Peptic ulcer in south-west Scotland

A. LITTON¹ AND W. R. MURDOCH²

From Dumfries and Galloway Royal Infirmary, Dumfries, Scotland

EDITORIAL SYNOPSIS A survey is made of the incidence of peptic ulcer in a predominantly rural population in south-west Scotland.

The prevalence of peptic ulcer in modern society, with its resultant chronic ill health and economic hardship, justifies continued interest in its incidence and aetiology. Recent analysis of the aetiological factors has shown a wide variety of views, but it would appear that there is a difference in the occurrence of peptic ulcer in rural and other communities. Although a number of reports (*e.g.*, Doll and Jones, 1951; Pulvertaft, 1959) deal with urban surveys, there are few studies of the prevalence of peptic ulcer in rural areas or in the community as a whole.

Methods of estimating frequency have serious limitations. General practitioner, hospital, and necropsy surveys, for example, deal with selected groups. It has been suggested that if accuracy of diagnosis could be established population surveys, although expensive and time consuming, would provide the best method of assessing the incidence of peptic ulcer (*Lancet*, 1960).

Our survey concerns peptic ulcers which occurred between 1957 and 1959 in the population of the predominantly rural area consisting of the counties of Dumfries, Kirkcudbright, and Wigtown. The only large town, containing the general hospital for

¹Present address: Southern General Hospital, Glasgow, S.W.1.

²Present address: Victoria Infirmary, Glasgow.

FIG. 1. Map of the area surveyed. The Stranraer area bounded by the dotted line was excluded.

the area, is Dumfries, with a population of 26,322 (Fig. 1). Although a small number of patients on the borders of the counties may be referred to hospitals in Ayrshire and Carlisle, the vast majority are seen either at the hospital or at its peripheral clinics. The Stranraer area has a small hospital of its own and is excluded from the survey. The population of Dumfries and the rural area is shown in Table I. As the radiological services in the area are open to general practitioners, in addition to our hospital series we have been able to obtain details of patients with radiologically proven peptic ulcer treated by their own doctors.

TABLE I
POPULATION SURVEYED

	Sex	Total Population	Population Aged 15 Years and Over
Urban (Dumfries)	Male	12,181	9,125
	Female	14,141	11,160
	Total	26,322	20,285
Rural (Dumfries and Galloway less Stranraer area)	Male	53,954	39,745
	Female	55,729	42,595
	Total	109,683	82,340
Grand total	Male	66,135	48,870
	Female	69,870	53,755
	Total	136,005	102,625

The diagnosis of peptic ulcer was confirmed radiologically in the majority of cases, the remainder being composed of acute perforations or peptic ulcers diagnosed at laparotomy. Cases of alimentary bleeding suggestive of peptic ulcer were excluded unless there was positive radiological or operative evidence of ulceration.

PEPTIC ULCER

In the three-year survey (1957-59), there was a total of 944 cases of peptic ulcer consisting of 810 patients with duodenal ulcer, 106 with gastric ulcer, and 28

TABLE II
PATIENTS WITH ACUTE SYMPTOMS OF PEPTIC ULCER
IN DUMFRIES AND GALLOWAY, 1957-59

Ulcer	Male	Female	Total
Duodenal	607	203	810
Gastric	57	49	106
Combined gastric and duodenal	24	4	28
Total	688	256	944

cases of combined gastric and duodenal ulcer. The figures are analysed in Table II. In further analyses the combined ulcers are included in both the duodenal and the gastric ulcer totals.

DUODENAL ULCER

Of the 838 cases of duodenal ulcer, 631 were in males and 207 in females. The overall mean annual incidence of duodenal ulcer per 1,000 males 15 years and over is 5.42 and for females is 1.28, the male/female ratio being 4.22/1.

GASTRIC ULCER

Of the 134 cases of gastric ulcer, 81 were in males and 53 in females, giving an annual incidence per 1,000 of 0.55 for males and 0.32 for females, the sex ratio being 1.7/1. The duodenal ulcer/gastric ulcer ratio in males is 7.8/1 and in females is 3.9/1.

INCIDENCE IN TOWN AND COUNTRY

Although Dumfries can hardly be regarded as a highly industrialized centre, yet it seemed worth while to compare it with the surrounding rural area. Thus of 9,125 males, aged 15 years and over in Dumfries, 226 had active duodenal ulcers during the three-year survey, giving an annual incidence per 1,000 of 8.26. In the country group of 39,745 males there were 405 duodenal ulcers, an annual incidence of 3.40. From these figures duodenal ulcer in males was 2.43 times more common in town than in the country. Similarly 72 females in a population of 11,160 over 15 years of age in Dumfries had duodenal ulceration, the annual incidence per 1,000 being 2.15. One hundred and thirty-five women in the rural area with 42,595 women over 15 years of age had duodenal ulcers, giving an annual incidence of 1.06. This gives a ratio of town to country as 2.03/1 in females.

