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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 XII.

*On the diseased actions supervening upon  
primary amputation. Erroneous premises  
on which certain conclusions in reference to  
the questions of primary and secondary am-  
putations are based. Analysis of causes of  
death in twenty-nine cases of primary am-  
putations. Some observations on the febrile  
types supervening.*

By close analysis, I have endeavoured to show the nature, frequency, and gravity of the diseased actions, local and general, supervening.

1st. On complicated fractures treated without amputation, and causing death.

2nd. On similar cases causing amputation during treatment.

With the advantage of some previous knowledge on these points, therefore, we proceed with the inquiry, as to the nature, the frequency, and the fatal effects of such actions, as supervening upon primary amputations, modify the progress, and determine the ultimate result of the case.

Many questions of the highest practical importance connected with amputation, its application to injuries and disease, and the results; hitherto involved in uncertainty, and surrounded by doubts and contradictions, I am firmly convinced, admit of satisfactory solution. Vague guesses at conclusions from inadequate data, have been much more frequent than attempts to solve any doubts by close reasoning, founded upon a large number of well-ascertained facts in comprehensive and complete series.

Before entering upon the consideration of the effects of the double shock of a violent

injury to an extremity, quickly followed by the still sharper anguish and commotion to the whole nervous system of an amputation, it was absolutely necessary to determine what are the effects of such injuries when they do not lead to amputation!

It seems strange, and not very creditable to us as a profession, that of all the large and richly-endowed civil hospitals in the metropolis, and in every county in the kingdom, no one has sent forth such a statement of the cases admitted, or such a series of cases as to enable us to decide the important question, of how many patients sunk in the effort to save a limb! Dr. Laurie, of Glasgow, alone, has published a series of forty, while these lectures have been in progress.

If the surgeons of a few hospitals will follow the example, applying some system to the collection of the various interesting facts connected with the progress and results of disease and injuries, we may fairly hope to see the science of medicine based upon accurate and indisputable evidence. We shall then, too, see it less disfigured by vague theories and doctrines, open to contradiction whenever they can be tested by facts in large numbers, and as quickly supplanted by others equally worthless. We may truly say that medicine is, in the case spoken of by Horace Walpole, when he said,—It was of little use curing a man of one folly, since it only made room for another which quickly supplied its place. The constant production of large classes of facts, so arranged as to bear distinctly upon leading doctrines and principles of practice, cannot fail to have the most salutary effect—not only by destroying that which is erroneous, but by supplying better and safer material wherewith to build anew.

In the preceding lectures, the actions supervening on complicated injuries of the extremities either rendering amputation necessary, or destroying the patient by their full development, have been traced, under various circumstances, in reference to the nature of the injury, its site, and the external and collateral circumstances. I have thus endeavoured to establish certain grounds of comparison, by which we may determine what new elements of fatal disease, or what modifications owe their origin and character to

the second quickly-succeeding shock of amputation.

Without this groundwork, the result we are now seeking was, in truth, wholly inaccessible—it formed the necessary basis for our advance. If you turn to the tables and analysis of causes of amputation—and causes of death during treatment, where no operation was performed—and compare them with the causes of death in primary amputations, you will be enabled better to follow the analysis, and appreciate its bearing on the general question. Returns No. XVI. and XVII. give the result of fifty-seven cases of primary amputation, each series contained therein being complete. The mortality is 29, or 1.965; and I am confident many of our hospital surgeons would be startled, and hesitate to accept the responsibility of what to them would seem a mortality so unusual and disastrous. I did not, three years ago, hesitate to publish this result, taking the responsibility, even without giving the details and observations now produced, which it was impossible to analyse and classify, in the brief time I allowed myself to publish the work in question—a work intended, moreover, to give *general results* only, in reference to important points in surgery.

