

CLINICAL
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PEPTIC
ULCER

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D. C. CARTER

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CLINICAL SURGERY INTERNATIONAL

Vol. 7

Peptic ulcer

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CHURCHILL LIVINGSTONE

EDINBURGH LONDON MELBOURNE AND NEW YORK 1983

CHURCHILL LIVINGSTONE

Medical Division of Longman Group Limited

Distributed in the United States of America by
Churchill Livingstone Inc., 1560 Broadway, New York,
N.Y. 10036, and by associated companies, branches
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permission of the publishers (Churchill Livingstone,
Robert Stevenson House, 1-3 Baxter's Place, Leith Walk,
Edinburgh EH1 3AF).

First published 1983

ISBN 0 443 02728 5

ISSN 0263-4422

British Library Cataloguing in Publication Data

Peptic ulcer.—(Clinical surgery international,

ISSN 0263-4422; 7)

I. Peptic ulcer

I. Carter, D. C. II. Series

616.3'43 RC821

Library of Congress Cataloging in Publication Data

Main entry under title:.

Peptic ulcer.

(Clinical surgery international; v. 7)

Includes index.

I. Peptic ulcer—Surgery—Addresses, essays,
lectures. I. Carter, D. C. (David C.) II. Series.
[DNL: 1. Peptic ulcer. W1 CL795U v. 7/W1 350
P42405]

RD540.53. P46 1983 617'.553 83-7203

Printed in Great Britain by Butler & Tanner, Frome

Preface

The twentieth century has seen a remarkable rise and fall in the incidence of peptic ulceration, and despite great strides in our understanding of the pathophysiology of ulcer disease we have no convincing explanation for these changes. The disease has become markedly less common in most Western societies in the past decade, prompting Morton Grossman to remark, tongue in cheek, that 'we had better find a cure for it quickly before it disappears'. However, it must not be assumed that peptic ulceration is no longer a significant problem. The disease still kills and we cannot assume that its incidence will continue to fall. It remains a major cause of symptoms which impair the quality of life, a substantial drain on the resources of the community, and a significant cause of both elective and emergency admissions to hospital. However, our improved understanding of the physiology of the digestive system has been translated into more effective medical treatment, endoscopy has opened the way to accurate diagnosis and offers an exciting prospect for therapy, and surgeons have striven for a better balance between safety, risk of recurrent ulceration and undesirable sequelae of operation.

No single volume can offer comprehensive coverage of the peptic ulcer diathesis. In this volume, I have invited acknowledged authorities to provide up-to-date coverage of growth areas, paying particular attention to advances in epidemiology and pathophysiology, to the need for accurate diagnosis, and to the implications of available medical and surgical treatments. It is no accident that a substantial proportion of the volume is devoted to consideration of the complications of ulcer surgery, and we have still some way to go before all of our patients are offered surgery which is both safe and free from the risk of side effects, which may sometimes seem worse than the original disease.

I am grateful to my fellow contributors for the quality of their submissions and their prompt delivery, to my publishers for their help and forbearance, and to my departmental secretaries, notably Anne McKellar, for their patient and skilled assistance.

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Contents

1. <i>Epidemiology</i> M. J. S. Langman	1
2. <i>Pathophysiology of acid/pepsinogen secretion</i> L. Olbe	14
3. <i>The nature of the mucosal defences against ulceration</i> P. E. O'Brien	28
4. <i>Problem areas in diagnosis</i> G. P. Crean and R. J. Holden	44
5. <i>Role of modern medical management</i> J. J. Misiewicz	62
6. <i>Implications of vagotomy</i> J. M. Becker and K. A. Kelly	77
7. <i>Operations available for duodenal ulcer: an overview</i> G. G. Jamieson	90
8. <i>Operations available for gastric ulcer: an overview</i> A. G. Johnson	104
9. <i>Complications of peptic ulceration</i> C. G. Morran and D. C. Carter	115
10. <i>Recurrent ulceration</i> B. E. Stabile and E. Passaro, Jr	132
11. <i>Long-term sequelae of ulcer surgery</i> A. Cuschieri	149
12. <i>Reasons for failure</i> W. P. Small	172

