

THE LANCET.

Vol. II.]

LONDON, SATURDAY, APRIL 10, 1841.

[1840-41.]

LECTURES

ON

AMPUTATION,

AND ON THE

Nature, Progress, and Terminations of the Injuries for which it is required.

(Delivered at Sydenham Coll. Med. School.)

By RUTHERFORD ALCOCK, K.C.T., &c.

LECTURE IX.

Influence of dynamic and moral forces chiefly, as shown in the types of fever, and in the character, frequency, and mortality of supervening actions, during the first six weeks of treatment, in a series of five hundred wounded. This number, arising from several successive actions in one week, the last ending in a reverse, the hospitals temporarily crowded, and a period of inactivity and depression succeeding.

THIS series of wounded resulted from different affairs, on successive days, from the 10th to the 16th of March, 1837, both days inclusive: the troops kept the field day and night. During five out of the seven days rain fell almost incessantly, inundating the encampments. On the 15th, a series of formidable positions, after a sanguinary and obstinate struggle (lasting from day-break to night-fall), were carried by the British at the point of the bayonet, while exposed to a heavy fire. On the 16th, these positions were attacked by the enemy with fresh reinforcements and a large numerical superiority. The troops, confident, victorious, and flushed with success on the 15th, were but ill-prepared for the kind of moral shock awaiting them on the 16th, when they were partially borne back by the force of superior numbers: during the day a temporary panic had seized the Spanish, and a portion of the legion troops on the left and right wings simultaneously, and caused their retreat. Notwithstanding this partial reverse the enemy were checked, the principal and central positions maintained throughout the day, and those on the right, for a time abandoned, retaken.

No. 919.

At night-fall they were ordered to retire back to their lines; thus leaving the disputed ground to the enemy. The real object for which the battles had been fought (as one only of a series of combinations with two other armies) had failed, by the non-advance of the others, thus rendering the ground so fiercely disputed valueless. The mere fact of retiring at all had, however, its depressing influence. The general feeling among the officers that the active political enemies of the legion in England would paint the partial reverse of the one day into a great disaster and a complete and disgraceful rout, spread imperceptibly a disheartening impression. These circumstances, I repeat, tended singularly to depress the minds of the officers, and even of the soldiers, who are ever ready to catch the prevailing impressions of those who command them.

Nor must the violent and conflicting passions be forgotten which had been brought into play, passing rapidly from the triumph of victory to the bitterness of retreat.

During the week, also, the troops had been constantly exposed to the most inclement weather.

Thus, though some physical deleterious influences existed, the moral, it may be concluded, greatly predominated. The compulsory inactivity of the army for weeks succeeding must be counted among the unfavourable circumstances.

Compulsory and inevitable, because one of the causes of depression lay in the conviction, that the general commanding could not advance a step to the front against the double range of fortified lines, without bringing down the whole of the Carlist force in the Basque provinces, forming an army of at least double the number under his command; the offensive could only be resumed by new combinations with the Spanish commander-in-chief. With nothing to rouse the troops from the depression consequent upon these events, employed only, during the unfavourable weather which succeeded, in performing duty in the monotonous lines of San Sebastian, it is clear that little existed to favour a healthy reaction, either in the troops on duty or the wounded within the hospital.

This detail—far from being irrelevant—it

F

will be seen, is essential to the due appreciation of the causes of supervening diseases, as relate to physical circumstances on the one hand, and the direction of dynamic and vital forces on the other.

In two papers published in the "Medical Gazette," May, 1838, on the medical statistics of armies, I proved, by reference to the official returns of the Peninsular army, from 1809 to 1812, that the most disastrous of eight periods (into which that army's service might be divided) was the sixth, "*passed undisturbed by an enemy in winter cantonments;*" and if a reverse immediately preceded such a period, it would prove still more disastrous.

