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INTERIM REPORT ON DYSPEPSIA IN THE ARMY

BY

REGINALD T. PAYNE, M.S., M.D., F.R.C.S.

Surgeon, Emergency Medical Service, Sector VI

AND

CHARLES NEWMAN, M.D., F.R.C.P.

Subdean, British Postgraduate Medical School

(From the Departments of Medicine and Surgery, British Postgraduate Medical School, Hammersmith)

Early in the war it was noticed that indigestion appeared to present the biggest medical problem among the sick invalided back to the United Kingdom from the British Expeditionary Force in France. The Royal College of Physicians therefore appointed us to carry out an investigation under the auspices of the Leverhulme Trust during the three months February to April, 1940. The volume of material will take some time to analyse, but the importance of the problem has become obvious to so many in the meantime that it seems better to publish a brief interim report at once, similar to those presented to the Royal College of Physicians and to the Army.

During the period between the dispatch of the B.E.F. and April 29, 1940, 12.5% of all cases evacuated to the United Kingdom had a primary diagnosis of gastric or duodenal disease. If the emergency evacuation of the base hospitals (when even minor illnesses were sent home) is excluded the figure is 14.4%. This represents only a portion of the total dyspeptic cases in the base hospitals in France, but, even so, the figure is much higher than, for instance, that of the cardiac cases, including effort syndrome, which have received so much attention.

The method adopted was to take a full and detailed history of the whole of the patient's life from birth to the time he was seen by us, correlating his work, habits, diet, and environmental conditions with his medical history, especially his digestion. To this were added in each case full details of the dyspeptic syndrome, observations on teeth, build, weight, and height, and other physical details; the family history; details of his personal habits with regard to alcohol, tobacco, and exercise; observations on the effect of the war upon the economic condition of his family or dependants; and, finally, such conclusions as to his intelligence and psychological make-up as it was possible to draw from one interview.

Clinical Material

Of 287 cases investigated, 201 were from France and 86 from England. We visited six Emergency Medical Service hospitals to which convoys had been sent from France. In each hospital we saw every case in which a primary diagnosis suggested a gastric or duodenal lesion, together with a few which had been found, after admission, to be suffering from such diseases. We had a complete list of suspected gastric or duodenal cases, in every instance through the kindness of Colonel G. B. Edwards, who kept us supplied, from the Medical Disembarkation and Distribution Headquarters, with nominal rolls of all convoys on which the diagnosis of each case was entered. In this way we saw a representative and unselected sample

of the dyspeptic cases being invalided home from France. Subsequently we investigated the 86 cases of local sick in two large military hospitals in this country.

The majority of cases seen were N.C.O.s and men, but there was a small group of officers. Even with very strict criteria it was possible to make an exact diagnosis in most instances. In some cases the patients had already been under treatment for so long that radiography was done too late to be likely to reveal an ulcer crater. We felt that in some instances there was too great a tendency to expect a demonstrable ulcer crater in the duodenal cases. The small groups of probable ulcers shown in Tables I, II, and III represent cases in which, although it was impossible to prove the presence of an ulcer, there was every clinical reason for supposing that this was the actual pathological lesion. There was a small group of difficult cases, including the psychological ones, in which only investigation by every known means would have enabled an exact diagnosis to be made. In Table I is given a summary of all the cases, both from France and from England.

TABLE I.—*Dyspepsia in Army: 287 Cases from France and England*

Proved ulcers (226):					
Gastric	42	Gastritis and duodenitis	7		
Duodenal	164	Carcinoma	1		
Gastric and duodenal	7	Volvulus of stomach	1		
Anastomotic	4	Indefinite dyspepsia	4		
Anastomotic and duodenal ..	1	Gastro-enteritis	5		
Site undetermined	8	Neurotic and functional	11		
		Misdiagnosis (non-gastro-duodenal)	11		
Probable ulcers (21):					
Gastric	2				
Duodenal	19				

Cases from France

A summary of the cases from France is given in Table II. It was particularly in this group that there was in some instances a considerable delay between the beginning of treatment and the radiological examination.