I did not hesitate, because I was conscious that neither neglect nor mala praxis had in any way contributed to this mortality; that although some difficulties and some adverse circumstances, often inseparable from the vicissitudes of military service, contributed on some occasions their deleterious influence: yet upon the whole, the results such as they were, favourable or otherwise, were the results of such natural causes—in relation to the original character and site of the injury, state of health, mind, and constitution of patient, together with the means and appliances for efficient treatment, as would frequently obtain in war; and therefore, that they would furnish a *true average mortality* for cases *under similar circumstances*. Anxious for the truth, it was indifferent what might be the complexion of the result; nor, until I had classed them, could I have ventured to say what those results would prove to be.

The mortality mentioned only rendered me the more anxious to investigate the causes, and determine their degrees of influence—not the less so, that Mr. Guthrie had published, as the result of collected returns of amputations during a period of the Peninsular war, a relative degree of success of primary and of secondary amputations, which was in contradiction to the facts I had studied in the hospitals under my own charge. It was not only that there was no sort of relation between the mortality in primary amputation in those returns and in mine; but while their success was so much greater in primary, it was much less in the secondary, as shown by the returns under my hands. These discrepant results were further brought forward,

by my having detected many contradictions in practice, and its results, to the principles assumed by writers generally, at least by the most strenuous advocates of primary amputation, as satisfactorily accounting for this great disproportion between the success of amputation in the first instance, and at subsequent periods.

In my “Notes,” published in 1838, I stated that, as the facts accumulated under my eye, I was insensibly led to the conclusion, that a train of symptoms were developed after primary amputations, dependent upon the reaction of the nervous system, highly and injuriously irritated by the double and quickly-succeeding shock of the original injury and subsequent amputation, falling upon a robust and plethoric subject, and thus producing a violent, irritative, and absorbent action; one which, after developing febrile symptoms bearing the same character of irritation, ultimately absorbs or exhausts the powers of life.

This peculiar action, with the train of symptoms—febrile, absorbent, and disorganising—is manifested sometimes locally, sometimes generally, more rarely both. In many, therefore, the action is developed in the stump; in others, the stump even heals, while the small irritative fever is destroying the life of the patient, without any trace of organic disease.

To the modes of development and other peculiarities of these causes of mortality, I will refer in the sequel: some more general remarks on their bearing must, however, have precedence. It has seemed to me certain that to this action, steadily overlooked or [denied, by the stauncher advocates of primary amputation, may be attributed much of the discrepancy of opinion between them and another class who condemned the primary amputation in cases that admitted of any hope of their reaching a secondary, and, in their opinion, a much more favourable period for the operation. When we know that among the latter John Hunter took a prominent part, it might have seemed more prudent, instead of voting his opinion void of all foundation, to inquire if something, indeed, might not exist to justify it. If in the plethoric state of the system natural to robust health, and the excited state of the mind at the moment of receiving the injury (a severe shock, he it remembered), followed, with slight interval, by a second and violent commotion, powerfully affecting both the *physique* and the *morale* of the patient, there might not be an action developed not altogether so predisposing to recovery as imagined? To these deleterious forces brought into action, there requires to be added a loss of venous blood more or less considerable, tending also to destroy the equilibrium of the circulation, reacting upon the nervous system, and calculated in the revulsion that ensues to fall with grievous force on some previously-weakened internal organ, or upon

the nervous system of organic life arresting the vital functions.

Because a patient recovers from the first stunning shock of a severe injury, or because the immediate effects are not apparent in the first instance, surgeons have proceeded boldly to operate, conceiving there was nothing to fear from the effects of such shock, and even an additional one upon the system. This is precisely the error, hitherto very general, taken up in reference to the effects of *concussion of the brain*. I believe in some former lectures on the injuries of the head, and, subsequently, in an essay on the Effects of Concussion, to which the Royal College of Surgeons were pleased to award the Jacksonian prize of 1840, I proved distinctly that a concussion which shall ultimately develop the most fatal effects, may not even be followed at the moment by a loss of sensibility, or any visible effect of a highly-dangerous or fatal injury; and again, that when a man falls with instant loss of sensibility, he may, in a few minutes, or hours, recover from this—be apparently released from all the paralyzing or destructive effects of concussion; and yet those effects shall be traced on through many stages for weeks, months, and, occasionally, for the remainder of a life-time. Thus it is with the shock communicated by a violent injury or a severe operation, or both combined; the diseased actions which ensue are the results, but, because masked for a time, their real *cause* has been overlooked.