13. <i>Endocrine syndromes and peptic ulceration</i>	183
S. N. Joffe	
14. <i>Gastric cancer and peptic ulceration</i>	200
F. B. V. Keane	

<i>Index</i>	214
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1

Epidemiology

M. J. S. LANGMAN

Although death from peptic ulceration is relatively uncommon, disability due to the disease represents a major health problem. Thus 10% or more of Western populations may develop the disease at some time in their lives, and there is much evidence to show that ulcer frequency is high in many underdeveloped areas. Peptic ulcer incidence fluctuates markedly from time to time and from place to place, indicating the interplay primarily of environmental influences.

Problems of epidemiological assessment

The collection of descriptive data, and hence the identification of the patterns of general ulcer frequency and of any special deviations from these patterns, has been hindered by a number of factors.

Separation of gastric and duodenal ulceration

Despite clear epidemiological and pathophysiological evidence that gastric and duodenal ulcer are distinct entities, many epidemiological analyses have failed to separate them.

Chances of diagnosis

The amount of ulcer disease detected in a community measured either as prevalence (total amount in the community, irrespective of the date of onset) or incidence (total number of new cases occurring within a given time-interval) will depend upon a series of factors; these include:

1. the availability and accuracy in use of fiberoptic and radiological diagnostic equipment
2. the chances that individuals with ulcer disease will present with their symptoms and the likelihood that diagnostic measures will then be employed.

Measures of frequency

Most figures describing disease frequency, unless they are derived from the finding in special surveys, are obtained by consideration of data obtained through

2 PEPTIC ULCER

hospital admissions, or following death. However, only a minority of ulcer patients are admitted to hospital and fewer still die, and figures which describe the outcome of inpatient or mortality surveys cannot be assumed to reflect the patterns prevailing for the generality of ulcer disease.

Incidence and prevalence data. Sets of information are few, and direct comparison between figures obtained in one place at one time and at another time requires caution for the reasons given earlier.

Hospital admission rates. The chances that a patient will be admitted to hospital with ulcer disease may be affected by physician prejudice about the appropriate means of treatment, which may dominate where dyspeptic symptoms are concerned, or else, as in the case of ulcer perforation, once the diagnosis is made admission becomes mandatory. In Western communities ulcer perforation rates have been used as a convenient index of the frequency of peptic ulcer, but it should not be assumed that complications occur in a fixed proportion of all ulcer cases. Thus, ulcer perforation may be less likely to occur in some tropical areas.

Mortality rates. It must never be forgotten that death certificates are primarily legal instruments and secondarily tools of epidemiological investigation. The chances of death being recorded as due to ulcer disease rises several hundred-fold with age, and when ulcer deaths occur they are due either to the complications of the disease or to postoperative complications. The group of individuals dying with ulcer cannot be assumed therefore to be a reasonable sample of the total ulcer group.

Autopsy surveys. Reliable information about the current frequency of ulcer, and some about the past frequency (as judged by the presence of scars or by evidence of previous surgery having been undertaken), can be obtained at post-mortem examination. However, autopsies are being performed progressively less frequently in many countries, and more likely to be carried out if special problems have occurred during the terminal illness, so that findings at autopsy cannot necessarily be related to the expected findings in the ordinary population. Accident victims might form a group of special interest, but again they may differ, for instance in habits with regard to alcohol intake or in social class mix, from the ordinary population.

Ulcer prevalence and incidence

Mortality

Table 1.1 shows the frequency with which death has been ascribed to ulcer disease in the United Kingdom. The figures demonstrate the steeply rising frequency with age, and the consistent tendency for death ascribed to ulcer disease to be more common in men than in women. Taken overall, death from ulcer disease remains uncommon, accounting for about 1% of all deaths (Table 1.2).

