TABLE VI (continued).

XII. Proflavine. Concentration: As added, 1:1,000; in mixture 1:3,000.

Time of Action.	Bacterial Count.*
0	819,200
5 minutes	201,340
15 "	208,000
45 "	122,500
90 "	53,220
3 hours	29,670
6 "	2,995
24 "	2

XIII. Proflavine.† Concentration: As added, 1:1,000; in mixture, 1:3,000.

5 minutes	778,000
15 "	376,800
45 "	186,400
90 "	164,300
3 hours	28,290
24 "	0

XIV. Proflavine. Concentration: As added, 1:3,333; in mixture, 1:10,000.

0	819,200
5 minutes	753,700
15 "	652,000
45 "	591,400
90 "	394,200
3 hours	448,000
6 "	48,380
24 "	282

XV. Proflavine.† Concentration: As added, 1:3,333; in mixture, 1:10,000.

5 minutes	933,600
15 "	835,600
45 "	750,900
90 "	208,700
3 hours	204,500
24 "	331

* 1 drop = $\frac{1}{10}$ c.cm.

† The blood and antiseptic were mixed, incubated twenty-four hours and then the suspension of staphylococci added. In these experiments, therefore, the precipitate occasioned by the dye was produced before inoculation. Comparison of X and XI indicates the probability that many organisms are carried down by the relatively slow formation of a flocculent precipitate. The rapid falling off of the cocci found in the fluid was probably due to this cause, and not to the germicidal action of the dye.

The germicidal action of the dyes in defibrinated blood is in most cases distinctly superior to that shown in the blood serum-muscle extract medium. Malachite green is seen to be distinctly inferior to brilliant green, acriflavine, or proflavine. Neither brilliant green nor malachite green when present in 1:3,000 concentration failed to prevent multiplication of the organisms. Acriflavine and proflavine present in 1:3,000 concentration failed to sterilize in six hours, but usually did so in twenty-four hours, while when present in 1:10,000 concentration the mixture was not quite sterile in twenty-four hours.

DISCUSSION AND CONCLUSIONS.

The main facts disclosed by the preceding series of experiments are as follows: (a) The rapid and complete disinfection brought about by solutions (one volume) of members of the chlorine group of antiseptics of the strength commonly used in the treatment of wounds, when added to heavily infected blood serum-muscle extract mixture (two volumes). (b) Under similar circumstances, solutions of acriflavine, proflavine, brilliant green, and malachite green failed to sterilize in six hours mixtures which the chlorine antiseptics sterilized completely in five minutes or less.

Browning concludes from his experiments that acriflavine is 800 times more powerful against staphylococci in serum than chloramine-T. A comparison of our Experiment VI, Table II, and Experiment IV, Table IV, shows that a 1:600 solution of chloramine-T can sterilize in six hours an infected blood serum-muscle extract which was not sterilized in six hours by 1:1,000 acriflavine. The difference in results is striking and deserves comment. One source of error in Browning's experiments has already been indicated, namely, the addition of the chlorine antiseptics to the blood serum before adding the organisms. We believe another source of discrepancy is due to the fact that Browning and his associates used extraordinarily few bacteria in their tests, namely, 0.1 c.cm. of a 1:20,000 dilution in saline of a twenty-four-hour peptone water culture. A loopful of this mixture plated on agar yielded "twenty or more colonies." It appears to us that the use of such small numbers of organisms is unsuited for the determination of the germicidal value of substances, for, in the first place, such a low concentration of organisms in the secretion of a wound of long standing borders on "surgical

sterility"; hence the experimental conditions are not comparable with those in acute septic wounds. Secondly, if 5 per cent. of the organisms in Browning's tests survived they would have a good chance of being entirely overlooked, and sterility might thus be inferred when viable organisms were actually present. Lastly, the bactericidal properties of the serum medium becomes a significant factor when few organisms are used in the presence of native germicidal substances.

