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## L E C T U R E S

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 XVII.

*On the influence of different modes of amputating, especially by flap and by circular incision; on the relative mortality in each; on the relative liability to secondary hæmorrhage; exfoliations; conicity of stumps. Observations on union by first intention, and on consecutive union.*

THERE can be no doubt that the modes of operation adopted, the time consumed in their performance, the mode of dressing a stump and the whole after-treatment, general and local, exercise an important influence on the progress of cases of amputation, and upon their final issue.

An instance has come to my knowledge of a patient who underwent amputation of the thigh for a compound and comminuted fracture of the femur, where the operator, miscalculating the extent of fissuring, had to make repeated dissections upwards, which, together with loss of time in other steps of the operation, kept the wounded man nearly fifty minutes on the table; he was not old, but strong and healthy to appearance; yet he survived only a few hours, destroyed, beyond doubt, by the violent and protracted shock of the operation.

Sudden and violent pain cannot be inflicted without an impression upon the nervous centres, which may be defined as a shock; and the influence of this shock must ever be more or less deleterious. It may only, to some extent, derange the functions, and cause different degrees and types of febrile action,—or it may entirely absorb and destroy the powers of life at once,—in a few hours, or, by a slower process, in the course of days. Pain, be assured, is an absorbent

of life, exhausting all nervous energy and vital power.

Instances of this action I have already given in the preceding lectures. In the "Notes" published in 1838, I mentioned a case which occurred during my house-surgeoncy at the Westminster Hospital, in 1829, where the patient, a young and muscular man, was destroyed by the pain and irritation of retention of urine, which had commenced twenty-four hours before; he died with no very violent distention of the viscus, and while measures were taking (immediately after his admission) to obtain relief by milder means than operation. The impression on the nervous system caused his death. No trace of organic disease could be detected in the post-mortem examination.

Pain, singly and simply, then, is in itself one of the most deleterious influences to which the frame can be subjected, for it seems to act directly upon the nervous system, with a powerful sedative action, at times producing the effect of a slow poison; at others, the rapid blight of electric fluid, or of the most deadly narcotic.

In all operations the surgeon should have the consciousness of this fact about him. It may be laid down as an axiom, that in proportion to the rapidity of the operation, if otherwise well devised and performed, will be, *cæteris paribus*, the patient's chances of recovery. Could we divest the great operations of the pain of their performance, I believe we should succeed in stripping them not only of their terrors, but of nearly all their dangers.

This principle of rapidity applies especially to the question of amputation by flap or by circular incision; the former is more quick of execution, and all who have operated much must know the value of this advantage. Upon this ground chiefly the flap operation which, until of late years, was only practised on the continent, has found many strenuous advocates among English surgeons.

The preceding observations will afford sufficient proof that my experience has disposed me to appreciate rapidity of execution at its full value, and to deprecate, as one of the worst injuries that can be inflicted upon a

patient, the pain of a protracted operation. Nevertheless, the value of the flap method of operating may be exaggerated, and some of the disadvantages attending it kept out of sight; and this I think has been the case. As I am not a partisan of either mode of amputation, I feel in no danger of exaggerating the one or disregarding the other: I have both practised and caused others to perform under my observations, the two kinds of operation, in a very large number of cases; and I deem it right in giving my opinion on this subject, to put you in possession of all the principal facts connected with the two operations, their progress and results.

Many of the facts are numerically stated in the two tables formed for that purpose (see Tables XVIII., XIX.); they are formed of the same series of cases, with a few exceptions, as the tables which have already been analysed. Thus, for instance, four cases of partial amputations of the hand are omitted as not telling upon the present question; and among the secondary amputations are included a few cases of amputation for gangrened feet, &c., not included in the preceding tables, which comprised only cases of fracture. The total number of the series remains nearly the same, but not all the cases.

Other tables have shown the influence exercised by the nature of the wound, by the site and the degrees of injury, and the periods of amputation; also by external and collateral circumstances during treatment.

Keeping the influence of these in view, we have now more especially to consider how the mode of operating, by flap or by circular incision, may modify the progress and results. The most ready mode of demonstrating such influence, I believe, will be to compare a series of each, and to ascertain what differences are observable.

1. In the mortality.
2. In the liability to secondary hæmorrhage.
3. In the frequency of exfoliation.
4. In the liability to conicity of stumps.
5. In the period of healing.
6. In the liability to phlebitis and purulent depôts.