TABLE II.—*Dyspepsia in Army: 201 Cases from France*

Proved ulcers (167):					
Gastric	26	Gastritis and duodenitis	5		
Duodenal	124	Carcinoma	0		
Gastric and duodenal	5	Volvulus of stomach	1		
Anastomotic	4	Indefinite dyspepsia	3		
Anastomotic and duodenal ..	1	Gastro-enteritis	0		
Site undetermined	7	Neurotic and functional	7		
		Misdiagnosis (non-gastro-duodenal)	5		
Probable ulcers (13):					
Gastric	2				
Duodenal	11				

Cases from England

After completing the investigation of the cases sent home from France it was suspected that this clinical material, although representing the more serious disorders,

did not show the whole problem of dyspepsia as it appeared to the medical officers in France. There were reasons for believing that the gross organic lesions were very accurately selected and sent home, but that there were a certain number of cases, including the minor dyspepsias, which were not represented in our series. We therefore spent the rest of the period of investigation in visiting two large military hospitals which admitted local sick from the Army in England. The summary of the results in the cases from England is set out in Table III.

TABLE III.—*Dyspepsia in Army: 86 Cases from England*

Proved ulcers (59):		Gastritis and duodenitis ..	2
Gastric	16	Carcinoma	1
Duodenal	40	Volvulus of stomach ..	0
Gastric and duodenal ..	2	Indefinite dyspepsia ..	1
Anastomotic	0	Gastro-enteritis	5
Anastomotic and duodenal	0	Neurotic and functional ..	4
Site undetermined	1	Misdiagnosis (non-gastro-duodenal)	6
Probable ulcers (8):			
Gastric	0		
Duodenal	8		

Comparison of Cases from France and from England

It will be seen that the diseases in the French and English groups proved to be very similar, though there was a slightly higher proportion of minor and functional disorders in the English group. It is probable, therefore, that the material in the base hospitals in France was not very different from the material seen by us. The material from France was selected, though unselected by ourselves, whereas the English material was selected by ourselves with the help of the hospital medical officers. A proposed visit to France to complete the survey of gastro-duodenal disease was rendered impossible by the military situation.

Results of Investigation

We have data relating to over seventy points on each case. The sorting of these data and the statistical investigation will take some time. From a preliminary survey of the material the following conclusions have been drawn, and have been embodied in reports to the Royal College of Physicians and to the Army authorities.

1. Of the cases 89% are of gross organic disease. Among those investigated there was little evidence of minor dyspepsia.

2. Almost all the organic lesions are ulcers, the majority being duodenal.

3. Of the ulcers 92% were present before the war, and only 8% appeared to have originated in the Army since the war started—that is to say, the vast majority did not originate in the Army, but only relapsed.

4. The age of onset of ulceration is earlier than was expected; in about 40% of the cases it was below the age of 25.

5. The following was the unit distribution in the ulcer cases: A.M.P.C., 56; infantry regiments, 48; R.A., 33; R.E., 29; R.A.S.C., 20; R.A.O.C., 14; R.A.M.C., 8; R.C.O.S., 6; R.A.F., 4; Tanks, 3; others, 5.

6. Of the ulcer cases, 51 (22.5%) originated in regular soldiers before the war.

7. A large proportion of ulcer cases were in reservists or supplementary reservists. The medical examination, although it did not exclude any of these men from service in the Army, appeared to have been thorough in 87.8% of our cases examined by civilian recruiting boards, but in only 26.3% of our cases examined by military medical officers, who were too rushed to be able to examine the men thoroughly.

8. In only a few cases were inquiries made about previous dyspepsia, but where these were made some men were loth to report it, and others were in a state of

remission at the time. A proportion of the cases could probably have been suspected on the grounds of obvious pallor, wasting, and abdominal scars.

Considering the small number of ulcers which originated during the war, this investigation is not likely to throw any light on the origin of peptic ulceration. But we investigated many points which have been thought to be contributory, and some of the findings are listed below.

Conclusion

1. Practically all the ulcer patients had lived for years on a relatively strict diet, and the breakdown appeared to be due to the change to Army food, which is too heavy for those prone to ulcers. In our opinion this was the most important factor leading to breakdown.

2. Many men replaced their rations by food bought outside and so avoided a breakdown until they got to France, where this practice became difficult or impossible.

3. One of the effects of the heavy diet was to cause a much higher incidence of vomiting in the duodenal ulcer cases than is met with in civilian life, and in many instances this persistent vomiting was the determining factor in the men's going sick.

