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LECTURES

ON

AMPUTATION,

AND ON THE

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

(Delivered at Sydenham Coll. Med. School.)

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LECTURE III.

Chief objects to be kept in view.—Different forces, physical and dynamic, influencing the development of disease during treatment of severe injuries, or after amputation.—Explanatory remarks and definitions bearing upon the forms of statistical returns adopted; their scope and object.—Five statistical tables of amputations, and of severe injuries treated without operation; including amputations performed in civil hospitals for disease, and for the usual accidents of civil life, comprising 403 cases.

In the preceding lectures I glanced, in general terms, at the opinions most in vogue respecting amputation and its collateral questions, their irreconcilable contradictions, and especially at the false premises upon which many of the conclusions, however true in themselves, were founded, pointing out the doubts, difficulties, and uncertainties arising from these causes.

I was also led to make some remarks upon the value of statistics in medical science, notwithstanding the dangerous errors to which such a concentrated expression of mere results is exposed. The more so at the present time, from the prevailing tendency of the day to give undue preponderance to physical causes and changes of mechanical structure, almost to the total exclusion of more important causes of disease and death. More important, because more powerful—more subtle in their nature, more difficult to trace; for such are the dynamic influences upon the human frame. These are developed frequently by means of physical laws, never

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against them, but not unfrequently without their aid or obvious interposition.

I stated also that I had two objects in view, although one was secondary to the other. The first of these I propose to accomplish by the analysis of a large body of facts, studied and collected by myself on military service, and two series of cases supplied by Drs. Hayward and Norris from the civil hospitals of Pennsylvania and Massachusetts. By these I hope to demonstrate the fallacy of many dogmas, and to place certain conclusions of greater accuracy on a sound and logical basis, by furnishing correct premises from whence they may be deduced. This effected, we may then hope, by reference to the mass of individual and collective facts, to bring the whole results of the last fifty years' experience into something more like harmony than has hitherto been observed. From this labour I venture to anticipate that a series of laws or principles, applicable alike to military and civil practice, may be established, no longer presenting those contradictions which tend, on each new field for practice and observation, to unsettle opinions on questions of such vital importance.

The second object is one naturally arising out of the means employed to accomplish the first; viz., to point out alike the peculiar sources of error with which statistics and the collection of mere mechanical or physical results, with reference only to the mechanical and obvious causes, abound; and the great value of their evidence properly employed, when the results in detail are referred to their causes, mechanical or physical and dynamic; showing the relative influence of each upon the injuries under treatment, and the results of amputations at different periods.

And before proceeding to the more immediate questions of *amputation*, it was stated to be desirable to obtain a valuable starting point, by determining the nature, frequency, and gravity of the diseased actions which occur during the treatment of such severe injuries as generally give rise to amputation. By determining the same in reference to three periods of amputation, viz., primary, intermediary, and secondary; and comparing these results with those which occur during treatment, we should thus obtain the means

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of deciding how much could justly be attributed to the original injury, and how much to the various amputations.

That as there could be no doubt that there were dangers attached to amputation at each of the three periods, and to treatment without operation, the first step in any scientific inquiry was to determine the nature, progress, frequency of occurrence and mortality in each. We should then be in a state to grapple with the question of primary and secondary amputation in all its bearings, and, indeed, to reduce it to the simplest form for solution.

So far as I am aware, this is a labour, in the comprehensive view just stated, which has not hitherto been satisfactorily performed, even if attempted.

The object of these lectures, therefore, shall first be to show *the nature, progress, and frequency of diseased actions supervening on complicated injuries of the extremities, either rendering amputation necessary as a sole resource, or carrying off the patient by their full development, without operation having been performed.*

These actions we shall find vary according to two sets of *physical causes*; viz., 1st, the *nature and degree* of the injury; 2nd, the favourable or unfavourable nature of *collateral and external circumstances*.

They vary also according to the agency of certain dynamic influences: 1st, the temperament and constitution of the patient, his moral organisation, the temper, age, and sex; 2nd, the degree and nature of impression made upon the nervous system in its three divisions—the cerebral, ganglionic, and true spinal.

How difficult must be the accurate appreciation of some of these agencies, particularly the dynamic, is too obvious to require comment. A few observations, however, will show that much may be done even here.

A series of tables, or statistical returns, are here shown, calculated to throw some light on the subject. Very early in my career as a surgeon, in charge of large hospitals, I received an impression from the daily study of series of cases under my care, that the supervening actions, the causes of mortality, as well as its amount, were not only different in, but were directly influenced by, various *degrees and kinds* of injury. The conviction that such difference, if clearly ascertained, ought to exercise its due, and certainly not unimportant, influence in the question of amputation, as to the period of performance, or the greater expediency of treatment; and even on the nature of that treatment, sufficed to fix my attention on these circumstances, in which mechanical or physical agents chiefly predominated.

These returns, therefore, show gunshot fractures as arranged in two classes; viz., those involving the articulations and those consisting of gunshot fractures without this

complication, forming two *kinds* of injury, and the principal forms for which amputation is ever required.