These, I believe, to be the chief, as they are the most interesting and important points of comparison, and by these we shall be enabled to determine the value and relative advantages and disadvantages of the two modes of operation. The series before us consist of

87 Amputations by circular incision.  
24 By flap.

111

#### I. ON THE MORTALITY.

A glance at these tables will give at once the data as to the relative mortality. If the flap operation diminishes the time of performance, and this unequivocal advantage is not counterbalanced by other disadvantages,

we may naturally anticipate in flap amputations some diminution of mortality.

By the circular incision the mortality in 87 is 1 in 2; by the flap operation in 24, it is 1 in 1.8. This is the first and most general result, which, you perceive, is in favour of the circular incision.

#### a. *Relative Mortality in Amputation at different Periods.*

In 39 primary cases amputated by circular incision, the mortality was 1 in 1.95; in 18 removed by flap it was 1 in 1.80. The difference is exceedingly trifling, but in favour of the circular mode.

There are no intermediary flap operations. In 20 secondary amputations by circular incisions the mortality is 1 in 3.3. In 6 by flap, 1 in 2.

In both, therefore, a difference more or less considerable stands against the flap operation.

#### b. *Relative Mortality in reference to Site of Amputation.*

In *Thigh*, the mortality in the flap operation is 1 in 1.5; in the circular, 1 in 1.6. In *Leg*, by flap, mortality 1 in 2; by circular, 1 in 3. In *Shoulder-joint*, mortality in flap operations, 1 in 5; by circular incision, 1 in 5 also. In *Arm*, flap, 1 in 1.3; circular, 1 in 2.1. In *Forearm*, by flap, 1 in 2; circular, 1 in 2.3.

In the shoulder-joint there is, by a singular coincidence, exactly the same number of cases and the same mortality: in *all others* an advantage is gained; and in the leg, arm, and forearm, the balance in favour of the circular incision is considerable.

#### c. *Relative Mortality in reference to External Circumstances.*

The number of flap operations is scarcely sufficient to give fair data for comparison; you will find the general result to be thus—

In favourable circumstances, 12 flap, died 5; mortality 1 in 2.4; circular, 40, died 9; mortality 1 in 4.4.

In unfavourable external circumstances, more or less, 12 flap, died 8; 1 in 1.5; circular, 47, died 34; 1 in 1.2.

Under this aspect the legitimate inference to be drawn is, that under favourable circumstances the circular incision has greatly the advantage. Under reversed circumstances, the difference is not great: the fraction, such as it is, stands in favour of the flap.

In reference to the relative degrees of mortality, therefore, I think we are warranted in the following conclusions:—

First. Since the mortality in amputations by the flap operation is greater both in primary and secondary amputations, and in the upper and lower extremities, there must be some counterbalancing disadvantages attached to that method which render nugatory the unequivocal advantage of greater rapidity

in the performance. These disadvantages are most obvious in secondary amputations.

Secondly. This inference undergoes some modifications in reference to the favourable or unfavourable nature of external circumstances. Any disadvantages attached to the flap mode of operation no longer appear to counterbalance the benefit, attributed chiefly to rapidity, but probably not less due to the free division of diseased structures, the ready exit to matter, and the larger suppurating surface left, all of which, in cases of extensive alteration of structure, are calculated to be of benefit to the patient.

These conclusions seem to me well founded, and of practical importance. In reference to the question of what the disadvantages may be under which the flap operation labours, I doubt whether many of the facts which I have now to lay before you will afford much information. Let us proceed, however, to inquire into

II. THE RELATIVE LIABILITY OF AMPUTATIONS BY FLAP AND BY CIRCULAR INCISION TO SECONDARY HÆMORRHAGE.

In 24 flap operations there are 4 cases; 1 in 6; in 87 circular, there are 16 cases; 1 in 5.4.

One of the four cases of secondary hæmorrhage in the flap operation occurred from

*In Reference to Periods of Amputation.*

Amputations by Circular Incision.	Number of Cases of Secondary Hæmorrhage.	Flap.	Secondary Hæmorrhage.
Primary..... 39	6 1 in 6.5	18	3 1 in 6
Intermediary .... 28	5 1 in 5.6		
Secondary ..... 20	5 1 in 4.	6	1 1 in 6
87	16 1 in 5.4	24	4 1 in 6

In primary amputations by circular incision, although the difference is slight, it is in favour of this mode. In secondary amputations, on the contrary, the difference in favour of the flap operation is considerable: the cases of secondary hæmorrhage are only as 1 in 6 compared to 1 in 4.

