softer food for some time. In every case individual care must be given and each food treated as an experiment. It is clear that the intelligent co-operation of the patient is of the utmost help, and he should be taught to observe with care the foods which cause him any inconvenience. At the end of two years from the cessation of symptoms treatment by medicines may cease and a greater freedom in diet be permitted.

Treatment along these lines gives satisfactory results in the great majority of cases. It is sometimes objected that the time of treatment is long. This is true, but, except for a period of from one to three months at the beginning, the patient is going about freely and is enjoying a liberal diet.

SURGERY.

It may be asked whether surgery is no longer to play any part in the treatment of peptic ulceration. I do not think that we have yet arrived at so desirable a position. Apart from such acute emergencies as perforation, in which almost the whole chance of survival depends on speedy operation, such conditions as pyloric stenosis are only amenable to surgical aid (one must be careful, however, to be sure that there is pyloric stenosis, for many cases that appear to be such clear up admirably under medical treatment). Again, where there are adhesions causing pain and discomfort it may be necessary to operate; but, for uncomplicated ulcer, is operation necessary? I think the indications for operation will in future be social rather than clinico-pathological. An uneducated or unintelligent patient will neglect to follow the careful regime that is necessary for the success of medical treatment. A patient in poor circumstances will find himself unable to provide himself with what is required. In these cases I think surgery offers a better prospect. It is necessary, however, to say that if surgery is to get its best results operation must be followed by care nearly as meticulous as that required for purely medical treatment. It is not my object to put medicine and surgery in competition, but rather to try to place before you a statement of what a patient may nowadays expect from medical treatment.

A STATISTICAL REVIEW OF GASTRIC AND DUODENAL ULCER.

BY

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THE purpose of this paper is to give the results of a statistical inquiry into cases of gastric and duodenal ulcers treated in Professor Walter K. Hunter's wards in the Royal Infirmary, Glasgow. The records of patients admitted to hospital in the decade 1913-22 have been examined and their after-histories followed up. This was done in 1927, so that the follow-up comprises histories of five to fifteen years' duration. The total number of cases considered is 214-96 male and 118 female. In a survey of this kind the difficulty which arises is one of diagnosis, the undoubted correctness of which is almost impossible to establish. The surgeon and pathologist alone can give us absolute confirmation. The physician deals with the clinical aspect, supplemented by x-ray examination and chemical analysis of the stomach contents after a test meal.

The cases taken in this review are those which have been considered clinically, radiologically, and chemically to be cases of chronic ulceration. The period of survey did not allow of fractional analysis being considered, as the older Ewald test meal method was then in use.

I have, on the whole, not attempted to differentiate duodenal and gastric ulcers, for I am of opinion that while this is possible in extreme cases, it is almost, if not absolutely, impossible in others. This view of the difficulty of differentiation is upheld when one studies the widely divergent statistics of the incidence of duodenal and gastric

ulcers as compiled by different clinicians and pathologists. Even the surgeon at times finds difficulty in deciding whether an ulcer is duodenal or gastric. His landmark is the pyloric vein, and, like all veins, this is not infrequently aberrant.

HOSPITAL INCIDENCE.

The term "hospital incidence" has been used because in arriving at a percentage we have to bear in mind that we are dealing with patients from a very selected portion of the population, who are more or less considered to be seriously ill and are admitted to hospital wards. The incidence from such a source is necessarily high. In the following table of in-patients and out-patients this is made clear, although we must still remember that the incidence, as shown both by in-patients and out-patients, is that of a selected proportion of the population—namely, the working and poorer classes.

Table I gives the incidence with regard to patients admitted to the wards and that of patients attending my own out-patient department at the Royal Infirmary, Glasgow, during a period of five years—1919-24. The out-patients are included for comparison only, and none of these cases comes within the scope of this review. In all percentages estimated in this paper the figure is taken to the nearest whole number in order to simplify comparison.

TABLE I.