A second set of tables, to which I shall have to refer hereafter, will show the latter class of cases arranged under three heads, indicative of *degrees*. 1. Favourable cases for treatment. 2. Doubtful cases. 3. Unfavourable cases.

The strange and irreconcilable discrepancies which occur in the results of operations, as stated by the advocates for immediate or deferred amputation, prove how much circumstances may influence such results; and in all tables of comparative results, the absolute necessity of classing together *similar cases* only, both in relation to the *degree and kind* of injury, the *external and collateral circumstances*, the *time and mode of performance of the amputation*.

If we refer to Faure for the results of the battles of Raucoux and de Lauffield—to Guthrie and Larrey for the results in the wars of Napoleon, it is impossible to avoid being struck with the wide differences in the results recorded. A difference not, in my opinion, to be accounted for by any superior efficiency in operative methods which the latter may have employed, although something may fairly be attributed to this circumstance.

In reference to kinds and degrees, therefore, a triple set of tables have been formed; viz.,

1. Fractures into articulations.
2. Fractures not involving the articulations.
3. Favourable, doubtful, and unfavourable cases for treatment.

The results of these are shown when treated under favourable, partially unfavourable, and unfavourable external circumstances.

These returns are calculated to show the results of those influences chiefly physical or mechanical. They have hitherto scarcely been estimated at their full value, except in extreme cases; and I am not aware of any similar attempt to prove not only the extent, but the relative degrees of their influence on a large number of cases. I cannot but believe, therefore, that they will be found interesting, and of some practical value.

That the different tables may be fully understood, and their bearing upon questions of amputation appreciated, some explanatory definitions are required.

1. By *favourable cases for treatment*, I define those which give fair and reasonable hope of saving a useful limb.
2. *Doubtful cases*, where the injury is so severe or complicated, as to make it a serious question how far the chances of successful issue may justify the attempt by treatment to save, even when it shall be determined that a useful limb *may* be the result, if recovery ultimately take place.

Decidedly *unfavourable cases*, such as none but a disciple of Bilguer's would think of attempting to save, where the limb is hopelessly shattered and injured—the cases which have been defined by Le Dran, Faure, Le Conte, and nearly all succeeding surgeons, military and civil, as requiring immediate amputation.

In relation to the external and collateral circumstances under which the cases were treated. Under the head *favourable circumstances* are comprised those cases received within four or six hours into a well-ventilated and efficiently-organised military hospital at a permanent station, with every essential advantage for treatment, where they remained until the issue of the case was determined and recorded.

Under *partially unfavourable circumstances* the cases were subjected to a few hours' more delay before admission, or to a sojourn of a day or two at a temporary station.

Under *unfavourable circumstances* are classed those cases which were treated either in an imperfectly organised temporary hospital during the first critical period, or received into the principal hospital when crowded, and some epidemic prevailing; or, finally, those subjected to a transport by sea or land after sojourn in a temporary field hospital.

The influence of these different circumstances are very distinctly demonstrated by the statistical results. In the cases here brought forward, the treatment generally was directed by the same mind, only varied in application to the circumstances, but unchanged in its principles. It does not, therefore, require any particular detail, and, of course, applies to all alike. Some few *special circumstances* I shall allude to at a future period.

I have merely to observe, therefore, that the operations were performed generally expeditiously, either by circular or flap methods—almost invariably without the use of the tourniquet—in my own operations I have never employed such means; I consider it not only unnecessary, but mischievous and painful, causing a loss of arterial blood avoided when an assistant's hand compresses the artery. In some few secondary amputations, where the parts were much diseased, a pledget of moistened lint has been interposed between the flaps or cut surfaces—otherwise the edges were always brought accurately together at the time, and secured by two or three strips of plaster—occasionally in flap operations by two or three sutures, and the stump slightly dressed with a few folds of bandage above. Cold lotion was subsequently applied, and the dressings removed on the fourth or fifth day. Union by first intention in the entire extent was rare, notwithstanding every precaution. The general treatment consisted in an opiate in the first instance, and in clearing the bowels subsequently, and acting gently upon the secretions

by saline and diaphoretic medicines, together with an occasional dose of blue pill and James's powder. Reaction was carefully watched, and the development of any secondary inflammations, and the endeavour made to heal any febrile excitement by the aid of depletion; and if any organic or local lesion threatened, local abstraction of blood and counter-irritation, with general remedial agents, were called in to aid. This was the practice I directed as a general system in all the hospitals under my charge or superintendence both in Portugal and Spain.

These tables are, comparatively, easy of formation; the influencing causes are palpable, tangible, material, and physical, in a great measure, both in their nature and modes of action. But, proceeding onward to those influences, chiefly arising from the dynamic forces—evident in their results, yet too subtle in their action to be as distinctly appreciated and as easily demonstrated—we are surrounded by difficulties. I would gladly have investigated them in such manner as to present equally positive information; but all our much-lauded knowledge of physical laws, of mechanical structure, of the machine of the human body, miserably fail us here, and we feel the necessity of estimating their force and influence on the tangible results, by faculties and means of investigation more in harmony with the nature of the forces in action.