Another cause of the marked difference between our own and Browning's results is the fact that he allowed the antiseptics to act for twenty-four to forty-eight hours before testing, whereas in our own experiments subcultures were taken at frequent intervals, which brought under observation the progress of disinfection. The longer period naturally fosters a favourable judgement of the slowly acting dyes, while shorter periods are adverse to them.

We conclude, therefore, that the statements of Browning and his colleagues as to the relative germicidal efficiency of chloramine-T and other antiseptics of the chlorine group compared with brilliant green, malachite green, and acriflavine, are incorrect, and that their mode of testing the germicidal action of the substances studied by them leads to results which are radically misleading.

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¹ Browning, Gulbransen, Kennaway and Thornton, BRITISH MEDICAL JOURNAL, January 20th, 1917. ² Journal of Hygiene, 8, p. 92, 1908; 10, p. 237, 1910. ³ BRITISH MEDICAL JOURNAL, January 27th, 1917; February 10th, 1917.

DETECTION AND TREATMENT WITH EMETINE BISMUTH IODIDE OF AMOEBIC DYSENTERY CARRIERS AMONG CASES OF IRRITABLE HEART.*

BY

MARGARET W. JEPPE,

BATHURST STUDENT, NEWNHAM COLLEGE, CAMBRIDGE,

AND

J. C. MEAKINS, MAJOR C.A.M.C.

(Report to the Medical Research Committee.)

AMOEBIC dysentery as a direct or aggravating cause of irritable heart was found amongst soldiers returned from the Mediterranean Force.¹ It was therefore considered important, in dealing with this condition, to determine the number of cases of carriers, and to attempt to cure them. From October, 1916, to February, 1917, we examined the stools of all cases from the Mediterranean Force admitted to the Hampstead Military Hospital suffering from irritable heart. No selection of the men was made in so far as the presence or absence of a history of dysentery was concerned. In all sixty-five cases have been examined, of which twenty-five had a definite history of dysentery.

Infections.

The microscopic examinations of the stools were made in the usual way, and we aimed at six careful examinations at least of each man before discharging him as uninfected. How far we were able to carry this out the following figures will show:

6 or more examinations	...	...	51 cases
5 examinations only	...	...	1 case.
4 "	"	...	8 cases
3 "	"	...	3 "
2 "	"	...	1 case
1 "	"	...	1 "
			65

The following infections were detected:

<i>Entamoeba histolytica</i>	24 cases	= 36.9 %	total cases.
<i>Entamoeba coli</i>	32 "	= 49.2 %	"
<i>Lamblia intestinalis</i>	20 "	= 30.8 %	"
<i>Chilomastix mesnili</i>	3 "	= 4.6 %	"
<i>Trichomonas hominis</i>	1 case.		

Entamoeba nana (Wenyon and O'Connor) was found as the active free amoeba in one case, and its cysts were found in others. Their occurrence was not always recorded, however, so that no indication of the frequency of this infection can be given. The so-called "iodine cysts"

* This work was done at the Hampstead Military Hospital. The treatments were carried out by one of us (J. C. M.), and the examinations made by the other (M. W. J.).

† This was done at the suggestion of Mr. Clifford Dobell.

of *Wenyon* were found in six cases,³ and the eggs of *Trichuris trichiura* (= *Trichocephalus dispar*) in two.

The percentages are, of course, of little absolute significance in so small a number of cases. It was to be expected that they would be higher than some of the corresponding figures obtained elsewhere by a smaller number of examinations per case.³ That the larger number of examinations accounts, in part at least, for the exceptionally high proportion of infected cases may be seen in the following tables, where the examinations are shown at which infections were detected.

TABLE I.—Infections with *E. histolytica*, *E. coli*, and *Lamblia*.