Autopsy surveys

The frequency with which ulcer has been detected has been high; thus, in studies in Leeds and Rotterdam more than a fifth of all men and a tenth of all women were found to have evidence of present or previous ulcer disease.

Table 1.1 Age-specific death rates from peptic ulcer in England and Wales as rates per 100 000 per annum in 1973-77 (Coggon et al 1981).

	Age					
	25-	35-	45-	55-	65-	75+
Gastric ulcer						
Men	0.19	0.56	2.2	7.2	20.2	57.3
Women	0.08	0.30	1.0	3.1	10.0	41.6
Duodenal ulcer						
Men	0.22	0.95	3.4	8.5	23.5	58.6
Women	0.05	0.21	1.2	2.4	6.8	24.0

Table 1.2 Deaths in England and Wales 1979 (Office of Population Censuses and Surveys 1981).

	Men	Women
All causes	296 528	294 399
Gastric cancer	6536	4743
Colorectal cancer	7737	8798
Lung cancer	26 771	7906
Female breast cancer	-	12 059
Peptic ulcer	2209	2141

Special surveys

Table 1.3 summarizes results obtained in specific areas. The relative uniformity of these data is not a reflection of the even distribution of ulcer disease; thus, the chances that special surveys will be mounted in areas where ulcer is thought to be uncommon must be slight.

Table 1.3 Annual incidence (per 1000) of gastric (GU) and duodenal ulcer (DU) in Denmark and the United Kingdom.

		Annual incidence			
		GU Male	GU Female	DU Male	DU Female
Denmark	1948*	0.46	0.22	1.47	0.56
	1963-68*	0.51	0.38	1.83	0.84
United Kingdom	1952-57**	0.53	0.31	2.15	0.62
	1957-59***	0.38	0.30	5.42	1.28

*Copenhagen County: Bonnetie (1975 a & b).

**York, England: Pulvertaft (1959).

***South-West Scotland: Litton & Murdoch (1963).

Hospital admission rates

Figure 1.1 shows the pattern of hospital admission rates for ulcer disease in the United States as measured by two national surveys, that of the Commission on Professional and Hospital Activities (CPHA), which samples data for all non-Federal short-stay hospitals, and of the National Center for Health Statistics

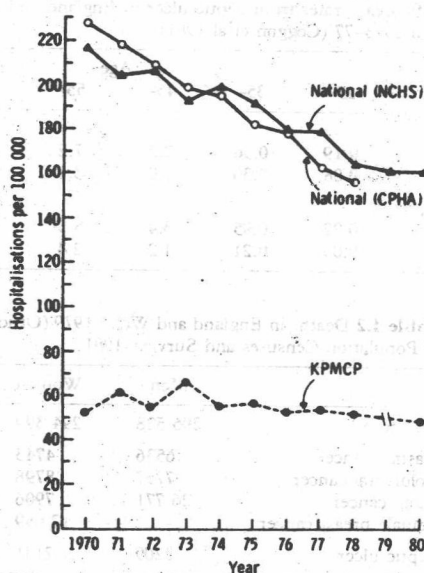


Fig. 1.1 Hospitalization rate per 100 000 according to data from non-Federal short-stay hospitals (NCHS & CPHA) and from insurance based Californian data (KPMCP). (From Kurata et al 1982) in *Gastroenterology*, reproduced by permission of the authors and the publishers.)

(NCHS), which collects data on another sample of federal hospital admissions. The uniformly declining rates of admission contrast with the relatively unchanging and lower rates recorded by the Kaiser Permanente Medical Care Program (KPMCP) from an insurance-based hospital group. Most of the variation recorded between the KPMCP figures and the others is accounted for by differences in the frequency of admission for uncomplicated ulcer, illustrating the dominant effect of physician opinion about the appropriate means of treatment on the figures. Nevertheless, it is worth noting that the hospitalization rate for perforated ulcer was in fact consistently higher in National than KPMCP statistics, suggesting that some of the variation reflected true differences in ulcer frequency.