3. *In reference to External Circumstances.*

Under favourable circumstances.

Circular incision, proportion of cases of secondary hæmorrhage ..... 1 in 5.  
 Flap ..... 1 in 6.

Under unfavourable circumstances.

Circular incision, proportion of cases..... 1 in 6.  
 Flap ..... 1 in 6.5.

The balance in both is in favour of the flap, the greatest advantage being gained in favourable circumstances.

If the upper and lower extremities be taken separately, we find these results considerably modified.

*Under Favourable Circumstances.*

The upper extremity by circular gives a proportion of ..... 1 in 5.  
 Flap ..... 1 in 4.  
 Thus reversing the general result of the above.

sloughing coats, and led to a fatal result: 1 in 24, therefore, is the proportion of fatal secondary hæmorrhage; 4 in 87 circular were fatal; 1 in 21.7; and 3 others required the opening out of the stump and ligation of the branches: thus, 7 were grave cases, 1 in 12.4, and 4 of these were fatal. Of the flap operations, the only serious case was fatal.

If the proportion of grave cases be compared, we see that in the flap operation they are 1 in 24, while in the circular they are nearly doubled, or 1 in 12.4. It is abundantly evident that so far as these facts may be held to determine the question, secondary hæmorrhage cannot fairly be classed as one of the disadvantages of the flap operation.

This liability I find varies according to, first, the site of amputation; second, the period of its performance; and, third, the favourable or unfavourable nature of the external circumstances.

1. *In reference to the Site.*

In the upper extremity there is scarcely an appreciable difference in the proportion of cases of secondary hæmorrhage; by the circular it is 1 in 5.6; by flap, 1 in 5.5. In the lower extremity, on the contrary, the flap operation is decidedly more favourable; by the circular method the proportion is 1 in 5; by the flap, 1 in 7.

The lower extremity by circular incision gives ..... 1 in 4.8.  
 By flap ..... 1 in 8.  
 Confirming the result already stated, but nearly doubling the proportion of cases occurring in the amputations by circular incision.

Under *unfavourable circumstances* the proportions are also curiously reversed, but not in the same manner.

Upper extremity, circular, proportion of cases of secondary hæmorrhage ..... 1 in 6.2.  
 Flap ..... 1 in 7.  
 Lower extremity, circular ..... 1 in 7.  
 Ditto flap ..... 6.

Large numbers are required before the questions involved in these results can be determined in a positive manner; but so far as these facts go, they tend to prove that amputations, under favourable circumstances, of the upper extremity, by circular incision, are less prone to secondary hæmorrhage than the flap operations. Under unfavourable circumstances this result is reversed. That in like manner amputations, under favourable circumstances, upon the lower extremities, by circular incision, are more prone, by a large proportion, to secondary hæmorrhage

than amputations by flap. Under unfavourable circumstances this, too, is reversed, but the difference is less.

In reference to the supervention of secondary hæmorrhage, the upper extremity, were these indications of sufficient authority, under favourable circumstances, should be amputated by circular incision; under unfavourable, by flap.

The lower extremity, under favourable circumstances, should be amputated by flap, and under unfavourable by the circular incision; the practice being thus in every sense reversed. I merely state this as the legitimate deduction from the facts, and not as a rule of practice, thus to be fixed, or considered as sufficiently demonstrated by proof. We have to bear in mind that the gross result of the whole series of cases favours the flap operation. This analysis of facts, connected with modes of operation and secondary hæmorrhage, is not without value, although the conclusions to which they lead may not sufficiently warrant our adopting them without further inquiry as rules of practice.

We have to prosecute the inquiry by determining

### III. THE RELATIVE LIABILITY TO EXFOLIATION.

I doubt whether the mode of operation has any influence on this result. As I have already explained, an absorbent or sloughing action, and generally both, must take place in all bones sawn across. Both may be considered healthy actions, in relation to the object but effected by different processes: occasionally, it is true, it becomes the commencement of a diseased action, involving more or less of the shaft, and proceeding to necrosis. It has been urged that the habit of dissecting upwards in the circular incision, must render the bone more prone to exfoliate than when its attachments are undisturbed; but the flesh is, or ought, only to be cleared up to the point where the saw touches: this cause of exfoliation, then, falls to the ground. If the saw in both operations removes the bone as far as knife or instrument can have in any way divided its periosteum, or the surrounding parts, the mere division of bone in both being identically the same process, so far as the operation, *per se*, is concerned, there can be no ground for difference. I have also shown that it is difficult to decide on the true causes of the difference of action, by which in one stump the rounding of the edges and removal of surface in contact with the saw is effected by an imperceptible process; while in others, larger or smaller portions of the extremity are exfoliated, and occasionally the whole bone involved in necrosis.