The corresponding figures for gastric ulcer in males were 32 in the town and 49 in the country, giving an annual incidence per 1,000 of 1.17 and 0.41 respectively. Thus gastric ulcers were 2.84 times more common in the town than in the country. In women, over the same three-year period, there were 19 gastric ulcers in the town and 34 in the country, an incidence of 0.57 and 0.27 respectively, giving a town/country ratio of 2.12/1.

AGE AND DURATION OF SYMPTOMS

As peptic ulcer is a chronic disease with episodes of increased activity, the duration of previous symptoms was often difficult to assess accurately. For example, a person with perforation of a peptic ulcer may not immediately admit to previous symptoms because of the urgent nature of his presenting illness, yet on closer questioning confesses to recurrent dyspepsia of several years' duration. For this reason we have

TABLE III

INCIDENCE OF DUODENAL ULCER PER ANNUM

Age Groups (yr.)	Men					Women				
	Dumfries		Rural		Total	Dumfries		Rural		Total
	No.	Per 1,000	No.	Per 1,000		No.	Per 1,000	No.	Per 1,000	
<20	5	2.01	7	0.63	12	1	0.35	—	—	1
20-29	33	5.78	54	2.30	87	8	1.24	10	0.43	18
30-39	45	8.22	92	4.06	137	19	3.21	25	1.15	44
40-49	53	10.00	67	3.02	120	16	2.68	40	1.79	56
50-59	60	15.45	96	5.72	156	17	3.19	34	1.72	51
60-69	22	8.71	61	5.57	83	7	1.74	16	0.99	23
70 and over	8	2.77	28	2.82	36	4	1.39	10	0.73	14
Total	266	8.26	405	3.40	631	72	2.15	135	1.19	207

considered only age at the time of first attendance during the three-year period under review. We have taken into consideration the population at risk in each age group. The results are shown in Table III.

In persons under 20 years of age peptic ulcer is not common, and its prevalence in the group aged 20 to 29 years is lower than in the following decades. Like other authors we have found a maximum

incidence of duodenal ulcer in men in the 50 to 59 age group (Fig. 2). After 60 years of age, the number related to the population at risk declined.

The series of gastric ulcers is small, rendering analysis difficult. In men and women the maximum incidence was in the decade 60 to 69 years, 10 years later than duodenal ulcer.

An attempt was made to assess the duration of symptoms at the time of diagnosis and the results are shown in Table IV. It is interesting to note that in more than a third of the patients with gastric ulcer the duration of symptoms was less than one year. A similar short duration of symptoms is usual in gastric carcinoma.

TABLE IV

DURATION OF SYMPTOMS IN PEPTIC ULCER

Duration (yr.)	Duodenal (%)		Gastric (%)	
	Male	Female	Male	Female
< 1	18.8	25.1	38.6	38.8
1-5	25.7	28.6	19.3	26.5
6-10	24.7	18.7	12.3	10.2
11-15	11.5	14.8	14.0	14.2
16-20	7.6	3.4	5.3	2.0
> 20	12.0	9.4	10.5	8.2

FIG. 2. The incidence of duodenal ulcer in men aged 15 years and over related to town and country.

INCIDENCE AND SOCIAL CLASS

Previous authors have correlated the incidence of peptic ulcer with social status. Although social status appeared to have little bearing in duodenal ulcer all agreed that there is an increased prevalence of gastric ulcer in the unskilled (Morris and Titmuss, 1944; Doll and Jones, 1951; Pulvertaft, 1959).

The composition of the population in our area according to social class was taken from the 1951 census (Scotland) tables. There does not appear to have been any appreciable difference in the various social class groups from 1951 till the three years under review in 1957 to 1959. In men, the occupations

TABLE V

PEPTIC ULCER AND SOCIAL CLASS IN MALES ONLY

Social Class	Duodenal Ulcer	Duodenal Ulcer Expected	Gastric Ulcer	Gastric Ulcer Expected
I	13	14	—	2
II	41	80	11	11
III	125	218	12	30
IV	136	108	13	14
V	158	52	28	7
Total	473		64	

For duodenal ulcer $\chi^2 = 282.07$ $P < 0.001$

For gastric ulcer $\chi^2 = 85.87$ $P < 0.001$

of 473 patients with duodenal ulcer and 64 with gastric ulcer were recorded and placed in the social class groups as defined by the Registrar General. On the hypothesis that peptic ulcer would be distributed evenly throughout all social groups, we calculated from the population tables the expected number of peptic ulcers in each group. The results are tabulated in Table V.