The influence of age, perhaps even of temperament, might be reduced to figures; but the latter especially is open to much doubt. The state of the mind, the moral constitution, are so involved with what we term the temperament, that it behoves us, in weighing such subtle influences, to be wary how we reduce them to given and definite quantities, as we would so many legs amputated, with cure or death for result.

They are, in truth, influences requiring so much judgment to determine truly their value, so open to debate, while any errors are so completely beyond the reach of detection by others, that decisions on such subjects must at all times either be taken blindly or rejected altogether; an order of things peculiarly inimical to scientific inquiry, or the advancement of medicine. I relinquished, with these feelings, my original intention of including these circumstances in any *statistical return*. With respect to age, I have already observed, that a very large majority of the cases recorded were young men between twenty and thirty.

Although I have forbore to offer any statistical returns, reducing their influences to precise numbers, my opportunities of observing their effects have been too numerous to allow any doubt on my mind that they ought to enter into, and in every case form a part of the considerations which determine our line of treatment. A nervous and anxious temperament, with its general accompani-

ment, a fretful temper, or a bilious and depressing habit, are as certainly injurious influences, as a sanguine and cheerful habit is a most valuable adjunct to all treatment; and though, perhaps, too frequently lost sight of in estimating the chances attending different injuries, and the methods of treatment which art has provided, yet no one, I fancy, is prepared to dispute the fact. Neither is this the point of importance, but to determine, if possible, the degree of influence they exercise, and whether this tells *equally upon the injuries treated, and upon the amputations at each of the three periods*: my own conviction is, that they do not; that the nervous, anxious, and bilious habits are much more fatal to the primary and intermediary amputations than to the secondary; that they tell less upon the original injuries than upon the two first classes of amputations; but more upon the fractures, both in the first and second stages of their progress, than in secondary amputations; whereas a cheerful and sanguine habit always exercises its most salutary influence at first, and this more especially when the injury is treated than if the limb be amputated. But without facts, marshalled in numbers, and with the greatest care, I do not attempt to give these as fixed views; I give them but as impressions, formed upon no limited or careless observation, yet still vague, and, to a certain extent, unsatisfactory, as a means of convincing others. So mere opinions must always be, under such circumstances, as the estimation of influences intangible in their nature and mode of action, however palpable in their effects upon organic matter.

If it should be admitted, however, that these opinions are well-founded, the inferences to be drawn from them, and their application in turning a nicely equipoised balance between treatment and amputation in any of the periods, are sufficiently obvious, and do not require further explanation.

Amputations I have divided, in reference to the periods when the operation was performed, into three kinds—*primary, intermediary, and secondary*. On the necessity for this division, and its value, I will not at present enter. It will suffice here to say, that the *primary* including amputations performed before the supervention of local inflammation, or febrile action—say within twenty-four hours, although this period may sometimes extend to forty-eight—states of limb and system, not hours, determining the limit of this period.

By *intermediary* amputations, I define those performed after inflammation and febrile disturbance is developed, and before these states subside, and the suppurative stage is fairly established; a period extends from the termination of the first to the twentieth day on an average.

Secondary, all amputations performed at any time subsequent to the period last defined.

With these returns, and the explanatory definitions of the various classifications adopted, I shall conclude for the moment. The result relating to mortality and proportionate number of amputations required, are here presented in their most concentrated forms. I am unwilling to disturb the facile appreciation of the *general* results. In the succeeding lectures I will recapitulate the chief facts, with such explanations and details in reference to each class of returns, as will further elucidate the bearing of the whole. I will then, also, in each lecture, offer such considerations and arguments at length, as will, I trust, leave little room for doubt, using the numerical results rather as a confirmation of opinions, the truth of which may be made apparent, independent of such conclusive aid, than as originating doctrines not otherwise sustainable. It is in this corrective and corroborative sense that I think the statistics of disease most valuable.

(For Tables 1 & 2, see pp. 397, 398.)

* * * The three other tables in illustration of this lecture, are unavoidably postponed until our next Number.

INJECTION OF NITRATE OF SILVER IN GONORRHOEA.

To the Editor of THE LANCET.

SIR:—Should you appropriate a corner of your valuable Periodical to the insertion of the undermentioned, you will much oblige, Sir,
W. H. FOSTER.

The treatment of the primary or inflammatory stage of gonorrhoea by the injection of a weak solution of nitrate of silver, is not, I believe, frequently practised; I have tried it with success, and without experiencing any of the ill effects ascribed to the early use of irritating injections in gonorrhoea, which induces me to add my recommendation to this plan. The accompanying case occurred in a young man of unusually irritable habit, and may not be interesting:—A. B. came to me with gonorrhoea three days after connection. On examination, I found the orifice of the urethra swollen and inflamed, the inflammation extending for some distance on the surface of the glans penis; slight scalding on voiding urine; a small quantity of pus escaped from the orifice of the urethra, on pressure; to use the injection three times a-day (in the proportion of three grains of nitrate of silver to an ounce of water).

On the following day inflammation less considerable; complains of the injection causing much pain: to continue its use.

On the third day, inflammation nearly subsided: to continue injecting.

Fourth day, all inflammation disappeared: to omit injection.

Seventh day. Continues perfectly well.