4. There was much criticism that the cooking in the Army was bad. Men who served in the last war say that the actual food is better in this one, but there was a constantly reiterated complaint of good food spoilt. This criticism applies especially to the early months of the war, and it is right to point out that the criticism comes from men with abnormal digestions. Most of the men were from newly formed units, and inspecting medical officers, including the hygiene specialists, who were constantly investigating the cooking, found that the standard was generally high in the majority of units considering the field conditions prevailing. In the early stages of the war experienced cooks could not be provided for all new formations, but the matter was taken in hand from the start, new schools of cookery established, and experts appointed to advise and instruct units.

5. Fatty food, which was easily dealt with, and even appreciated, by healthy men, appeared to these dyspeptics to be "greasy" and was considered by them to be a serious drawback.

6. During the winter of 1939-40 green vegetables were scarce in some places, and the cooking in some units was not good. The dyspeptic patients, by voluntary restriction of their diets, still further reduced their vitamin C intake and were certainly deficient in this factor. Apart from the possible bearing of this on peptic ulceration there is abundant evidence that vitamin C is essential for adequate resistance to infections and for the prevention of complications.

7. Among the ulcer patients 38% had teeth which were inadequate as a chewing mechanism. This factor is important when taken in conjunction with the heavy food these men were eating in the Army.

8. Only 15% of the ulcer cases showed dental sepsis.

9. Psychological factors do not seem to have played an important part in the breakdown of ulcer patients in the Army.

10. There are a certain number of genuine neurotic disorders. Malingering, the exaggeration of symptoms for evasive purposes, and pension-seeking are at present rare. These may become more common in the future, as it is getting known that Army Medical Boards are discharging men with peptic ulcers.

11. The incidence of peptic ulceration in the Army is likely to persist and even to increase, because conscription

is beginning to involve the age groups in which ulcers are common.

12. Our experience proved that the sorting of serious cases in France for invaliding to this country was very efficient.

Recommendations

On the basis of this investigation we have submitted to the Army authorities certain recommendations on recruiting, treatment, and disposal.

This work was carried out with aid from the Leverhulme Fund of the Royal College of Physicians and at the suggestion of Colonel H. Letheby Tidy. We should like to thank the Military and Emergency Medical Service authorities, the commanding officers, medical superintendents, and staffs of all the hospitals we visited for their great assistance and unfailing courtesy.

A NOTE ON THE TRANSFUSION OF RECONSTITUTED DRIED HUMAN SERUM

BY

H. A. BROWN, M.B., M.R.C.P.

AND

P. L. MOLLISON, M.B., M.R.C.P.

(From the N.W. and S.W. Emergency Blood Supply Depots)

The usefulness of plasma and serum in the treatment of shock and even acute haemorrhage is now generally recognized, but there is some uncertainty whether serum has any disadvantages as compared with plasma.

Among those who have referred to the supposed toxicity of serum are Strumia, Wagner, and Monaghan (1940) and Scudder (1940). Levinson, Neuwelt, and Necheles (1940), although they preferred serum to plasma because of clotting difficulties with the latter, found reactions in 25% of cases. These reactions consisted of a moderate transient drop in blood pressure: spontaneous recovery always occurred. This effect was not repeated with subsequent infusions. Some "pools" cause reactions in one case and not in another. Buttle, Kekwick, and Schweitzer (1940) concluded from animal experiments "that some toxic substance absent from plasma was present in serum." They found with serum "that immediate reactions are more numerous than with plasma, and the return of the blood pressure is not sustained." Black (1940), too, has stated that results with serum are less favourable than with plasma. This conclusion, however, was reached from a study of only three cases.

A different point of view is that of Magladery, Solandt, and Best (1940), who state dogmatically that "there is no need to differentiate between serum and plasma. In theory and in our experience they are therapeutically identical." In an earlier paper Best and Solandt (1940) had reported successful results with three-times-normal serum in the treatment of shock in animals. They do, however, hint that reactions may happen, by saying that "if any untoward reaction occurred [in a control dog] serum from another pool was used." Bond and Wright (1938) reported good results in the treatment of haemorrhage and traumatic shock with lyophile serum. In these experiments (on animals) no reactions were noted. Wright, Bond, and Hughes (1938) reported results of treating raised intracranial pressure in man with concentrated serum. No untoward results arose.

Perhaps a recent statement by Levinson (1940) may contain the truth on this question and explain past discrepancies with regard to results with serum. Speaking in a discussion he said, "I protest emphatically that

properly prepared serum is not toxic. . . . Wide experience from all serum centres indicates that properly prepared serum is safe. I have no doubt that if plasma was improperly prepared it would not be innocuous."