We found that as with gastric ulcer, duodenal ulcer had a correlation with social class. Statistical analysis confirmed that there was a significantly increased prevalence of duodenal ulcer in unskilled workers. In women there were few records of social class.

OCCUPATION

In previous studies, attempts were made to assess the incidence of peptic ulcer in various occupations.

Although Dumfries and Galloway is predominantly a rural area, only 26% of the employed males (15 years and over) were engaged in agricultural occupations (agriculture, forestry, and horticulture). We recorded the occupations of 473 males with duodenal ulcer and 64 males with gastric ulcer and compared agricultural occupations with all others (Table VI). Duodenal ulcer was less common in agricultural workers relative to other occupations. Our findings are in agreement with those of Doll and Jones (1951). In contrast to duodenal ulcer we found no significant variation in the incidence of gastric ulcer in agricultural workers.

TABLE VI
AGRICULTURE AND OTHER OCCUPATIONS
OF ULCER PATIENTS

	Duodenal Ulcer		Gastric Ulcer	
	Observed No.	Expected No.	Observed No.	Expected No.
Agricultural occupations	103	123	18	16.64
All others	370	350	46	47.36
Total		473		64
	$\chi^2 = 4.40$ $0.02 < P < 0.05$		$\chi^2 = 0.15$ $0.1 < P < 0.9$	

HAEMORRHAGE AND PERFORATION

Haemorrhage occurred in approximately a quarter of the males with peptic ulcer and perforation of the ulcer occurred in just less than one in 10. In women peptic ulcer was a more benign condition; slightly fewer than one in five sustained haemorrhage from the ulcer and only 3.5% perforated. Table VII expresses the figures for haemorrhage, perforation, and other clinical symptoms.

The incidence of haemorrhage from peptic ulcer was compared in town and country (Table VIII).

TABLE VII
DISTRIBUTION OF PEPTIC ULCER BY SYMPTOMS

	Males	Females
Haemorrhage	160 (23.3%)	49 (19.1%)
Perforation	62 (9.0%)	9 (3.5%)
Other clinical symptoms	466 (67.7%)	198 (77.4%)
Total	688	256

TABLE VIII
INCIDENCE OF HAEMATEMESIS IN THREE-YEAR PERIOD
1957-59

	Male		Female	
	Town	Country	Town	Country
Duodenal ulcer	49	92	13	25
Gastric ulcer	5	5	4	7
Combined ulcer	4	5	—	—
Total	58	102	17	32
Annual incidence per 1,000 (aged 15 yr. and over)	(2.12)	(0.856)	(0.508)	(0.25)

The incidence per 1,000 (aged 15 years and over) for men was 2.12 in town and 0.856 in the rural area and for women was 0.51 and 0.25 respectively. Haemorrhage from ulcer was 2.48 times more common in

TABLE IX
INCIDENCE OF PERFORATION IN THREE-YEAR PERIOD 1957-59

	Males		Females	
	Town	Country	Town	Country
Duodenal ulcer	25	34	4	4
Gastric ulcer	—	—	1	—
Stomal ulcer	2	1	—	—
Total	27	35	5	4
Annual incidence per 1,000 (aged 15 yr. and over)	(0.986)	(0.292)	(0.149)	(0.031)

males living in town compared with males living in the country. The ratio for women was 2.08. A similar comparison was made for perforation (Table IX). This gave a town-to-country ratio of 3.37/1 in males and 4.77/1 in females.

It has been suggested that easy access to diagnostic facilities leads to a higher apparent prevalence of peptic ulcer in the town. Perhaps owing to the distances involved, the countryman finds it more difficult to consult his own doctor, but haematemesia and perforation being dramatic in their onset compel patients to seek medical help no matter where they stay.