To John Hunter, and others who advocated both in France and England the same opinions as he did, it was objected by the army surgeons, who followed with a phalanx of successful primary amputations, that such writers were theorists, who drew speculative conclusions, had never been on the field to judge the question—had never seen amputations on a large scale, and primary amputation fairly tested.

This might, and did for a time, suffice, summarily, to settle the question, and even to silence those with less ample experience but closer observation; yet it may reasonably be doubted whether this was a scientific mode of arriving at truth, the sole legitimate object of discussion or inquiry.

I am not afraid of being put down as a theoretical writer; I have seen several hundred amputations—performed a large number myself, and watched, with the greatest care, the whole progress of at least some five hundred severe and complicated injuries of the extremities in the hospitals under my own personal direction, and, of course, each and every amputation to which they gave rise. I speak without hesitation, therefore, though, I trust, with no overweening confidence or presumption, of what I have seen and studied in no very limited field for observation; and I am bound to declare my conviction of the truth of what John Hunter advanced, and Faure and Le Conte before him (however out of vogue, and talked down and

almost out of sight and memory such opinions may be); viz., that the system is not in the best state to bear the shock of an operation within twenty-four hours after the receipt of a violent injury, such as a gunshot fracture; and that patients, in two cases out of three, are in a more favourable state at a succeeding period, if no organic disease shall have been developed, or the patient be not utterly exhausted.

Instead of those who advocate this opinion being open to the charge of being theoretical, I think it might lie more heavily on those who say, that because the man is in health, before disease has worked its ravages, *he must be in a better state than at a later period*. Is a man in *health* immediately after a violent commotion or shock, physical and moral? Is the system at that time in a condition favourable to any one healthy and regulated action? To set off by saying *that he is in health*, is begging the question. By so much nearer he is to the moment of receiving the injury, by so much more distant is he from the health he enjoyed. I maintain that when the shock has been sustained, it is difficult to imagine a state of body less favourable or further apart from *health*. A man who has survived this shock—the febrile reaction that succeeds—and retained a fair share of strength through the first week or two of the suppurative action, in my firm opinion is in a *better* state for operation, and one more favourable to recovery after it.

In the present state of opinion, I am aware this must seem to many a very startling assertion; and it will seem still more so if the conclusion should be drawn, that I am, therefore, an advocate for delayed amputation, when that operation is decided to be inevitable at the first moment. This is so far from necessarily following, that I feel a firmer faith in the propriety of primary amputation in the majority of circumstances, knowing that the observations from whence the two preceding statements have been drawn, also lead me to that conclusion; a conclusion which it is vain to deny has been sanctioned in reference to *military* practice, by the experience of twenty years' war, and on a scale so vast, as to leave little room to doubt its general correctness.

No question in surgery has been more frequently discussed, or more pertinaciously defended; perhaps few have given rise to such serious doubts among men of professional ability. Errors, I conceive, must have clung to both sides, or no doubt, at this late period, could have remained to be removed.

And it is curious to remark, in the destiny of opinions, as often in those of nations and individuals, how those which have been forced upon the world by hasty generalisation or erroneous principles, even though the results be good, after a period becomes less firm in men's minds—the constant subject of inquiry, dispute, and discussion—until that

which was erroneous is rejected, and the result, if essentially bad, overturned; or, if true, assured upon a sounder basis. Since the Peninsular war, little has been heard, until of very late years, upon the long-disputed question of the best periods for amputation after injuries, and the principles on which these were determined; but again, it has attracted the attention of the profession—M. Gendrin, of Paris; Messrs. Norris and Hayward, of America; M. Chelius, of Heidelberg; Dr. Laurie, of Glasgow; and others, have all been labouring to prove that immediately after the shock of an injury (meaning within twenty-four hours) is not, in reference to the state of the system, the most auspicious period for successful amputation. In 1838 I published such general results, as I thought tended to show there was room for further inquiry, and in these lectures I have proposed to furnish all the details which seem calculated to throw any light on the subject.