General patterns of ulcer prevalence and incidence

Table 1.4 summarizes views about the frequency of ulcer disease throughout the world. Though ulcer is common throughout European communities, with duodenal ulcer predominating there, it is clear that it is a common problem in some underdeveloped areas, where duodenal ulcer is usually most frequent and gastric ulcer is relatively rare. The reasons for the variations found are not understood; they do not correlate with climatic patterns or the overall degree of social development. Even within countries there may be marked differences in the apparent frequency of ulcer, as evidenced by the likely high frequency in South India and South Nigeria and the low frequency in North Nigeria and North India.

Table 1.4 Ulcer frequency in some different parts of the world.

Continent	Type of ulcer	Ulcer frequency
Africa	Almost all duodenal. Stenosis and obstruction relatively frequent. Almost all men	Common on W. Coast, Nile-Congo watershed, N. Tanzania, N. Ethiopia. Rare in north Savannah of W. Coast, S. Ethiopia, N. Nigeria, most of Zaire and Zambia
India	Almost all duodenal. Stenosis and obstruction relatively frequent. Almost all men	Common in south and in Assam; rarer in north.
Europe	Duodenal and gastric both generally common (DU two to four times as frequent as GU)	No recognized areas of rarity, but some regional variations, e.g. DU two to three times as frequent in Scotland as in S. England
N. America	Duodenal ulcer fairly common. Gastric ulcer probably less frequent than in Europe	Probably fairly even
Australia	Mainly duodenal ulcer, but relatively high frequency of gastric ulcer in younger women	Gastric ulcer may be especially common in New South Wales and Queensland

Variable frequencies are also detectable within European countries; thus, the chances of ulcer perforation occurring are distinctly greater in northern than in southern parts of the United Kingdom (Table 1.5). Differences are detectable for duodenal but not for gastric ulcer, which, taken together with the fact that perforation is a mandatory cause of admission, argues that differences are likely to be due to the action of a specific environmental factor or factors.

Table 1.5 Regional admission rates of men with perforated gastric and duodenal ulcer per 1000 population in 1967 in the United Kingdom (Brown et al 1976).

	Ulcer	
	Duodenal	Gastric
England: south		
East Anglia	0.07	0.08
South-west	0.14	0.02
Wessex	0.08	0.08
Oxford	0.13	0.04
England: north		
Leeds	0.22	0.07
Manchester	0.23	0.10
Liverpool	0.23	0.03
Newcastle	0.31	0.10
Scotland	0.45	0.07

Temporal changes in ulcer frequency

Attempts at analysis are beset, as are those describing geographical fluctuations in frequency, by difficulties in deciding how varying diagnostic measures, changing health provision and changing medical interests will have affected the figures compiled. It is nevertheless clear that, at least in communities with a Western pattern of civilization, ulcer disease has changed greatly in type and frequency.

Before 1900 gastric ulcer predominated, and tended to be a disease of younger women; however, at the turn of the century duodenal ulcer became more frequent, particularly in men, whilst gastric ulcer became more of a disease of the elderly. It seems likely that duodenal ulcer frequency then reached a peak just over 20 years ago and has since fallen, at least in some areas. Support for these figures can be derived from a series of sources. The only early figures are those for deaths, and Table 1.6 compares the pattern of deaths by age observed by William Brinton in London in the 1860s with the pattern seen in the Registrar General's figures for the United Kingdom in three periods 6 years apart. The age and sex distribution vary by amounts which are too great to be ascribed to technical errors associated with the type of data and the methods of collection.

Table 1.6 Proportion of men and women dying with gastric ulcers (Langman 1979).