Under the circumstances just related, on March 17th, the chief military hospital of San Telmo, permanently fitted up for 600 beds, and which I retained under my own personal direction, was suddenly crowded with 800 cases, 500 of which were recent wounded: every church, convent, and hospital in San Sebastian, was equally occupied by the Spanish wounded, amounting to a still greater number, from the same actions; the second of the legion hospitals, destined chiefly for fevers and strictly medical cases, was filled to overflowing. There were thus 1041 patients in the hospitals of the legion, calculated only to accommodate, with due regard to health, 800; and the chief press of the extra numbers fell upon the Surgical Hospital of San Telmo.

This crowded state I succeeded in remedying within ten days, and the "divisions" of the hospital set apart for the reception of all the more severe wounds; I had never permitted to receive more than their proper number, which was 100 each. On these wards, therefore, any effect from the extra number in other parts of the building, it may be presumed, was not very great or direct.

While treating on this subject in the "notes" already published, I thus described the vicissitudes of temperature and the atmospheric changes of the six weeks.

From March 10th to April 25th, the weather was exceedingly variable: March 10th (the opening of the campaign) was a fine, hot, dry day; the fighting severe, producing near 1000 British and Spanish wounded; but the enemy were completely driven from their positions: 11th, 12th, 13th, incessant and heavy rain, the troops nearly all bivouacked: 14th, rain at intervals; new positions taken up, and the enemy driven further back, with some bloodshed: 15th, half the day rain, the other half fine; none of these days very cold. On this day a sanguinary conflict with the Carlist force in their last entrenched positions, from which they were driven, at the point of the bayonet, foot by foot, with considerable loss on both sides: 16th, fine and hot; the battle renewed; ten fresh battalions of Carlists having reinforced the enemy, and at night-fall the British and Spanish troops retired from their ad-

vanced positions to within their lines. These are the seven days which the troops kept the field; the rest of the six weeks under consideration, fine for a day or two, was generally rainy, often exceedingly cold, some time hail-storms, and for many days in the middle of April, blowing hard gales of wind. During the intervals of fine weather, it was hot in the sun and chilly in the shade.

I have thus stated the principal circumstances, physical and moral, existing of a character to influence the wounded of these actions. Of this series,

17	underwent primary amputation, and only	2	recovered.
4	ditto intermediary; all died.		
3	ditto secondary:	1	"
—		—	
24		3	

Only 1 in 8 saved.

The mortality in the March series of amputations, instead of being about one-third the previous average proportion, is seven-eighths: a disproportion so signal must, we would presume, have had some striking and very obvious cause. It lies not on the surface, however, and requires investigation. The question naturally suggests itself, Was it the same cause acting in all the primary amputations? Did the same cause exist, and pervade alike the primary, intermediary, and secondary amputations? Finally, Can we trace the same supervening actions equally active and fatal in the fractured extremities not amputated? In the severe wounds generally? An inquiry of this nature I think likely to lead to some valuable information, as to the influence of predominating dynamic forces of unfavourable character.

The following heads will keep the true objects of investigation clearly in view.

1. Was the mortality in the mass of patients, medical and surgical, in this hospital, increased during March and April?

2. Was the mortality in fractures of the extremities not amputated increased?

3. What was the apparent influence on the amputations as a class?

4. What were the causes of death in gunshot fractures not amputated? in primary, in intermediary, and in secondary amputations?

Answers to these are essential to a just appreciation of the ultimate results of this series, especially in regard to their bearing upon amputation.

1. *Was the Mortality in the mass of Patients, Medical and Surgical (not including Gunshot Wounds), treated in the Hospital of San Telmo during March and April, beyond the usual average?*

The returns of all cases, medical and surgical (exclusive of gunshot wounds), give the following results. From June to December, 1836, 1000 patients were treated, and 15 died: 1½ per cent. In a second period of six

months, from January to June, 1837, the number treated was 1117, of whom 38 died, or 1 in 29.2: between 3 and 4 per cent. Finally, 1898 were treated in the twelve months specified, of whom 53 died; 1 in 35.8: something under 3 per cent. on the year, or a fractional per centage per month of .242. The average mortality on the second six months being greater than on the first.

In March, 1837, 568 cases of the character defined were treated (many of these were transferred, however, to other hospitals before recovery), and 13 died: giving a mortality per cent. of somewhat more than 2, the deaths being 1 in 43.6; and considering the large number of patients removed, the real loss in proportion would be much larger. In April, 196 were treated, and 4 died; or 2 per cent. In both months there is a large increase of mortality per cent. And the question is thus succinctly and clearly answered.