One great error on each side I trace, at least. The propriety of primary or secondary amputation, in reference to each other, has been made to hinge upon the question, of which is the most favourable period for the safe recovery of the patient. The advocates of primary amputation seemed to feel themselves, of necessity, bound to maintain that a man was in the best possible state soon after the receipt of the injury. The practical conclusion happened to be right, the premises were false; and the numbers even by which the rule was sought to be established, were equally unfair as tests; for many a secondary amputation is performed (as in the rupture of a large vessel) to arrest a death otherwise imminent, and thus offering a faint hope of ultimate recovery; also for tetanus, and under a variety of circumstances, rendering them unfair cases for *any operation*; and to these have been added, all those performed in the worst of all periods—not one, certainly, contemplated by the advocates of delayed amputation—which were no more *secondary* amputations, in the accepted sense of the word, than were the secondary, in reality, entitled to be termed primary. The mortality of the secondary, *therefore, has been greatly exaggerated—the dangers of the primary underrated*. Again, the results of primary compared with secondary amputations, and their proportionate mortality, varies greatly in civil and military hospitals. The same proportion no longer exists; nay, it is not seldom *reversed*: a fact, which seems to have been altogether overlooked or unknown. The advocates for secondary amputations have equally lost sight of all the lives lost with and without operation, in the intervening period, between the first and twentieth day.

I object to the erroneous grounds on which a principle of practice of such vast importance and wide application is based; because I think it calculated, in every new field for

experience and inquiry, to unsettle opinions of surgeons, and lead to fresh doubt and discussion. For those who reason at all on the facts presented to their observation, the grounds on which primary amputation is sustained, will be continually contravened in civil, and occasionally in military, practice; and finding the premises false, the next step is naturally to call in question the truth or value of the deduction. This was the course in my own mind—I ended, after long-continued and laborious investigation, by accepting the practical conclusion in favour of primary over delayed amputation, under many circumstances, but repudiating, as untenable, the generally-accepted grounds for such practice. If amputation must be performed, primary amputation, beyond question, I hold to be the best practice in the majority of instances—not because *the human system is at that period in the best state for meeting the consequences of the double shock, moral and physical*—not because these present such decidedly more favourable results than secondary amputations, under every condition of circumstances (when the latter are not compulsorily performed)—but because *many will be the forced amputations in an intermediate and still less favourable period; many more the deaths before the favourable period arrives; and a large number even then remain who arrive at that period, but offer no reasonable chance of surviving the shock of an operation, if superadded on the diseased and exhausting actions to which the original injury had given rise*. Add all these deaths to those from secondary amputation (properly so called), and he must be a bigot indeed to the adverse opinion, who can have one moment's hesitation as to which side of the question the amount of human suffering and the loss of human life preponderates. Still this question has never been fairly and impartially dealt with; and for this reason I have framed the tables accompanying these lectures, which, with other statistical details, explanations, and cases, form a body of evidence, placing the subject in all its bearings (for the first time, it appears to me), clearly and palpably before the profession, with the just grounds for the conclusions already jumped to, upon false premises, by the majority of surgeons.

I trust this labour may not be useless, as confirming, in many instances, and better defining in all, most important rules of practice, taking away not only causes of doubt as to their correctness, but furnishing true instead of erroneous grounds. Such a labour must tend, moreover, to remove plausible points of attack from those who may be disposed to advocate contrary and more disastrous practice.

Prior to giving an analysis of the causes of death in fifty-seven primary amputations, I will offer a few more general observations on the classification of diseased actions. The classes taken as representing the predo-

minant action, and most obvious cause of death, I shall adopt as so many heads, under which I may clearly arrange the remarks I have to offer on the *supervening actions causing death after primary amputation*.