Examination at which detected.	<i>E. histolytica</i> .		<i>E. coli</i> .		<i>Lamblia</i> .	
	No. of cases.	Per-centage of cases.	No. of cases.	Per-centage of cases.	No. of cases.	Per-centage of cases.
1st ...	11	16.9	14	21.5	9	13.8
2nd ...	3	4.5	5	7.8	1	1.6
3rd ...	4	6.3	5	7.8	3	4.7
4th ...	1	1.7	1	1.7	1	1.7
5th ...	2	3.8	2	3.8	1	1.9
6th ...	2	3.9	1	2.0	2	3.9
Totals ...	23	—	28	—	17	—
8th ...	—	—	1	—	—	—
9th ...	—	—	1	—	—	—
10th ...	1	—	—	—	—	—
14th ...	—	—	1	—	1	—
28th ...	—	—	1	—	—	—
32nd ...	—	—	—	—	1	—
47th ...	—	—	—	—	1	—
Totals ...	24	—	32	—	20	—

The percentages for each examination are worked out on the number of cases which had at least that number of examinations. Table II shows the total number of infections found after each of the first six examinations among the fifty-one cases which had at least six examinations each.

TABLE II.—Infections Found after the Several Examinations.

No. of Examinations.	<i>E. histolytica</i> .		<i>E. coli</i> .		<i>Lamblia</i> .	
	No. of cases.	Percentage total cases.	No. of cases.	Percentage total cases.	No. of cases.	Percentage total cases.
1	9	17.6	12	23.5	8	15.7
2	11	21.6	14	27.4	8	15.7
3	15	29.4	18	35.3	10	19.6
4	16	30.4	19	37.3	11	21.6
5	18	35.3	21	41.2	12	23.5
6	20	39.2	22	43.1	14	27.4

It is clear that infections were detected on every examination, including the sixth and last. That even this does not represent the actual total number of infections is demonstrated by the few figures given for still later examinations in the lower half of Table I, which gives the results of twenty-three extra examinations made on twelve negative cases, and of the examinations made during and after treatment on some of the positive cases. These are given merely as further examples of infections not detected in a small number of examinations.

Carriers of *E. histolytica*.

It is of interest to note that among this series of twenty-four carriers in no fewer than twelve no *E. histolytica* cysts measuring over 10μ in diameter were ever observed. These small cysts, measuring $6-10\mu$ in diameter, have been described by several authors,⁴ but rather as an abnormal form of rare occurrence. Such infections may be exceedingly difficult to detect, even when specially looked for, and it has often been necessary to fix and stain films before

a certain diagnosis could be made. The cysts are very easily overlooked when present in the stool in small numbers, particularly if many other small bodies, such as *Chilomastix* cysts, some of the yeasts, pus cells, etc., be present at the same time. For example, Case No. 13 was not found positive until the tenth examination (Table I), although very careful search was made for *E. histolytica*, as large quantities of pus with blood and mucus were usually present in the stool, and the bacteriological report was negative. The cysts were extremely rare and measured about 7μ in diameter. They disappeared after treatment (vide infra), and the clinical condition of the patient improved. The twelve infections in which only small cysts were found were detected as under:

Examinations.	No. of Cases Detected.
1st ... Nos. 23, 24	2
2nd ... Nos. 9, 19, 22	3
3rd ... No. 10	1
4th ... No. 7	1
5th ... Nos. 8, 21	2
6th ... Nos. 18, 20	2
10th ... No. 13	1
12	

These figures, on comparison with Table I, show that in this series it happened that no infection of *E. histolytica*, where typical large cysts were found, was detected after the third examination. This is probably due to chance, and not to the fact that all such infections can be detected in three examinations only. There is naturally a decrease in the number of infections detected at each succeeding examination, and little evidence, if any, that *E. histolytica* differs in this respect from *E. coli* and *Lamblia*, both of which were sometimes discovered at the sixth and later examinations.²

In one other case (No. 11) the diameter of the *E. histolytica* cysts varied from 7 to 15μ , all intermediate sizes being observed.⁴

Treatment.