The town-to-country ratio of peptic ulcer and its complications are summarized in Table X. The ratio of haematemesia in men and women closely parallels

TABLE X
TOWN AND COUNTRY RATIOS OF PEPTIC ULCER
AND ITS COMPLICATIONS

	Town and Country Ratios	
	Male	Female
Duodenal ulcer	2.43 : 1	2.03 : 1
Gastric ulcer	2.82 : 1	2.13 : 1
Perforation	3.37 : 1	4.77 : 1
Haematemesis	2.48 : 1	2.08 : 1

the ratio of both duodenal and gastric ulcer as a whole, suggesting that the increased prevalence of peptic ulcer in the town is real. Although the numbers are small, the higher incidence of perforation in the town might indicate that peptic ulcer was a more active condition in an urban community.

TREATMENT

It is not our intention to discuss treatment in detail. Most patients were treated along conventional lines with diet and antacids. In 21% of cases, patients were treated solely by their general practitioners. Of 209 cases of haemorrhage, only 10 patients required emergency surgery for haemorrhage uncontrolled by medical measures. However, elective surgical treatment was carried out in a further 53 patients, who had a history of recurrent haematemesis. The number of deaths directly attributable to haemorrhage was nine (4.3%). This low mortality, in association with the low emergency surgery rate, suggests that in our area haemorrhage is a less severe complication of peptic ulcer than in large towns.

PERFORATION

Simple suture was the standard emergency treatment of perforation. There were five deaths in a total of 71 cases (7%). One patient, a married woman aged 52 years, was admitted to hospital in a moribund state, three days after the onset of severe abdominal

TABLE XI
SURGICAL TREATMENT OF PEPTIC ULCER

	No. of Male	No. of Female	Total
Duodenal ulcer	172 (28.33%)	41 (20.19%)	213 (26.29%)
Gastric ulcer	32 (56.13%)	12 (24.5%)	44 (41.5%)
Combined ulcers	15 (62.5%)	2 (50%)	17 (60.7%)
Total	219 (31.8%)	55 (21.5%)	274 (29%)

pain. At necropsy an unsuspected perforated duodenal ulcer was found. There were four post-operative deaths, all in males over 65 years of age. The details

of surgical treatment for peptic ulcer as a whole are shown in Table XI. Three out of every 10 men and two out of every 10 women with acute symptoms had surgical treatment.

DISCUSSION

The frequency of peptic ulcer and the pattern of the disease has been reported from many countries. Dogra (1940, 1941) showed a higher incidence in southern India than in northern India, and Konstam (1954) reported a similar unequal distribution in Nigeria. Alsted (1953) reviewed the pattern in Denmark and found a higher incidence in towns than in rural districts. In Britain several reports have been published but many more are required before a complete picture of peptic ulcer throughout the country can be obtained. Morris and Titmuss (1944) reported a lower mortality from ulcer in rural than in urban communities. Pulvertaft (1959) found a higher frequency in York than in the adjoining rural area. In our series, where 80% of the population is rural, the incidence of peptic ulcer in the burgh of Dumfries was approximately twice as great as in the surrounding country.

In a large number of cases, ulcer symptoms had been present for years before the patient sought medical aid. Difficulties in defining the onset of symptoms or of including patients with proven but inactive ulcers make comparison of various series difficult. Comparison of perforation figures, however, is more precise and it is interesting to compare our area with Glasgow (Jamieson, 1955) and York (Pulvertaft, 1959) (Table XII). The incidence of

TABLE XII
COMPARISON OF INCIDENCE OF PERFORATION
IN PEPTIC ULCER

Area	Author	Incidence per 100,000 Population	
		Male	Female
Glasgow (1952-53)	Jamieson (1955)	32.6	3.2
York (1952-53)	Pulvertaft (1959)	26.6	2.8
Dumfries (1957-59)	Present series	15.2	2.2

perforation in Dumfries and Galloway is lower than in York and considerably lower than in Glasgow. In a report (1960) from Aberdeen, Weir found that the annual incidence of duodenal ulcer perforations (1946-56) in males aged 15 years and over was 0.88 per 1,000 in Aberdeen city, 0.75 in the north-east small boroughs, and 0.62 in landward areas. The rates in south-west Scotland in 1957-59 were 0.91 for the burgh of Dumfries and 0.28 for rural areas. The incidence of duodenal ulcer perforations in males in the burgh of Dumfries is very similar to Aberdeen. The perforation rate for women

appears to be reasonably comparable in the various series. Illingworth, Scott, and Jamieson (1944) reported a much higher perforation rate in men than in women. The sex ratio in 1944 in the Glasgow area was 19/1. Jamieson in 1955 reported that the ratio had fallen to 12/1. In our series (1957-59) in Dumfries and south-west Scotland the sex ratio was 7/1. The diminishing sex ratio may indicate that perforation in women is becoming more common.