I have shown, by reference to cases, that sometimes the bone will round without exfoliation, although fatal, general disturbance exist;\* and in cases even where disease of stump and periosteum are present. Again, that ex-

foliation has been proceeding with a healthy united stump,\* and the most extensive necrosis for months may be carried forward with good general health. I have carefully analysed all the cases where exfoliation had been sufficiently striking to attract notice, whether during life, or in the examination of the stumps of fatal cases. This process, however, might have been going on, in a slighter degree, in cases where it was not particularly noted. I give the results, therefore, with less confidence, as to their including *all* such actions, and with less hope, even without this drawback, of their leading to any really valuable practical result.

In 24 flap operations, 4 cases of exfoliation . . . . . 1 in 6.

87 circular . . . . . 20 . . . . . 1 in 4.3.

The number, therefore, seems to be greater in the circular amputations. The variations through site, external circumstances, &c., do not seem of sufficient importance to be followed out.

### IV. ON THE LIABILITY TO CONICITY OF STUMPS IN THE TWO OPERATIONS.

Conical stump is a rare occurrence when the operation has been properly performed: it will occasionally occur, however, in spite of every care in the after-treatment, and in the best-performed operations. Two cases are at present before me, one of which I have related,† and they form the only two instances in the series under consideration. Constitutional causes seemed to produce the one, while local disease (necrosis) seemed the chief and exciting cause of the other. In both instances the tendency became evident on the first dressing.

Such a result, I repeat, is very rare when no fault has been committed in the operation, or subsequent dressing. If the error be in scanty covering left by the operation, judicious dressing will go far to prevent conicity, though not always exfoliation: and however deeply buried at the apex of a cone the bone may be left by the operator, if the dressing be careless and injudicious, the bone may ultimately protrude. For this reason I have always directed the integuments to be drawn down, and so retained by a bandage, secured in the first instance round the body (in amputations of a limb near the trunk), and then passed two or three turns round the upper portion of the limb; and to such management I attribute in a great measure my good fortune in never having had to deal, in my own amputations, with a stump which threatened to be conical. I think there is a tendency in the present day to disregard the after-steps of treatment in amputations, on which their success depends fully as much as upon the mode of operation. There are three causes of conicity in the stump:—

\* See Case II., vol. ii., p. 498.

† See Case VII., vol. ii., p. 501.

\* See Case I., vol. ii., p. 498.

1. A bad operation, the bone not being cut short enough in the first instance.
2. Injudicious dressing and position, when the operation may have been well performed.
3. Unhealthy action, general and local, particularly in an emaciated subject, when the bone is very liable to make its way through the integuments, or necrosis of the bone to supervene.

A stump formed by circular incision must be more liable to become conical than the stump of a flap amputation; but under good management it must be so rare an occurrence (only two occurred in 111 cases, and I might add in more than twice that number), that in the comparison between the two modes of operation this result can tell but little for or against either. It is singular that both these cases were flap operations.

#### V. ON UNION BY FIRST INTENTION, AND RELATIVE PERIODS OF HEALING IN THE STUMPS FORMED BY FLAP AND CIRCULAR INCISION.

Union by first intention, entirely and permanently, according to my experience, whether in private practice, in military or in civil hospitals, is of much more rare occurrence than writers have generally led the world to believe. Two or three weeks are most frequently required under the most favourable circumstances; in the majority, six weeks: while those in which tedious exfoliation takes place, are not perfectly and permanently out of the surgeon's hands for months.

My anxiety in these lectures is to record *all the facts* connected with the subject of amputations. I have no favourite theory to support, nor am I ambitious of appearing more fortunate than any one else; my object is to offer instruction, by giving the results of my experience, and at the same time a contribution to our knowledge on the subject of capital operations, in which no partial view shall enter, whether for good or evil. I am bound, therefore, to declare to you, in reference to the healing of stumps, that the above are the *general* results founded on the observation of from three to four hundred amputations, the majority performed under my eye, many by myself.