The deaths during this period were confined, in the Medical Hospital of La Lonja, to a few forms of disease. There died from

Continued fever.....	22
Pneumonia and pleuritis.....	6
Dysentery and diarrhoea.....	24

Diseases of vital action, or diseases of thoracic and gastro-enteric mucous membranes. There, as in the Surgical Hospital, no one form of fever, or disease of any specific character, seemed to prevail. If we except influenza of a very severe character attacking the mucous surfaces of the head and throat, and occasionally involving the gastro-enteric membrane, which certainly prevailed with considerable severity during January, February, and March, but not to a fatal extent in many instances.

I cannot help remarking here (since these numbers call the circumstances so forcibly to my mind) on the incorrectness and illiberality of the impression often sought to be conveyed—whether from ignorance or other motives I will not decide—that surgeons on military service, great as may be their ability in *practical* surgery (with due emphasis on the restricting word), or in the treatment of gunshot wounds, cannot compete with surgeons in civil practice, whose general and scientific medical knowledge must be so superior! Since the advantage of no ordinary opportunities or share of experience could not well be denied, it has been assumed to be that of the treatment of gunshot wounds exclusively. To this injurious depreciation I, in common with others, have, of course, been exposed; and the more so, perhaps, that hitherto I have claimed attention chiefly to facts, derived from the consideration of such complicated injuries as the field produces, and the diseased actions marking their progress. But how do facts bear out the general assumption of the limited and exclusive nature of the experience derived from active military service?

In one hospital in the space of twelve

months, and that the Surgical Hospital, chiefly devoted to gunshot wounds, you have seen that nearly 2000 cases of disease in the greatest variety were received and treated: while in the same period, in another hospital, not two hundred paces distant, and equally under my direction, 3458 *medical cases* were treated: making a total in one year of upwards of 5000 cases, *exclusive* of wounded. On the other hand, in this twelve-month the wounded did not amount to 1500!

To assume the military surgeon's practice to be exclusively confined to injuries or wounds, therefore, is either the result of the most lamentable ignorance, or but a very poor attempt to underrate and depreciate the experience he may have gained. Every ailment, disease, or injury to which any large number of men are liable, of course come under his notice, and require his treatment; and it must be very desperate fighting indeed that in a year makes the wounded predominate over the sick: such fighting as has not been yet placed on record, so far as I know. From these few observations you will know how to appreciate, in future, any remarks tending to reduce a medical officer's practice on military service to the mere details of operative surgery, and the dressing of wounded; and so far from being deterred from military service, you will feel that if it differ from the practice of civil life, it is in accumulating, within a given time, a larger number of cases of every kind of disease under your care; and demanding, in addition to medical skill, the sudden and frequent exercise of the highest qualifications for operative surgery.

To return to the question of mortality in February and March. One-sixth of the cases admitted in February into San Telmo (not wounded), were labouring under the effects of influenza, which had attacked with such severity, as to require a long period for perfect convalescence. The remainder of the large classes admitted into the Surgical Hospital, were made up as follows for that month.

Inflammatory affections of general character.....	30
Ulcers.....	33
Anthrax, boils, abscesses, tumours, and enlarged glands.....	29
Syphilis gonorrhœa et sequelæ... ..	19
Diseases of eyes and lids.....	16
Diseases of liver.....	17
Rheumatism and diseases of skin..	30
Convalescents.....	111

Only 4 of the classes enumerated died, and these occurred in the last, where there was great debility.

The proportions of different classes of disease treated in March did not materially vary from these; and again, 8 out of the 13 deaths occurred in the class of patients transferred from the fever hospitals, under the head "convalescents;" dying, therefore, from

the effects of the fevers under which they had laboured. Of the 5 remaining, 2 died of diseases of the lungs and heart; 1 by the sequelæ of syphilis and debauched habit; 1 icterus, and 1 fever. The same remarks apply to April; the 4 deaths were from previous fever.