Sex.	Total Patients.	Gastro-duodenal Illnesses.		Duodenal Ulcers.		Gastric Ulc. rs.		Gastro-duodenal Cases other than Ulcer.	
		No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
IN-PATIENTS :									
Male... ..	2,507	235	9	65	3	31	1	139	5
Female	2,374	330	14	56	2	62	3	212	9
OUT-PATIENTS :									
Male... ..	3,220	312	10	33	1	16	0.5	263	8
Female	5,789	625	11	24	0.4	98	2	503	9

If we analyse the above table it is seen that there is very little percentage difference in ward and out-patient department cases showing gastro-duodenal illnesses, but there is a marked difference in the percentage of duodenal and gastric ulcers in both sexes. In taking a rough estimate of a five years' period (1919-24) in an upper middle-class general practice I find that the clinical incidence of duodenal and gastric ulcer falls below 1 per cent. in both classes and in both sexes. It seems, therefore, that if we judge by hospital ward records alone our estimate of the incidence is much too high. If hospital necropsy records are examined the same high incidence prevails, because the necropsies are undertaken where there is a preceding high incidence of serious illness. The relative frequency of duodenal to gastric ulcers as found at necropsy has been fully worked out by Stewart¹ on 602 necropsies, where he gives the percentages as duodenal 6.8, gastric 5.15, and also by Hart,² whose figures are duodenal 4.6, gastric 7.13. I think, clinically, we must accept figures which are much lower if we are to arrive at an estimate of the incidence in the general population.

SOME ETIOLOGICAL FACTORS.

I do not intend going minutely into the etiology of duodenal and gastric ulceration, but will give some of the data which have been obtained from the survey of the 214 hospital ward cases.

Age.—It is obviously difficult to assess this etiological factor with any degree of accuracy. The age of the patient when admitted to hospital must not be taken, because there is generally a comparatively long history to be considered. Even in carefully recorded clinical histories it is impossible to say that we have elicited the very first symptoms of onset, and, even if we have, the ulcer may

have been there without symptoms. For statistical purposes I have taken the age at the onset of symptoms.

TABLE II.—Age at Onset of Symptoms.

Decade.	Males.		Females.		Total.
	None		None		None
0-10					
10-20					
20-30					
30-40					
40-50					
50-60					
60-70					
Over 70					

These figures agree more or less with those of other observers—for example, Fenwick,³ C. F. Martin,⁴ and Willigk and Miquel.⁵

Occupation.—I can find no statistical evidence to support the general view that cooks, domestic servants, and glass and porcelain workers show a proclivity to chronic ulcer. The occupations in this series of cases were extremely varied, the incidence being highest amongst miners, but this is explained by the fact that the patients in the Glasgow Royal Infirmary are largely drawn from a mining area.

Alcohol.—In 28 male and 6 female cases there was a history of alcoholism (16 per cent.), but such a percentage is no higher than obtains in other diseases. Other observers have found much higher percentages, particularly Tourette,⁶ who puts the figure at 55.5 per cent. Alcoholism is certainly a factor in preventing the healing of an ulcer once formed, but whether it is more than a predisposing cause in its production is doubtful.

Trauma.—It may be accepted that internal injuries to the stomach mucosa predispose to the formation of an ulcer, and in such a category I include injuries inflicted by chemical poisons and irritating articles of diet, but the statistical information given here more concerns external trauma. In this series there was a history of definite epigastric injury in 10 males (10.4 per cent.) and 9 females (7.6 per cent.), and the onset of symptoms developed immediately after the injury. Bolton⁷ considers the condition rare, but a percentage of 7-10 can hardly be considered rare. It can be argued certainly that the ulcer was there previously, but clinically we must accept clinical facts. The view that trauma has a place in etiology is upheld by Fenwick.⁸

Heredity.—Unlike most other writers I am inclined to believe that heredity plays a part in the production of ulcer, but suggest that it is hereditary habits rather than hereditary tendencies which determine the ulcer. There were 8 male patients (8.4 per cent.) and 15 female patients (12.7 per cent.) who gave a history of ulcer in one or both parents, and in all these cases one or more brothers or sisters were similarly affected.