Emetine bismuth iodide when given in a powder generally causes nausea and vomiting. In order to overcome these conditions three preparations of the drug were tried. These were experimental preparations made by three different firms, and were submitted to us for trial. They were all in tablet or pill form, and were either mixed or coated with some material supposedly insoluble in the stomach. In all twenty-three courses of treatment were given with these preparations. In no case was nausea or vomiting produced, but in eight cases (35 per cent.) severe diarrhoea and abdominal cramps occurred. Some looseness of the bowels was observed in all cases where the drug appeared to have any action. The results obtained with these preparations are shown below. In these tables "relapsed" signifies that *E. histolytica* was again detected in the stools, and "unaffected" that no negative period was observed during or after treatment.

TABLE III.—Treatment with Stearin-coated Tablets.

Case No.	Treatment.		Dose.	Consecutive Negative Examinations after Treatment.	Result.
	Began.	Ended.			
2	1916. Oct. 27	1916. Nov. 8	36 gr.	No. Days. 24 in 34	Discharged as cured.
1	Oct. 25	Nov. 6	"	26 " 35	" " "
3	Oct. 26	Nov. 7	"	34 " 40	" " "
7	Nov. 6	Nov. 17	"	31 " 46	" " "
6	Nov. 6	Nov. 17	"	23 " 46	" " "
4	Nov. 3	Nov. 15	"	4 " 5	Relapsed Nov. 22, 1916.
5	Nov. 7	Nov. 13	"	12 " 23	Relapsed Dec. 16, 1916.
17	Oct. 31	Nov. 12	"	0	Unaffected.
	Nov. 24	Dec. 8	"	0	"
	Dec. 19	Dec. 20	"	0	"
8	Nov. 18	Nov. 29	"	25 " 33	Discharged as cured.
10	Dec. 2	Dec. 15	39 gr.	22 " 26	" " "
9	Nov. 24	Dec. 5	36 gr.	2 " 2	Relapsed Dec. 8, 1916.
13	Dec. 29	Jan. 9, 1917	"	17 " 21	Discharged as cured.

TABLE IV.—Treatment with Stearin-coated Pills with Resin Ointment Basis.

Case No.	Treatment.		Dose.	Consecutive Negative Examinations after Treatment.	Result.
	Began.	Ended.			
12	1916. Dec. 11	1916. Dec. 22	36 gr.	No. 0	Unaffected.
14	Dec. 18	Dec. 29	"	0	"
15	Dec. 18	Dec. 29	"	0	"
11	Dec. 11	Dec. 22	"	0	"
13	Dec. 13	Dec. 24	"	0	"

TABLE V.—Treatment with Stearin-coated Tablets.

Case No.	Treatment.		Dose.	Consecutive Negative Examinations after Treatment.	Result.
	Began.	Ended.			
12	Dec. 29, 1916	1917. Jan. 6	27 gr.	No. 2 Days in 5	Relapsed Jan. 11, 1917.
14	Dec. 30, 1916	Jan. 6	24 ..		
	Jan. 11, 1917	Jan. 22	36 ..	18 .. 23	Discharged as cured.
15	Dec. 30, 1916	Jan. 6	24 ..		
	Jan. 11, 1917	Jan. 22	36 ..	0	Unaffected.
11	Dec. 29, 1916	Jan. 6	24 ..		
	Jan. 11, 1917	Jan. 22	36 ..	0	"

* Case No. 12 was often negative for a few days while untreated.

Different measures of success were, it will be seen, obtained with these different preparations. With the first preparation there were eight cures out of twelve cases treated, or 66 per cent. With the second there were no cures, while with the third there was only one cured out of four cases treated, or 25 per cent. Of the three preparations, the first was the only one which gave sufficiently good results to justify its use in preference to the drug given in powder (see below). But even the proportion of cures with this preparation is not sufficiently high to warrant its general use.

The objection to the use of emetine bismuth iodide in powder, given in a cachet or capsule, has been the occurrence of nausea and vomiting. We have treated eleven cases with cachets, and these symptoms occurred in all of them. The drug was given with a hot drink at 9 p.m., after the patient was in bed. The time of the vomiting after the drug was taken varied in different individuals, as is shown in Table VI.