I would observe, therefore, in conclusion, that the great increase of mortality demonstrated to have taken place in the cases treated in both hospitals, but in San Telmo especially, *did not arise from any one prevailing type of disease*; but in the latter hospital it fell chiefly upon a class of debilitated patients, transferred during a doubtful convalescence after fever or dysentery, most commonly both combined.

The mortality in March and April, then, was increased in the mass of surgical and medical cases (not wounded) in both hospitals; in La Lonja, or the fever hospital, this mortality fell exclusively on two classes—those labouring under fever, diseases of vital action, and those affected by disease of the mucous membranes of the chest and abdomen. In the surgical hospital of San Telmo the deaths almost as exclusively fell upon the patients transferred from La Lonja, during their protracted convalescence from these diseases.

With these results I pass on to the second ground of inquiry.

2. *Was the Mortality in Fractures of the Extremities, which were treated (without resorting to Amputation), increased?*

A different method must be pursued to determine this question; the number of deaths which occur among wounded decrease in proportion to the time that elapses from the receipt of the injury, the greatest number taking place in the first month.

382 wounded, which I collected into one hospital, eight days after the battle of Ayete, on the 5th May, 1836, and retained under my immediate and daily inspection, compared with the March series of 500, give the following results:—

	Died.	
	May.	June.
14 Gunshot fracture of thigh (1 amputated in May, 2 in June)	1	1
16 Idem of leg and foot (4 amputated in May)	1	0
12 Ditto of arm (3 were amputated)	1	0
13 Ditto of forearm and hand	0	0
12 Gunshot fractures involving joints (2 amputated in May, 1 in June)	4	1
75 Severe wounds, chiefly muscular (4 of lock-jaw)	7	2
<hr/>	<hr/>	<hr/>
142	14	4

Proportionate mortality to cases treated in May, 1 in 10.1; in June, 1 in 29.5; com-

bined, 1 in 7.8, or 12.6 per cent. in first six weeks. Or, if we deduct the amputations, the total of cases treated is only 116; of which 18 died, or between 15 and 16 per cent.

	March 16, 1837.		Died.	
			March.	April.
2 Femur (1 amputated)	1	0		
22 Leg and foot (5 amputated)	2	4		
10 Arm (5 amputated)	1	0		
28 Forearm and hand	1	0		
16 Jointinjuries (10 amputated)	4	0		
214 Severe general wounds	18	1		
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
312			27	5

Proportionate mortality in March, 1 in 11.5; in April, 1 in 52.8; or combined mortality, 1 in 9.7: about 10 per cent. in first six weeks. If we deduct the 21 amputations, the total cases treated are then 291; deaths, 52: 1 in 9, or 11 per cent.

In a series of 10 fractures, brought to the hospital after an affair on the 6th of June, 7 were amputated in the first two months, 3 only were treated to the end, and of these 1 died—say 33 per cent. In a series of 24 fractured limbs and joint cases, brought into hospital after an attack on the lines, October 1st, 6 were amputated in the two first months. Of the remaining 18 there died 6; giving a similar mortality of 33 per cent., while in 31 severe general wounds, little more than 3 per cent. died.

In the May series, in 67 fracture and joint cases brought into hospital, 12 only were amputated, and of the remaining 55 there died in the first six weeks 9, or 1 in 7.0: about 15 per cent. In the March series, we have seen 78 cases entered the hospital unamputated; during the first six weeks 21 were amputated, of the remaining 57 there died in the time mentioned 13, or 1 in 4.3: rather more than 22 per cent. The precise similarity in numbers, treated to the end, in the May series, and the following year, in the March, brings out the greater mortality of the latter strikingly, being 7 per cent more.

The mortality in general severe wounds, on the contrary, is less apparently in the March series, being as 1 in 11.2 to 1 in 8.3; the result of cases treated after the action of Ayete. But it is to be observed that a much larger proportion, in reference to the whole number of wounded, is included under this head in the March series; we may fairly conclude, therefore, that in estimating the differences of character which led to their classification as *severe*, in contradistinction to *slight* wounds, greater latitude was taken than in the classification of such injuries in May.