Diet.—That certain types of diet may cause or predispose to the production of a chronic ulcer is indisputable, but more important than the type of diet is, I think, the regularity with which meals are taken. One generally finds that patients with a chronic ulcer give histories of irregularity of meals, which as a rule are hurriedly taken under bad conditions and in uncongenial surroundings: 75 male patients (78 per cent.) gave histories of hurried meals at irregular hours, and 35 of them (36 per cent.) had to carry meals to their work; 70 female patients (59 per cent.) gave similar histories, and 30 of them (25 per cent.) had to partake of carried meals.

Teeth.—The condition of the teeth influences many diseases, but in the production of chronic ulcer decayed teeth are a potent factor, and statistical evidence upholds this view. Whether it is the septic condition of the mouth or the consequent lack of mastication it is difficult, or impossible, to state. The condition of the teeth in this series was as shown in Table III.

TABLE III.

Condition.	Male.		Female.	
	Number.	Percentage.	Number.	Percentage.
Bad	73	76	92	78
Fair	3	3	6	5
Good	23	21	23	17

Syphilis.—Many French authors hold that practically all ulcers are syphilitic, but, in this country at any rate, this statement cannot be accepted. In this present series a positive Wassermann reaction was obtained in 8 males (8.4 per cent.) and 2 females (1.7 per cent.). That syphilis undermines the health and, like other lowering diseases, renders the patient more vulnerable to illnesses of all kinds can hardly be gainsaid, but it cannot be considered a cause of chronic ulcer, and even a positive Wassermann reaction does not necessarily mean that the ulcer is syphilitic. That syphilis of the stomach does exist is undoubted, as McNee⁹ has shown pathologically, and as I¹⁰ have recorded clinically.

Infections.—There is no evidence that any one infectious or septic disease more than another causes chronic ulcer. In this series nearly all these diseases were present in one patient or another, the greatest percentage (7.8 per cent.) recording a serious influenza. One noteworthy point is that most of the patients (74 per cent.) had suffered from a severe infectious or septic disease a short time before the onset of gastric or duodenal symptoms. I refer to such diseases as small-pox, enteric fever, typhus, influenza, malaria, appendicitis, parotitis, and periostitis. From this it is quite a plausible inference that the local infection of the gastric or duodenal mucosa was the result of one of these diseases.

Other Diseases.—Many other diseases are recorded in the histories—as, for example, nephritis, bronchitis, and asthma—but they are, I am sure, of little or no etiological significance. The consideration of anaemia has been left out purposely, because it is impossible to decide whether the anaemia is cause or effect. The same is true of constipation. There is no doubt, however, that anaemia and constipation influence the course of the disease.

SOME OBSERVATIONS ON SYMPTOMATOLOGY.

This is not intended to be an exhaustive communication regarding the symptoms of gastric and duodenal ulceration, but merely the percentage incidence of the more cardinal symptoms.

Pain.—Of all the symptoms of chronic ulcer of the stomach and duodenum this is the most important. The degree of pain matters little, and the description of it still less. Mild pain creating little general disturbance is as common as agonizing pain which renders the patient unfit. The sensation of pain is variously described as stabbing, gnawing, stinging, aching, sharp, burning, tearing, cramp-like, dull, heavy, grinding, screwing. The all-important point with regard to pain is its periodicity, and this was noted in 93 per cent. of the total male cases, and in 92 per cent. of the total female cases. Sometimes complaint of constant pain is made, and it is in such cases that a careful scrutiny of the whole clinical history must be made to elicit whether or not constant pain was preceded by periodic pain. Equal care must be taken in investigating pain in the back. In such cases the pain has altered in character by reason of adhesions to surrounding structures at the site of the ulcer. These facts are elaborated by Moynihan,¹¹ who describes the sequence of pain in gastric ulcer as food, relief, pain, relief, and in duodenal ulcer as food, relief, pain. This is probably not true in every case, because the duodenal type is simulated by ulcers of the lesser curvature and sometimes of the pyloric antrum. Rosenthal¹² holds that hunger pain is present in about 50 per cent. of lesser curvature ulcers.