Some Points in Technique

The object of this note is to point out that the dried serum emanating from the Medical Research Council's serum drying unit at Cambridge is not only safe but efficacious. The Cambridge drying plant has already been fully described by Greaves and Adair, and it suffices to say that the process consists essentially in drying from the frozen state *in vacuo*. Before drying the serum is passed through a Seitz filter.

Ninety-one transfusions of this serum have been given. Most of the serum used was from donors of Group AB. Some serum of Group A and some pooled serum were also given. In most cases the serum was administered in four-times-normal concentration by reconstituting the

TABLE I

Case No.	Clinical Condition	Serum		Time for Inj. (mins.)	Change in B.P.	Change in Pulse	Change in Hb %	Result
		Conc.	Dose c.c.m.					
1	P.P.H.	×4	45	14	75/45-100/80	152-116	65-54	
2	P.P.H. (850 c.c.m. blood last)	"	50	5	145/85-155/85	84-88	40-40	
3	Head injury	"	"	5	84/60-98/62	120-104		
4	Post-op. shock	"	"	10	36/2-76/50	160-128		+
5	Acute haemorrhage	"	"	3	74/2-104/40	146-124	70-66	+
6	Intra-op. shock	"	"	3/4	60/30-70/30	160-130		+
7	Haematemesis, coronary thrombosis	(1) "	"	9	74/52-82/48	124-118		+
		(2) "	"	9	80/52-86/50	116-120		+
8	Post-op. shock, usual B.P. 214/120	(1) "	"	4	100/68-124/76	84-86	80-80	
		(2) "	40	2½	112/78-134/80	84-92	80-80	
9	Wound shock operation	(1) "	50	4	80/2-98/70	126-114		+
		(2) "	"	7	106/84-124/90	126-112	72-68	+
10	Post-op. shock	(1) "	"	5	104/84-114/82	128-124	Hmt	+
		(2) "	"	4	116/86-128/90	128-120	40-38	+
11	Acute haemorrhage, operation	(1) "	40	4	66/34-102/56	92-108		+
		(2) "	50	4	100/50-112/56	88-96		
12	P.P.H.	"	100	10	90/60-100/75	110-96	74-70	
13	Post-op. shock	"	"	10	85/55-125/75	144-100	90-78	+
14	Traumatic shock	"	"	30	40/20-60/30	116-108	64-66	
15	Head injury, shock	"	"	8	68/44-76/42	92-84	82-70	
16	P.P.H.	"	100	20	90/50-125/75	112-100	65-50	+
17	P.P.H.	"	"	15	70/40-90/50	160-152		+
18	Severe menorrhagia	"	"	15	108/55-140/55	116-108	40-34	+
19	Traumatic shock	"	"	8	75/30-105/55	74-108	90-84	+
20	Gross internal injuries	"	150	5	Unrecordable	?		
21	Post-op. shock	"	200	30	0-50/25	120-108	72-56	+
22	Traumatic shock	"	200	25	120/65-125/75	120-90		+
23	P.P.H.	"	250	35	100/85-165/125	140-104	80-58	+
24	Wound shock: operation	(1) "	50	5	56/30-72/38	100-100	90	
		(2) ×2	100	3	72/48-80/48	100-112		
		(3) "	100	7	64/38-72/38	136-130	66	
25	"	(1) ×4	50	1½	40/20-40/30	88-94	86-84	
		(2) ×2	100	3	60/?-80/?	94-120	84-82	+
		(3) "	100	2	78/?-88/68	124-120	82-79	+
26	Burn shock	(1) ×4	50	4½	Return of pulse	112-100		+
		(2) ×2	100	6				+
		(3) "	100	7				+
27	Wound shock: operation	"	400	25	102/60-112/60	88-92		
28	Burn shock	N	300		0-120/100			+
29	"	(1) N	300		100/75-130/75	96-94		+
		(2) "	500		40/75-130/75	96-84		+
30	"	"	300		95/70-130/70	88-92		+
31	Post-op. shock	"	510	55	80/45-110/55	116-96		+
32	Burn shock	"	1,200		94/70-110/75	96-96		+

+ = Clinical improvement.

dried powder to only a quarter of the volume of the original serum. This concentration was chosen partly because of the convenience of handling a smaller bulk of fluid (so that in some cases a syringe could be used for the administration), and partly because of suggested theoretical advantages of a fluid with a high protein concentration. Thus, in shock it has been suggested that the injection of a fluid of high osmotic pressure may help to reverse the flow of fluid from the capillaries