In joint cases and fractures the larger proportion died within two months in the March series, whereas in those of May they lingered longer: hence it would seem that either the supervening diseases in the former

series were of more grave and active character, or that the system was less able to make any effective resistance to their rapid progress.

I have entered into this analysis, far from unimportant as I believe it to be, in order not only to arrive at the truth, but to convince you that I have succeeded in doing so by legitimate deductions from facts; and how easily mere results in figures, however accurately stated, may be made sources of error, and mislead those who accept them without the closest investigation. In truth, as I stated at the commencement, these lectures have a twofold object; one of these is to elucidate certain principles in reference to the treatment of severe injuries, and the question of amputation at different periods as connected with the results of the operation. Another is to show the importance of statistics as applied to surgery, its sources of fallacy if carelessly brought to bear, and that when properly employed it is neither more nor less than the development of certain fixed results by the most patient calculations and balancing of opposing or contradictory conditions: the data being first sifted, and then subjected to the closest analysis and the highest powers of reasoning and logical deduction.

It is the working of a mathematical problem, with the additional difficulty of obtaining fixed quantities as a foundation. Our second problem is solved: there can be no doubt that within the two first months of treatment the mortality in the March series (as in the mass of patients not wounded) was much increased compared with the May series, which, from parity of numbers, was best adapted for that purpose.

3. Mortality of the Amputations.

The mere statement that seven-eighths of the whole number of amputations in the series died, sufficiently answers any question which may refer to the ratio of increased mortality. On amputations the mortality chiefly fell, and the deaths were beyond all proportion increased. Whatever were the deleterious influences or agents in action, their most fatal effects were developed in the class of amputations.

In reference to mortality at different periods, the great majority 17 being primary, and 4 only intermediary, while the 3 performed still later were already beyond the time of the great mortality. This question cannot be solved satisfactorily.

These preliminary points ascertained, we may now proceed to the last series of facts necessary to establish all the premises required for accurate or useful conclusions.

4. What were the Causes of Death?

1st, In general severe wounds; 2nd, in gunshot fractures not amputated; 3rd, in primary, in intermediary, and in secondary amputations

The causes of death in those who were not wounded, and who died during the same period, we have already seen.

In March, 18, general severe wounds were fatal (by which is defined the cases not included under the heads of fractures or wounds of the head, spine, thorax, or abdomen), and in April, 1; making a total of 19.

In March, 9 fractures under treatment were fatal.

In April, 4

13 Total deaths from fractures.

Although there was an increase of mortality even in February, on the average rate of the whole year, yet the mere fact that 7 deaths only took place in San Telmo in 736 cases, which were under treatment during that month, must be borne in mind, because it proves that a mortality of 1 in 105 is not, taken absolutely, great; and even 2 of these were from wounds involving the brain and bladder, while the remaining 5 were from so many different affections. It also demonstrates that there was no prevailing disease of any severity, and that at the beginning of March the hospital of San Telmo was in a good and sanatory condition for the reception of 500 wounded, who themselves, we may assume, were also, in the majority, free from disease at the time of admission.

The whole of the deaths in this hospital, during March, amounted to 51; 500 wounded, and 183 cases of various diseases, chiefly surgical, having been admitted: the great majority, or from 200 to 300 of the cases remaining in the hospital at the beginning of the month, had in the interim been either discharged well, or removed to other stations. These 51 deaths, therefore, give the proportionate mortality in 500 wounded, and we may calculate about 400 cases of disease = 900—1 in 19.6 during the month; near 5 per cent.

Causes of Death during the Months of March and April, 1839. In 500 Wounded, and 400 Cases of Disease treated during the Month, in the Hospital of San Telmo, in March, and 66 Cases in April, of which 440 were Wounded, and 196 Disease.

MARCH, 51 IN 900=19.6; 5 PER CENT.

Deaths.

20 Penetrating wounds of chest and abdomen. Term of death, from 1 to 9 days—13 within 48 hours; all died by direct action of injury, except 1 from trismus; 1 of these cases was from a series of wounded in the October preceding.