Vomiting.—Next to pain this is, according to percentage incidence, the most important symptom in gastric ulcer, but not of so great importance in duodenal ulcer. Here also the history has to be carefully examined, and to be of diagnostic value the vomiting must bear relationship to the pain, if present, or to the taking of food. The typical history is that vomiting takes place at the crisis of pain, which is thereby relieved. Vomiting was complained of in 81 per cent. of male cases and in 85 per cent. of female cases diagnosed as gastric ulcer. This is only slightly less than Broster¹³ records—namely, 88 per cent. In duodenal ulcer a very different state of affairs obtains, and vomiting was present in only 16 per cent. of male cases and 29 per cent. of female cases. Broster¹³ does not give the incidence in duodenal ulcer, but states the incidence collectively with non-ulcer cases as 50 per cent., and remarks that Walton's

observations record only 8 per cent. of duodenal ulcer cases which show vomiting.

Haemorrhage.—The vomitus may contain blood admixed with the gastric contents, either in small quantities or as frank haemorrhage. In this series blood in the vomitus was found in 35 per cent. of male cases and 66 per cent. of female cases, and was confined to gastric ulceration only. This is higher than the observations of Crohn,¹⁴ who states that roughly one-third of the patients vomit blood. The percentage of cases showing haematemesis varies greatly in the records of different observers, and I think this is due to a differing interpretation of the word. If we accept haematemesis as meaning the vomiting of blood, then the percentage given above is what is required, but if we interpret haematemesis as the presence of frank bleeding from the stomach with vomiting, then the figures have to be revised to 29 per cent. of male cases and 52 per cent. of female cases. As already stated, this symptom was present in gastric ulceration only. This is somewhat higher than the figure recorded by Broster¹³—namely, 30 per cent. A point worthy of note is that in the male cases haematemesis occurred irrespective of age, while in the female group there was a marked proclivity to it at or about the menopause.

Melaena.—Melaena is not a common symptom of gastric ulcer, as it only occurred in 10 per cent. of male and 13 per cent. of female cases. In duodenal ulcer the percentages were found to be 55 in males and 57 in females. This is higher than Broster's¹³ figures, which work out at a percentage of 9.8 in gastric ulcer and 21.2 in duodenal ulcer. These figures would be somewhat higher if cases of doubtful melaena were included. Rehfus¹⁵ considers that the number of haemorrhages from duodenal ulcers is comparatively small, and in his opinion Moynihan's¹⁶ percentage of 70.6 is very much too high. The diversity of views as to what constitutes melaena may be responsible for the widely differing percentages recorded.

Periodicity.—The periodicity of pain with regard to meals has already been mentioned, but equally important is the periodicity of attacks of gastric and duodenal disturbance. This is common to almost all the histories and need not be given in percentages. Short attacks of ill health separated by long periods of well-being gradually give place to long spells of ill health and shorter periods of well-being, until the patient becomes more or less always ill.

Many other important symptoms and signs come into the diagnosis of gastric and duodenal ulceration, but it is of little importance to classify them statistically, so they have been purposely excluded from this review, which is primarily a statistical one.

AFTER-HISTORY OF ALL CASES.

Considerable time has been spent in getting in touch with the patients who were treated in the wards, but by writing, personal visitation to their homes, and communications with their doctors, I have succeeded in following up all the female cases and 90 of the 96 male cases. In many of the tables which follow the word "cure" is used. I am fully aware of the criticism which may be levelled at this choice of a word, so I will define my meaning. "Cure" means the disappearance of gastric or duodenal symptoms, and the return of the patient to a state of well-being, maintained in this series over a period of five to fifteen years. If one takes the hospital ward records immediately after treatment a very erroneous conclusion is arrived at.

I even realize that a period of five to fifteen years is inadequate in some cases to record a cure, as recurrences not infrequently take place after intervals of well-being extending over such a period. As long as the patient lives one must realize the possibility of recurrence. In compiling statistics of cure the shorter the period after treatment the better the results will appear.

The following table gives the immediate results of treatment and the state of health of the patients when they left hospital, and includes both gastric and duodenal ulceration.