#### *Fevers.*

The classification of the febrile actions offers the greatest difficulty. Almost invariably after amputation there is constitutional disturbance, and generally more or less of a febrile character; yet to resolve the symptoms into a special type of fever, where there is little beyond the existence of febrile action to seize—or a mixed and complicated set of symptoms to guide us—is not only a difficult task, but one very liable to error. I wish this classification, therefore, to be taken as rather an approximation to what seemed the most predominating symptoms and types, than a fully-ascertained truth. To have classed all the various complications of organic disease, found in connection with *fever*, under that generic term, might have been safer; but for many reasons, which will soon be obvious, and more particularly that one type seemed to predominate over another, it was desirable to attempt somewhat more closely to define the febrile action.

The three forms I have adopted are the bilio-remittent, the hectic, and irritative; the latter more especially indicating a small kind of fever, assuming no very broadly-marked characters, although evidently wearing away the powers of life, and exhausting the patient.

Fever is occasionally, if not wanting, at all events so little obvious, and local or other diseased actions so evident, that it altogether escapes remark or observation; even in phlebitis, one case is recorded in the analysis, where the attention was chiefly directed to the bad actions of the stump.

Whether remittent, hectic, or irritative, be the types, we see each are complicated by secondary abscesses of viscera, or distant parts, each occasionally with phlebitis. A particular form of fever has been ascribed by some writers to each of these effects; an example which I shall hereafter produce, of one case out of each of the three classes, will prove that such assumption is not correct.

Whoever refers to the various treatises on fevers, will perceive that in the mass of opinions so various and contradictory, it is most difficult to establish therefrom any one series of symptoms as *distinctive* of peculiar types, but more especially of remittent and yellow fevers. The yellow fever is, in truth, a bilious remitting fever. The most fatal and malignant forms of remittent are developed and modified, in great degree, if not generated by endemic and epidemic influences, to which some constitutions and states of the system are so peculiarly

obnoxious, that the attack is generally fatal in its results; while to others it seems innocuous. My attention, as I have stated, was anxiously devoted to this subject from the circumstance, that of a great mortality in the amputations performed during the month of March, many were carried off by a form of fever I have termed bilio-remittent, and which, with equal propriety, perhaps, might have been called the yellow fever.

In the Spanish hospitals, crowded by the wounded from the same series of actions fought in that month, I believe the only case saved out of a large number of amputations was one of the arm, performed by myself. This patient I removed subsequently into one of the British hospitals, where a large and airy ward was preserved especially for operations.

To the consideration of these cases, and the influences under which they took their fatal course, I have already devoted two lectures. In the next, I shall proceed to lay before you some views upon the nature of this bilio-remittent form of fever supervening on operations, and frequently attended by suppurative disease in some important organ, or distant part, and the chief agents in the production of this type and its complications.

#### A CASE OF

### ACUTE HYDROCEPHALUS,

EXPOSED TO GREAT DANGER FROM DELAY IN THE TREATMENT, IN CONSEQUENCE OF BEING MISUNDERSTOOD IN THE FIRST INSTANCE.

By Professor DAVIS.

Miss F—, five years of age, a delicate little girl, sustained an accident at school, by falling from the back of her chair. In consequence of this accident she complained loudly of acute pain of the occipital region of the head, the part which came in contact with the floor behind. Being of a cheerful disposition, she presently ceased to cry, and admitted of being soon comforted by her schoolfellows. When, however, she went home at noon, she forgot not to mention her accident to her mother, nor the severity of the pain she suffered at the time, and in consequence of it. She, nevertheless, eat her dinner as usual, and was cheerful and chatty during the whole of the remainder of the day. She went to school again the next day, without experiencing any observable indisposition, and without making any complaint. When, however, on this, the second day after the accident, she came home at noon, she complained of being poorly, and refused to take her dinner. She was harassed with sickness and vomiting during the whole of the remainder of the day, and rather frequently during the following or third day after the accident. On the third day, which