7 Fractures of cranium, with lesion of brain, 6 within 48 hours.

6 Severe general (flesh) wounds.

5 with tetanus, at 5, 7, 10, 11, 15 days.

1 A wound of neck, causing extensive abscesses; no peculiarity of fever nor organic disease.

4 Fractures of extremities.

1 Irritative fever, no post-mortem examination.

3 Trismus, 7—12—12 days; in 1 amputation tried as a remedy, and failed.

1 Amputation of thigh, died same day from shock on system.

38 in 500—proportionate mortality 1 in 13: between 7 and 8 per cent.

Deaths, exclusive of the Wounded.

8 Received from medical hospital as convalescing from dysentery, dying from results of previous disease.

1 Icterus.

1 Ascites, pthisis.

1 Fever, type not defined.

1 Admitted with bubo, cause of death not specified.

1 Heart-disease, hypertrophy of left ventricle.

13 in 400—mortality 1 in 30: between 3 and 4 per cent.

APRIL, 44 IN 636=14.4; 7 PER CENT.

Deaths.

19 Amputations in 34 under treatment, 1.7.

8 Gunshot fractures, 66 under treatment, 8.2.

5 Remittent fever, 2 with suppurative disease of viscera.

1 Liver enlarged.

2 Disease of viscera, indicated by symptoms, but cavities not examined after death.

1 Knee-joint, notes mislaid.

1 Ditto, slight tetanus, fatal impression on nervous system.

1 Femur grazed, destroyed vitality of bone, excessive suppuration of whole limb, and hectic fever.

6 Flesh wounds.

1 Gangrene.

1 Inflammation of membranes of brain.

1 Tetanus.

3 Cause not ascertained.

4 Head cases,

2 Wounds of chest and abdomen, } Died by direct consequences of injuries.

1 Violent contusions of loins, no post-mortem.

40 in 410—mortality 1 in 11; 9 per cent.

4 Medical cases.

3 Dysentery.

1 Cause not specified.

4 in 196=1 in 49; 2 per cent.

Let me for a moment call your attention to the conclusions suggested by these facts.

First, as to the *wounded*. The mortality is increased in April, $1\frac{1}{2}$ per cent.; but if we exclude the amputations, of which nearly all died, the mortality is reduced one-half, and, instead of 9 per cent., it is between 4 and 5 per cent., or 1 in 20.8. Exclusive of this one fatal class, then, the mortality greatly decreased in April; on the other hand, we must remember the large proportion of 27 cases in March, of wounds through the brain, chest, &c., usually proving mortal, within the first 15 days, and only 6 of which appear among the deaths in April. If we fairly allow the one, therefore, to balance the other, the mortality still stands (*in similar cases*) increased in the month during which the amputations were carried off; whereas, in ordinary circumstances, from a mortality of about 8 or 10 per cent., and sometimes more, in the first month, it usually sinks during the second and third months, in round numbers, to between 2 and 3 per cent.

This is a result, therefore, sufficiently remarkable, and the more so, that again it seems reversed when we refer to the cases of disease treated; but, as I have already observed, the number of cases I have taken merely as an approximation of the number actually in the hospital throughout the month, a large proportion of those in the returns having been removed to make room, and not because they were cured. The exact relative mortality to the whole number treated, and who appear on the lists of San Telmo for that month, cannot be very closely defined. The actual number passing through the hospital, you have seen, was 568, of which 13, during treatment *there*, died.

The causes of death during treatment, both in the amputations and in the severer forms of injury occurring in this series, will be shown in the next lecture, together with such conclusions on the influence of unfavourable dynamic causes as may seem to be borne out by the facts, and worthy of further investigation.

OBSERVATIONS

ON THE

STRUCTURE OF THE GUBERNACULUM,

AND ON THE

DESCENT OF THE TESTIS IN THE FÆTUS.

By J. B. CURLING, Esq., Assistant-Surgeon in the London Hospital, Lecturer on Morbid Anatomy, &c.

DISSATISFIED with the description of the structure of the gubernaculum, and the causes of the descent of the testis, commonly given in English works on anatomy and physiology, I have recently made a careful examination of these parts, and conceiving that the results