TABLE VI.—Occurrence of Nausea and Vomiting.
No. of cases, 11.

Nausea and vomiting occurred during the				
First hour in	...	...	...	0
Second hour in	...	...	...	3
Third hour in	...	...	...	6
Fourth hour in	...	...	...	2

It is evident from this table that the nausea and vomiting occurs most frequently after the stomach is presumably empty. These symptoms fortunately did not persist during the whole course of treatment. The toxic symptoms disappeared after a time as if a tolerance had developed.^{5,6}

TABLE VII.—Duration of Nausea and Vomiting.
No. of cases, 11.

Nausea and vomiting disappeared after the				
First day in	...	...	...	0
Second day in	...	...	...	0
Third day in	...	...	...	1
Fourth day in	...	...	...	2
Fifth day in	...	...	...	3
Sixth day in	...	...	...	4
Seventh day in	...	...	...	0
Eighth day in	...	...	...	0
Ninth day in	...	...	...	1

Eleven cases were treated with emetine bismuth iodide in cachets of 3 gr. each. Ten cases (91 per cent.) were cured after twelve daily doses (Table VIII).

TABLE VIII.—Cachets.

Case No.	Treatment.		Dose.	Consecutive Negative Examinations after Treatment.	Result.
	Began.	Ended.			
9	1916. Dec. 12	Dec. 23, '16	36 gr.	No. Days. 23 in 28	Discharged as cured.
4	Dec. 29	Jan. 9, '17	"	18 .. 24	" .. "
5	Dec. 18	Dec. 29, '16	"	10 .. 24	" .. "
17	1917. Jan. 13	1917. Jan. 24	"	2 .. 4	Relapsed Jan. 28, 1917.
12	Jan. 26	Feb. 7	"	7 .. 24	Discharged as cured.
15	Jan. 26	Feb. 6	"	9 .. 23	" .. "
11	Jan. 26	Feb. 6	"	10 .. 23	" .. "
16	Feb. 3	Feb. 14	"	9 .. 24	" .. "
18	Feb. 19	Mar. 1	"	10 .. 96*	" .. "
19	Mar. 9	Mar. 22	"	5 .. 29	" .. "
20	Mar. 9	Mar. 21	"	5 .. 30	" .. "

* We are indebted to Dr. G. C. Low for facilities for making the last four examinations of this patient, after he had been transferred to another hospital.

The one case which was not cured had previously resisted three courses with the first preparation described above. The results obtained with the drug administered by this method are much more encouraging than those obtained with any of the other preparations.

TABLE IX.—Comparison of Results Obtained with the Various Preparations.

Case No.	First Preparation (Table III).		Second Preparation (Table IV).		Third Preparation (Table V).		Cachets (Table VIII).	
	Cures.	Failures.	Cures.	Failures.	Cures.	Failures.	Cures.	Failures.
1	1	0						
2	1	0						
3	1	0						
4	0	1	—	—	—	—	1	0
5	0	1	—	—	—	—	1	0
6	1	0						
7	1	0						
8	1	0						
9	0	1	—	—	—	—	1	0
10	1	0						
11	—	—	0	1	0	1	1	0
12	—	—	0	1	0	1	1	0
13	1	0	0	1	—	—	—	—
14	—	—	0	1	1	0	—	—
15	—	—	0	1	0	1	1	0
16	—	—	—	—	—	—	1	0
17	0	1*	—	—	—	—	0	1
18	—	—	—	—	—	—	1	0
19	—	—	—	—	—	—	1	0
20	—	—	—	—	—	—	1	0
	8	4	0	5	1	3†	10	1

* Three separate courses.

† See Table V.

All the patients treated were suffering from symptoms of irritable heart. Any possible effects of the removal of the *E. histolytica* infection on the symptoms of this condition were carefully looked for. Of the twenty cases which were cured, eleven (55 per cent.) showed a conspicuous improvement, while nine (45 per cent.) showed little or none. The degree of improvement was determined by their increased ability to perform graduated exercises without untoward symptoms.¹ Cases which, before treatment, showed severe symptoms after performing mild exercises could afterwards accomplish the more

advanced exercises with comparative ease. This confirms the previous conclusion that the removal of a coexisting infection may lead to the alleviation of symptoms of irritable heart.¹

Treatment with Methyl-Psychotrine.