	Perforated ulcer		Ulcer deaths	
	1867	1912	1918	1924
Aged <35 years:				
Men	18	182	167	151
Women	96	338	214	109
M : F ratio	0.2 : 1	0.5 : 1	0.8 : 1	1.4 : 1
Aged 35 years or more:				
Men	42	691	900	1219
Women	43	635	713	620
M : F ratio	1.0 : 1	1.1 : 1	1.3 : 1	2.0 : 1

Evidence suggesting a decline in ulcer frequency is uneven. In England, Wales, Scotland and the United States, overall admission rates have fallen (Elashoff & Grossman 1980, Coggon et al 1981), as have certified episodes of disability in the United Kingdom and patient episodes of duodenal ulcer in US Armed Services personnel (Mendeloff 1974, Vogt & Johnson 1980). By contrast, no clear changes in ulcer frequency have been detected in Denmark (Bonnevie 1980), and in the United States there is no evidence that complication rates have fallen or that episodes of ulcer symptoms as perceived by individuals questioned during health surveys have changed notably in frequency (Kurata et al 1982).

Presentation of data as overall rates may be misleading. Figure 1.2 shows that in England and Wales the chances of admission with perforated ulcer have fallen markedly in men, but with no discernible pattern in women. However, examination of age-specific patterns suggests a pronounced drop in the frequency of ulcer complications in younger men and women, but lesser declines or even an increase in frequency in older people (Table 1.7). Comparable data from elsewhere are lacking.

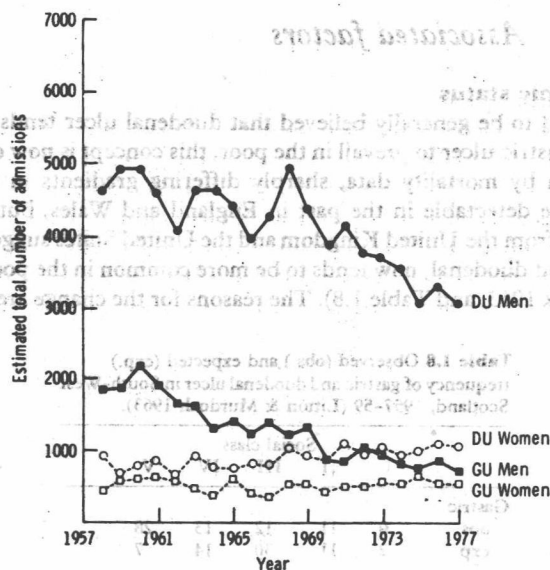


Fig. 1.2 Estimated total number of admissions for ulcer perforation in England and Wales (From Coggon et al 1981, reproduced by permission of the Lancet).

Understanding of the basis for these patterns is poor. It has been argued that the changing age distribution of peptic ulceration could be explained by a cohort effect as a population group made susceptible to the disease by environmental influences in early life has aged (Susser & Stein 1962). Such an explanation seems a poor one because it fails to account for the varying patterns in men and women, and also for what seem to have been rapid changes within age groups. It seems more likely that it is the current rather than the earlier play of external factors which is affecting liability to ulcer now.

Knowledge of temporal trends outside European and North American countries is fragmentary. There is a belief that ulcer disease becomes more prevalent in tropical areas as Western cultural patterns are introduced, but firm evidence to show that there are real changes is lacking. The widespread reports of duodenal ulcer disease in tropical Africa suggests that causal factors may be active within unchanged rural communities.

Table 1.7 Percentage change in admission rates for perforated ulcer in England and Wales according to age, and comparing 1958-62 to 1973-77 (Coggon et al 1981).