The mortality from perforation in the Glasgow series had fallen over 30 years from 25% to about 8% (Jamieson, 1955). The mortality rate in our series (1957-59) was 7%. Jones and Doll (1953) reported a mortality rate in the south of England of 7.9%. Weir (1960) found the mortality in north-east Scotland to be 4.4% in 1958. All authors agree that there is a very appreciable mortality in perforation in the elderly. In our series the mortality for males over 60 years was 30%.

The influence of social class on the occurrence of gastric ulcer was demonstrated by Morris and Titmuss (1944) and by Doll and Jones (1951) but both these authors were unable to show a similar relationship for duodenal ulcer. Pulvertaft (1959) in the York survey showed that both types of ulcer were influenced by social class and our findings in south-west Scotland also revealed an increase of both duodenal and gastric ulcers in unskilled persons. In the Aberdeen report (Weir, 1960) the perforation rate was also increased in the lower social classes. Our results and those of Doll and Jones (1951) indicate a decreased liability to duodenal ulcer in agricultural workers, which is contrary to the findings of Pulvertaft (1959) in York. Gastric ulcer, however, was just as common in agricultural workers as in the rest of the population.

Combined gastric and duodenal ulcers constitute only a small percentage of the total numbers of peptic ulcers. Mangold (1958) in a series of peptic ulcers from the Central Middlesex Hospital reported 2.7% of combined ulcers compared with 2.96% in our series. It is noted that the percentage of combined ulcers requiring surgical treatment is higher than for either duodenal or gastric ulcers separately. Mangold's combined ulcer series had an operation rate of 52%, whereas in our series 60.7% had surgical treatment. While careful necropsy surveys, for example that of Watkinson (1960), can indicate precisely the presence of active peptic ulceration, or the scarring of healed ulcers, these hospital reports are difficult to correlate with clinical estimates of the morbidity caused by peptic ulceration in the population as a whole.

On the other hand, surveys by general practitioners, though limited in their numbers and perhaps by the composition and situation of the practice,

help to delineate the problem of peptic ulcer in the community. Finer and Fry (1955) in a London practice showed that haemorrhage occurred in 18% and perforation in 10% of those with peptic ulcer, while 25% of all cases required surgical treatment. Lipetz (1955) reported that in a general practice in Edinburgh 16.4% had haemorrhage and 19.2% suffered perforation. In Pulvertaft's (1959) hospital series 15.8% males and 16.5% females had haemorrhage and 13.7% males and 7.8% females had perforation. In our series of hospital and general practitioner cases, we found that 23.3% of males and 19.1% of females sustained a haemorrhage and 9% males and 3.5% females had a perforation. The overall operation rate was 29%.

One cannot readily obtain an overall picture of the prevalence of the disease in areas where patients may be referred to one of several hospitals or to specialized units. In this respect we have been fortunate in studying a compact community with a single general hospital.

Although peptic ulcer is a common disease it is difficult to account for its increase in the town of Dumfries compared with the surrounding countryside. There are several factories and workshops in Dumfries but no significant atmospheric pollution. As far as we could observe there was no difference in dietary habits. Perhaps urban employment attracts the ambitious, and by its competitive nature leads to increased stress in the town. It is possible that ulcer patients in the country, finding difficulty in coping with heavy agricultural work, seek lighter urban employment.

Today in spite of our better understanding of gastric function, and the pharmacological action of antacids and other drugs, many problems remain in the management of peptic ulcer patients. Perhaps further studies similar to our own will elucidate important aetiological factors in this common modern disease.

SUMMARY

A survey of the incidence of peptic ulcer in rural south-west Scotland was made in the three-year period 1957-59. Nine hundred and forty-four patients with acute symptoms of peptic ulcer were studied. Diagnosis in all cases was confirmed radiologically or by laparotomy. The survey included cases both in hospital and in general practice, 21% cases being treated solely by family doctors. In both men and women gastric and duodenal ulcers were twice as common in town as in the country.

In the area surveyed the incidence of perforation was less than in York, north-east Scotland, and Glasgow.

Both gastric and duodenal ulcers were related to social class, being more common in the unskilled groups. Agricultural workers were less susceptible to duodenal ulceration although the incidence of gastric ulcer was not significantly different from that of the general population. In peptic ulcer patients, haemorrhage occurred in approximately one in four of the males and one in five of the females and perforation in one in 10 of the males and one in 28 of the females. Surgical treatment was carried out in 29% of all peptic ulcer patients.

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