In addition to these treatments with emetine bismuth iodide we tested a new alkaloid, methyl-psychotrine, prepared from ipecacuanha by Dr. F. L. Pyman, and sent to us for trial by Dr. H. H. Dale, F.R.S. Two cases were treated with this drug, the results being shown in the following table:

TABLE X.—Methyl-Psychotrine.

Case No.	Treatment.		Total Amount Given.	Result.
	Began.	Ended.		
11	Nov. 17, 1916	Dec. 6, 1916.	108 gr.	Unaffected.
12	Nov. 26, 1916	Dec. 4, 1916.	54 gr.	"

As will be seen from the table, the drug appears to have had no effect whatever upon the *E. histolytica* infections in spite of the large amounts administered. Case No. 11 had daily doses of the drug increasing from 2 gr. to 9 gr. Case No. 12, daily doses from 3 gr. to 9 gr. In both cases the drug appeared to be quite non-toxic to the patients. Both were subsequently treated with emetine bismuth iodide, and apparently cured of their infections, as shown in Table VIII. Case No. 11 also had a heavy infection of *Lamblia*, which was not affected by the methyl-psychotrine.

Differential Blood Counts.

Mrs. Briscoe, M.D., B.S.Lond., has very kindly given us the results of some differential counts which she made on some of our carriers. These are shown in Table XI. Mrs. Briscoe says: "They all show the high lymphocyte counts (relative and absolute) so frequently found in cases of 'irritable heart,' and they do not show any marked increase either in the eosinophils or large mononuclears. In fact, there is nothing in the counts to distinguish these men from other men suffering from 'irritable heart.'" This is in agreement with Dr. G. C. Low's findings in cases infected with intestinal protozoa.^{7, 8}

TABLE XI.

Case No.	Date of Count.	Infections in addition to <i>E. histolytica</i> .	Differential Count * (per cent. of 400 Cells Counted).						
			Poly-nuclears	Small Lymphocytes	Large Lymphocytes	Eosino-phils.	Large Mono-nuclears	Baso-phils.	
4	Nov. 3, 1916	<i>Lamblia</i>	54.0	12.75	27.5	3.75	1.5	0.5	
5	Nov. 3, 1916	—	51.25	21.75	23.75	2.75	0.25	0.25	
	Jan. 17, 1917	—	48.0	8.5	38.75	1.25	3.25	0.25	
8	Nov. 18, 1916	<i>E. coli</i>	55.0	26.5	14	2.23	1.75	0.5	
	Dec. 20, 1916	—	60.0	18.75	18.75	1.0	1.0	0.5	
9	Dec. 4, 1916	<i>E. coli</i> , <i>Lamblia</i>	43.75	22.0	30.75	0.75	2.75	—	
11	Nov. 17, 1916	<i>Lamblia</i>	48.0	26.25	17.75	4.0	3.0	1.5	
10	Nov. 28, 1916	<i>E. coli</i> , <i>Lamblia</i>	55.75	24.0	16.75	2.0	1.25	0.25	
12	Nov. 24, 1916	<i>E. nana</i>	55.0	10.5	26.75	5.0	1.5	1.25	
13	Dec. 13, 1916	<i>E. coli</i>	53.0	17.5	25.75	2.25	0.75	0.75	
14	Dec. 16, 1916	<i>Lamblia</i>	52.25	14.0	30.25	1.75	1.5	0.25	
15	Dec. 16, 1916	<i>E. coli</i> , Chilo-mastix	53.25	8.5	33.5	1.5	2.25	1.0	
17	Nov. 3, 1916	? <i>E. coli</i>	52.75	20.25	23.75	2.25	0.75	0.25	

* The classification used was that given by Cabot in Osler and McCrae's *System of Medicine*, 1915 (see *Lancet*, June 2nd, 1917).