TABLE IV.

State of Health.	Males.		Females.	
	Number.	Percentage.	Number.	Percentage.
Cured	64	67	89	76
Improved	21	22	17	14
Failures	3	3	3	2.5
Irregular dismissals ...	6	6	3	2.5
Deaths	2	2	6	5

From this table it is seen that the majority of patients left hospital cured or improved. The average period of treatment extended to forty-three days. These results correspond more or less with the figures given by Leube¹⁷ in a series of 424 cases. In later statistics¹⁸ of 627 cases he shows a higher percentage of cures—namely, 90 per cent.

If the foregoing table is more critically dealt with in respect of the duration of symptoms prior to the patients coming under medical treatment, we get a better idea of cure in relation to chronicity of symptoms.

It is clear from the figures given in Table V that the immediate result of medical treatment is extremely good, especially if the symptoms have not been present for more than one year (Group I). It is, however, into Group II that most of this series fall, and there is a distinctly smaller percentage of "cured" cases. In Group III the total number of cases is small, but it has to be noted that the percentage of cases "cured" has fallen to a very low level indeed. It is to be noted that the "improved" percentage rises as the "cured" percentage falls, except in the case of the males in Group III. I attribute this to the fact that more male patients seek operation than female patients, and consequently in the column of "failures" in Group III there is a high percentage of male "failures." This is due to the larger number of male cases going to the surgeon, and I have considered them as "failures" because, strictly speaking, a case which is operated on is a medical failure. I have considered irregular dismissals and have not eliminated them when calculating percentages because I think a more accurate figure is thus arrived at. One of the most striking observations is the "deaths" column, which shows that the shorter the history the greater the percentage of deaths. This is explained by the fact that profound haematemesis is liable to occur in the more acute cases and so cause a higher death rate, but I am also of opinion that cases which show active haemorrhage have a distinct tendency to heal quickly, and this to some extent explains the high percentage of "cured" cases in Group I.

TABLE V.

Duration of Symptoms.	Cured.				Improved.				Failures.				Irregular Dismissals.				Deaths.			
	Number.		Percent-age.		Number.		Percent-age.		Number.		Percent-age.		Number.		Percent-age.		Number.		Percent-age.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
I. Less than one year: 30 male, 43 female	25	36	83	84	1	2	3	5	0	0	0	0	2	0	7	0	2	5	7	11
II. One to ten years: 58 male, 63 female	37	50	64	79	18	10	31	16	1	1	2	2	2	1	3	2	0	1	0	2
III. Over ten years: 8 male, 12 female	2	3	25	25	2	5	25	42	2	2	25	17	2	2	25	17	0	0	0	0

Nielsen¹⁹ has made observations on the result of treatment in relation to duration of symptoms, and compiles them as follows.

TABLE VI.

Duration of Symptoms.	Cured.	Improved.	Unimproved or Operated upon.
I. Less than one year...	93	7	—
II. One to ten years ...	63	17	20
III. Over ten years ...	40	25	35

Although he has not differentiated the sexes, or included deaths, the figures in the main agree with this series.

It is of interest to review at this stage the condition of patients at the end of a 5-15 year period, and for that purpose I have compiled the results in much the same manner as in Table IV. All cases which have been treated surgically after discharge from hospital are included in "failures," and some of the deaths have followed surgical intervention. The percentages are calculated on the original number of cases.

TABLE VII.

State of Health.	Males.		Females.	
	Number.	Percentage.	Number.	Percentage.
Cured ...	28	29	47	40
Improved ...	14	15	24	20
Failures ...	30	31	29	25
Lost trace of ...	6	6	0	0
Deaths ...	18	19	18	15

If Tables IV and VII are compared it will be observed that the immediate results are much more encouraging than the late results, and that many of the "cured" and "improved" patients in the former table find themselves among the "failures" in the latter. This conclusion has been arrived at by other observers. Russell²⁰ reports on a series of cases two to three years after treatment, and records 27.7 per cent. cured and 14.9 per cent. improved. In France Delmasure²¹ finds the percentage even lower—namely, 14 per cent. well, 23 per cent. improved, 29 per cent. recurrences, 25 per cent. operated upon. Forman,²² in a gastric ulcer series, five to thirteen years after, records 22 per cent. cured, 20 per cent. improved.