	Gastric ulcer				Duodenal ulcer			
	25-34	35-44	65-74	75+	25-34	35-44	65-75	75+
1958-62								
1973-77								
Men	-86	-76	-53	-31	-48	-41	-25	+1
Women	-62	-20	-11	+12	-70	-10	+46	+60

Associated factors

Socio-economic status

Though it used to be generally believed that duodenal ulcer tends to affect the affluent and gastric ulcer to prevail in the poor, this concept is now out-dated. At least as shown by mortality data, sharply differing gradients in ulcer disease frequency were detectable in the past in England and Wales, but more recent figures drawn from the United Kingdom and the United States suggest that ulcer, both gastric and duodenal, now tends to be more common in the poor than in the rich (Guralnick 1963, and Table 1.8). The reasons for the change are unclear; it is

Table 1.8 Observed (obs.) and expected (exp.) frequency of gastric and duodenal ulcer in South-West Scotland, 1957-59 (Litton & Murdoch 1963).

	Social class				
	I	II	III	IV	V
Gastric					
obs.	0	11	12	13	28
exp.	2	11	30	14	7
Duodenal					
obs.	13	41	125	136	158
exp.	14	80	218	108	52

natural to ask if the patterns are spurious, perhaps being contrived by anomalies of classification or presentation, but no plausible basis exists for such a suggestion. As Table 1.9 also shows, a simple association of social level with smoking habits is unlikely to be the explanation.

Table 1.9 Educational attainment, smoking habits and percentage ulcer frequency* in Oakland, California (Friedman et al 1974).

	Highest level attained		
	Elementary school	High school	College
Smokers	15.1	13.3	10.7
Non-smokers	7.7	6.2	6.1

*Mainly duodenal.

Diet

The obvious factor to examine in seeking an environmental cause of ulcer is diet. Knowledge is fragmentary, basically because it has proved well-nigh impossible to conduct reliable retrospective case control studies in examining dietary habits. Similarly, to acquire data prospectively would demand very large financial resources for questioning a large number of people, many of whom would never develop ulcer, and in those who did the disease might not become apparent for a long time.

In India and Africa it has been suggested that diets containing a high fibrous residue may be protective, but if this is so it is unclear whether such properties are

related to the physical characteristics of the diet or to other features, since dietary fibre is heterogeneous. Support for these suggestions rests largely on broad geographical comparisons between the diets thought to be ordinarily taken in areas where ulcer is believed to be more or less frequent (Tovey 1975, Tovey & Tunstall 1975).

Knowledge of possible important features of Western diets is scanty. Some prospective data were obtained by determining the later illness patterns in Harvard and Pennsylvania students who were questioned during the 1930s about (amongst other things) their habitual beverage consumption and smoking habits. Ulcer proved to be a more common disease in individuals who had been habitual consumers of coffee and cola-type soft drinks, whilst milk seemed to be protective (Table 1.10) and no association was noted with tea or alcohol intake (Paffenbarger et al 1974).

Table 1.10 Age and interval adjusted incidence rates per 1000 for Harvard and Pennsylvania former students in relation to beverage consumption (Paffenbarger et al 1974).

Beverage	Consumption	Ulcer incidence
Coffee	Two or more cups	31.7
	Nil	17.7
Soft drinks	Yes	22.0
	No	14.9
Milk	Four or more glasses	18.6
	Nil	30.3

Other factors

Smokers are more likely to develop and to die from peptic ulcers than non-smokers. As Table 1.9 shows, such effects are unlikely to be due to simple associations of social class with smoking habits. Further supportive evidence derives from the studies of Harvard and Pennsylvania students, those who were smokers being more likely to develop ulcer later (Paffenbarger et al 1974). The basis for the association is uncertain; it is not necessarily causal.

The effects of alcohol consumption are uncertain, but mildly to moderately increased levels of intake do not seem to influence later liability to ulcer.

Associated diseases

A wide variety of other diseases have been claimed to be associated with liability to peptic ulcer. Interpretation is difficult; hindrances include the likelihood that once one disease has been found another is more likely to be detected during surveillance of the first disease, and the possibility that both diseases are more common within a specific social group (Donaldson 1975, Langman & Cooke 1976). When all factors are taken into account it seems likely