Acknowledgements.

We take this opportunity of recording our indebtedness to Dr. H. H. Dale of the biochemical department of the Medical Research Committee, and to Mr. Clifford Dobell, for very many helpful suggestions and for the practical interest which they have always taken in our work. Dr. Dale arranged for the supply to us of the various forms of emetine bismuth iodide. The methyl-psychotrine used in the treatments here described was kindly furnished, through Dr. Dale, by Dr. F. L. Pyman, Director of the Wellcome Chemical Research Laboratories; while Mr. Dobell has given invaluable assistance with the protozoological examinations, especially by his confirmation of the occurrence of small cysts of *E. histolytica* in the large proportion of carriers mentioned above. The opportunity is very gladly taken of expressing our sincere gratitude to him for his extremely kind and constant interest.

We are indebted to Lieut.-Colonel J. More-Reid, R.A.M.C., Officer Commanding, Hampstead Military (Mount Vernon) Hospital, for permission to publish this account of cases in his hospital.

CONCLUSIONS.

1. Additional infections with intestinal protozoa may be detected at the sixth and later examinations.
2. Infections of *E. histolytica* in which no cysts measuring over 10 μ in diameter are found in the stools are far from uncommon.
3. The use of emetine bismuth iodide has cured a large proportion (95 per cent.) of our amoebic dysentery carriers.
4. The best method of administration of this drug is in the form of the loose powder in cachets in daily doses of 3 grains. At least 36 grains should be given in all.
5. Symptoms of irritable heart in amoebic dysentery carriers are reduced in a large number of those patients who have been cured of the amoebic infection.
6. Infection with intestinal protozoa has no marked effect on the differential leucocyte count.

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SPONTANEOUS EVACUATION OF A SHRAPNEL BULLET IN THE LUNG BY EXPECTORATION.

BY

R. MURRAY LESLIE, M.A., B.Sc., M.D.,

PHYSICIAN PRINCE OF WALES'S GENERAL HOSPITAL AND ROYAL HOSPITAL FOR DISEASES OF THE CHEST, LONDON; MEDICAL OFFICER, BERMONDSEY MILITARY HOSPITAL.

THE main interest of the following case lies in the fact that the bullet was spontaneously expectorated four and a half months after the occurrence of the gunshot wound.

On April 6th, 1916, Pte. P. D., aged 33, while on military service in Mesopotamia, sustained a gunshot wound from a Turkish shrapnel shell. The bullet entered just above the middle of the right clavicle, and there was no exit wound. He stated that he lay unconscious for hours, and that it was ten hours after being wounded before he was picked up. There was no haemoptysis. He was transferred to the base hospital at Basra, where, except for some stiffness and bruising in the region of the right shoulder, he felt fairly comfortable. There was practically no cough nor expectoration. In ten days he was transferred from Basra to Bombay, where he made excellent progress, and the entrance wound, which for a time discharged fairly freely, gradually healed up.

After fourteen days, when the wound was nearly healed, he was shipped to a hospital in Alexandria, where he remained until June 20th, 1916. Three days after landing he developed left-sided pneumonia with pyrexia, cough, and expectoration, pain in the left side of the chest, but no haemoptysis. During convalescence he had a second attack of pneumonia, from which he recovered. He was then sent home to England, and on July 4th, 1916, was admitted to the Bermondsey Military Hospital under my care.

On admission the scar of the entrance wound was visible just above the middle of the right clavicle. His general condition was fairly good, and there was no pyrexia. There was slight cough, with frothy, muco-purulent expectoration, and some pain over the left chest in front, particularly in the third left interspace, and through to the back. There was also some dyspnoea on exertion. The pain was not continuous, and was sometimes referred to the left shoulder blade. At the base of the left lung there was marked dullness, with loss of vocal fremitus and breath sounds, due no doubt to thickening of the pleura. At the right base there was also some impairment of percussion.