I have not compiled any table to compare with Table V because it is evident that the greatest number of patients who remain cured come from Group I—that is, where symptoms have been present for less than one year.

Although this paper is primarily intended to show the after-results of medical treatment, it is interesting to dissociate cases treated surgically from those treated medically. In this series the number of cases treated by the surgeon is much too small to allow of any definite conclusion being drawn. It has also to be remembered that the cases which have gone to the surgeon are medical failures.

TABLE VIII.

Sex.	Lost trace of.		Treated Surgically.		Treated Medically.	
	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.
Males...	6	6	23	24	67	70
Females ...	—	—	9	8	109	92

The following table indicates the after-results of surgical and medical cases, and the percentages are based on

23 male and 9 female surgical cases, and 67 male and 109 female medical cases respectively.

TABLE IX.

State of Health.	Surgical.				Medical.			
	Male.		Female.		Male.		Female.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Cured ...	10	44	4	45	28	42	47	43
Improved ...	2	9	1	11	14	21	24	22
Failures ...	4	17	2	22	14	21	22	20
Deaths ...	7	30	2	22	11	16	16	15

These figures show very little percentage difference except that in the medical group there are more cases improved and fewer deaths. The majority of surgeons show a much better percentage of cures, but they deal with series of cases not confined to medical failures, and in most instances a more immediate survey of post-operative results. Paterson²³ shows excellent post-operative results over a 1-10 year period, but in the lifetime of a gastric patient a decade is a short space of time.

Condition of the Patients with regard to Work.

I have here calculated the percentage on the original number of patients treated surgically and medically.

TABLE X.

	Surgical.				Medical.			
	Males.		Females.		Males.		Females.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Unable to return to any work	4	17	2	22	14	21	21	19
Returned to work but gave up or changed to lighter occupation	3	13	1	11	11	16	13	12
Returned to original occupation	9	39	4	44	31	46	59	54

The capability of returning to work in the case of women was in many cases estimated by their ability to return to their ordinary household duties, such as washing, scrubbing, etc. Where they found it necessary to get outside help for rough work they were considered to have changed to a lighter occupation, and when they could not do light household dusting, washing dishes, etc., they were considered as unfit for any work.

It will be seen that the percentage of cases able to return to their original occupation is more or less comparable with the percentage of patients remaining "cured," and the percentage of patients unable to return to any work is very similar to the percentage of patients whose symptoms are progressive.

Readmission to Hospital.

Many patients gave a history of having had to seek further medical advice for their gastric condition, but the following percentages were readmitted to hospital (any hospital) for further medical treatment. No patient was readmitted to hospital for further surgical treatment, but cases previously treated surgically were readmitted for medical treatment.

TABLE XI.

	Surgical.				Medical.			
	Male.		Female.		Male.		Female.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Readmitted to any hospital	2	9	3	33	14	21	26	24

From the above table it will be seen that if we take the readmissions of both sexes the percentage of surgical cases readmitted is about equal to that of the medical cases.

The two male patients who had been surgically treated were readmitted for medical treatment on account of the recurrence of symptoms one and four years respectively after operation. One female patient who had been treated surgically was readmitted three times for recurrence of symptoms which developed one and a half years after operation. The remaining two female patients who had been surgically treated were readmitted owing to haematemesis two and five years afterwards respectively. Both of these patients were readmitted on several occasions. Of the 14 male patients who had been treated medically, 9 were readmitted for recurrence of symptoms one to five years afterwards, and 5 for haematemesis two to twelve years afterwards. Of the 26 female patients who had been treated medically, 16 were readmitted for recurrence of symptoms one to four years afterwards, and 10 were readmitted for haematemesis one and a half to ten years afterwards. Almost all the cases were readmitted on more than one occasion. All patients who were readmitted for treatment gave previous histories of many years' standing.

