N	N	N	—
26	M	—	—	—	—	—	—	—	—	—	
Total number of abnormals		—	7	—	1	2	—	1	2	1	

F Female M Male N Normal NR Result of test not recorded L Low H High — Not done

had a number of unrelated severe problems which presumably distracted attention from follow-up of her gastrectomy; the fourth paitent, who had not received a blood test at the time of audit, was a man of 42 who had been told by his surgeon to take one iron tablet every Sunday for the rest of his life and who had been prescribed 200 tablets one month after operation.

Iron, B12 and folate deficiencies

The reported incidence of anaemia as a late complication of partial gastrectomy varies from four per cent to 80 per cent (Mollin and Hines, 1964). The differences are due to the different criteria used to define anaemia, the time between operation and investigation, the preceding treatment for anaemia before investigation (Deller and Witts, 1962) and the type of operation (Hoffbrand, 1967). Hoffbrand also showed iron deficiency to be the sole cause of anaemia in 39 per cent in a study of 292 post-gastrectomy patients; iron deficiency was a contributing factor in a further nine per cent of cases of anaemia.

The corresponding value in our study is 46 per cent. The discrepancy in the proportion of mixed deficiency pictures contributing to the total incidence of iron deficiency can perhaps be attributed to the much smaller sample in our study. Wright and Tilson (1973) found iron deficiency in 44 per cent of men and 84 per cent of women 15 years after operation. There were only seven women in our study and none was iron deficient at the first blood test. However, one was later found to have a low serum iron which contributed to a mixed deficiency anaemia.

Reduced serum levels of vitamin B12 were found in 14 per cent of post-gastrectomy patients by Deller and Witts (1962). The corresponding figure in Hoffbrand's study (1967) was 20 per cent. One of our patients had a reduced serum B12 at the time of the first blood test as part of a mixed deficiency picture. Estimates of the incidence of reduced serum folate following partial gastrectomy have ranged from 12 per cent (Deller *et al.*, 1964) to 47 per cent (Mollin and Hines, 1964). The estimate in our study is lower (22 per cent) than in the larger surveys, possibly because of our smaller number of patients.

Metabolic bone disease

Minor bone changes are common after partial gastrectomy but severe pathological bone disease has only rarely been reported. In a series of 126 unselected patients after partial gastrectomy, 22 per cent had an abnormally high level of alkaline phosphatase (Tasman-Jones *et al.*, 1963). We found an incidence of 17 per cent. The diagnosis of metabolic bone disease is, however, often difficult, since symptoms develop only late in the disease and when present are usually vague. X-ray and bone biopsy will confirm gross osteomalacia or osteoporosis, but the most satisfactory screening test for established bone disease is probably the serum alkaline phosphatase level and the 24-hour urinary calcium excretion test (Tasman-Jones *et al.*, 1963). The treatment of what is often a mixture of osteoporosis and osteomalacia is not easy, and we have preferred to simplify the management by the empirical use of replacement therapy rather than subject the patient to investigations of the malabsorption which would usually have to be fairly extensive.

Associated deficiencies

In many of the patients reported in the literature, the presence of post-gastrectomy bone disease has been associated with iron and B12 deficiencies, but we did not find this.

Conclusions

1. Is surveillance necessary?

Our study confirms that follow-up after gastrectomy is necessary, and also shows that in this practice at least, nobody else has plans to do it. Since some patients had abnormalities in every test we used, these must be the minimum at first follow-up.

2. Did the management plan work?

First screening (44 per cent of possible tests completed) was less effective than the birthday follow-up (71 per cent of possible tests completed on those patients seen), this in turn being less effective than follow-up of abnormal results (91 per cent).

Table 4. Results of birthday follow-up (normal ranges as in Table 1).

	Full blood count	Serum iron	Total iron binding capacity	Serum B12	Serum folate	Red blood cell folate	Serum calcium	Serum phosphate	Alkaline phosphatase
Number of blood tests	8	8	2	8	7	2	9	9	9
Percentage of tests abnormal	*12.5*	*87.5*	*0*	*12.5*	*29*	*11*	*0*	*22*	*11*

3. Plans for the future

Birthday follow-up seems to be a good method. The problem of initiating surveillance is one which general practitioners need to face, since they will increasingly want to take on this responsibility for their patients who have chronic diseases such as thyroidectomy, hypertension, and diabetes. Computers will undoubtedly help, but even these will need to be fed with the initial information.

Because there were so few abnormalities found at follow-up, we have modified our plan in the following way:

One year and (arbitrarily) every five years after operation, all nine tests should be done. Follow-up of abnormal results will be after an appropriate short interval and (arbitrarily) for two annual reviews thereafter. If all tests are normal, birthday follow-ups are confined to a full blood count and serum iron until the five-year complete review comes round.

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