Deaths.

In this series there were 36 deaths, distributed as shown in the following table. The percentage is calculated on the total number of cases treated.

TABLE XII.

Cause of Death.	Surgical.		Medical.		Percentage.
	Male.	Female.	Male.	Female.	
Haematemesis	—	—	5	7	5.6
Post-operative collapse	4	2	—	—	2.8
Perforation	3	—	—	3	2.8
Carcinoma	—	—	1	4	2.3
Cardiac failure	—	—	3	—	1.4
Pulmonary tuberculosis	—	—	2	—	0.9
Cerebral haemorrhage ...	—	—	—	1	0.5
Accident	—	—	—	1	0.5

The percentage of deaths from haematemesis above recorded is high when compared with that obtained by other observers. Nielsen¹⁹ reports one death in 182 ulcer cases observed for two and a half to nineteen years, and Hurst²⁴ places the mortality rate at 2.5 per cent. in a series of 600 cases from Guy's Hospital.

It will be noticed that post-operative collapse was responsible for death in 2.8 per cent. of the total number of cases treated. If the percentage is calculated on the number of cases treated surgically the mortality is 19 per cent. Gastro-jejunostomy was the operation performed in all cases in this series, and for such operative procedure Pannett²⁵ assesses the mortality at 4.5 per cent. The high percentage recorded above may be due to the fact that the cases treated surgically were medical failures.

Perforation was responsible for 2.8 per cent. of deaths amongst the total number treated, and was equally distributed between surgical and medical cases. In the surgical cases it is impossible to state whether the perforation was at the site of the original ulcer or was due to gastro-jejunal ulceration, as no further surgical treatment was carried out.

The percentage of deaths from carcinoma following on chronic ulcer is discussed by Paterson,²³ and coincides with the figure of 2.3 per cent. above recorded. In this series the deaths all occur in the medical group, and the estimate may therefore be too high owing to inaccurate diagnosis.

The remaining causes of death are unimportant, as they may be incidental to any chronic illness.

TREATMENT.

The treatment of gastro-duodenal ulceration is not intended to form part of this paper, but it may be stated that a more or less intensive alkali treatment with appropriate dietary was practised in these cases, and the remote results are not by any means so encouraging as the immediate results, so that I am not so optimistic about cure as MacLean²⁶ in his recent publication. It will be interesting to see his results in a five to fifteen years' survey.

CONCLUSIONS.

1. The incidence of gastro-duodenal ulceration as compiled from hospital ward records is much too high an estimate for the general population.
2. The age at which gastro-duodenal ulceration commences is difficult to determine with accuracy.
3. Etiological factors are influenced to a great degree by local conditions.
4. Alcohol, trauma, and heredity are not unimportant factors in the production of gastro-duodenal ulceration.
5. The "carried" meal is responsible for the onset of ulceration in many cases.
6. Infection from bad teeth, and infectious and septic diseases are important factors.
7. Syphilis may cause gastric disease, but not necessarily chronic ulceration.
8. Due regard should be given to the early history of pain.
9. A better understanding should be arrived at with regard to what constitutes haematemesis and melaena, as opposed to the vomiting of blood as coffee-grounds and the presence of blood in the faeces.
10. Haematemesis is a common symptom at or about the menopause.
11. Immediate results are much more encouraging than late results.
12. The cure and mortality rates are markedly influenced by the length of time symptoms have been present.
13. Surgical treatment in medical failures adds to the "cured" list, but shows a heavy mortality rate.
14. Capability of returning to work bears a close relationship to the physical state as expressed in gastric well-being.
15. The number of deaths from haematemesis is higher than is usually recorded.
16. The number of deaths from carcinoma following chronic ulceration is about the figure which is generally accepted in Great Britain, but much lower than that accepted in America.
17. Our present methods of treatment are too much centred round healing of the ulcer, and too little attention is paid to investigating the real cause of ulceration.

I desire to thank Professor Walter K. Hunter for allowing me the privilege of making use of his ward records for the purpose of investigating this series of cases.

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