When surgeons talk, then, of union by the first intention, or by granulation, as the great cause of differences in *results*, attributing all the evils to the non-union by first intention, I confess my own observation has made me very sceptical as to the correctness of their conclusions. Volumes have been written on this subject, and the endeavour to promote one or other mode of cure, used to form a distinguishing feature between the treatment of amputations on the continent and in England. It was always made to play a no less prominent part in any attempt to account for differences, real or imaginary, in the results of amputations in the two countries of France and England. Mr. Philips published some time back a paper,\* one of the chief objects

of which was to show how much greater is the mortality in amputations than is generally imagined; and he also proceeds to trace the influence of union by first intention, and by a consecutive process in amputations performed *for chronic and suppurative diseases*. I have already alluded to the numerical results of this paper, and the reasons which I thought sufficient to prevent their being conclusive on many points, although I fully concur in the general conclusions in relation to the mortality of amputations. It by no means follows, however, that even if not conclusive they should be entirely disregarded; and the uniformity of the results of union by the first intention are sufficiently remarkable. Amputations, for the class of diseases mentioned, seem to give a loss of about 1 in 4 when immediate union is attempted, 1 in 5 when consecutive: this is a striking difference, and tells strongly against the propriety of *attempting* union by the *first intention*. It would be desirable, however, to know what number of the 117 cases in which union by first intention was tried, actually took place. If, as I think probable, not one-sixth actually united permanently by first intention, the rest were examples of consecutive union; and the destruction in all, except the influence of the *attempt* and the *first dressing*, falls to the ground. When it was the fashion to stuff the stumps with charpie, and in sufficient quantity to create great irritation, pain, and inflammation in the amputated extremity, there can be no doubt great mischief was done, and many lives lost. But in going to the opposite extreme, we have by no means escaped all the evils resulting from an injudicious treatment.

Whenever amputation is performed in diseased parts, and in cases of extensive injuries after long suppuration—and such must often be the case—immediate union may be *attempted*; but the only result, in nine cases out of ten, is the healing or uniting of the divided skin, partially or entirely, leaving a baggy stump with unhealthy suppurative surfaces within. It becomes, in truth, an ingenious method of penning up, in contact with the divided veins, a foetid and unhealthy discharge, that it may become more putrid, burrow upwards, and produce a continuance of the mischief set up by the diseased and injured limb.

Fortunately, nature often remedies the blundering of surgeons, and in the course of a few days, in such cases, she removes the adhesions, and exposes freely and fully the diseased surfaces of the stump. They are found less healthy than when first formed by the knife; but from this period they generally improve. The effective cleansing of all putrid collections, which then becomes possible, and the stimulus arising from the contact of the lint or charpie laid gently between the two diseased surfaces, tend to produce healthy granulating surfaces on both sides; these, when brought together at a later

\* See Medical Gazette, 1839.

period, are in a state to unite, and do so permanently. Finally, the suppuration gradually diminishes by a much safer and more natural process, than when suddenly and violently arrested or penned up.

When the parts divided are healthy, but a long-existing suppurative disease below has been the cause of amputation, the circumstances are somewhat different: the clean incised wound made by the knife offers no opposition to union. Does the sudden suppression of a discharge to which the system has been long accustomed, furnish any reason against such treatment? All surgeons are familiar with the dangers attendant upon such an occurrence, whether produced by artificial means, or occurring spontaneously. To judge by analogy, immediate union cannot be effected without some danger; but neither is the artificial suppuration, which may be created by dressing the surface of the stump, to be effected without some dangers, to which immediate adhesion is not open. Some little suppuration, to replace the large drain removed by amputation, would be an advantage:—how is this best to be effected? The proposal of Mr. Philips to make an issue in the vicinity prior to amputation, offers a practical inconvenience, which he seems to have overlooked: the parts in the vicinity above are required to be, in some degree, handled by the operator or his assistants during operation; bandaged, &c., after amputation. An ulcerated surface, therefore, must be an unnecessary source of pain to the patient, and inconvenience to the surgeon. This does not seem to me a desirable alternative. A better mode, I think, may be adopted, and in several cases in which I have tried its effect it seems to have answered the design; viz., the introduction of a strip of charpie, or a skein of silk, at one angle, or at the lower edge of the stump, leaving it in about one-third; while the other parts are brought gently in contact: the thread by which the skein is slung being brought out at the upper angle, or, if a horizontal line is formed at one side, so as to prevent the skein slipping out, and by this thread the quantity left within the lips of the wound may be regulated and gradually diminished: by this means a little suppuration will be kept up, and yet the greater part of the cut surface allowed to heal.

In primary amputations, where the incisions are made in healthy parts, immediate union offers great advantages, and, *apparently*, with scarcely a counterbalancing disadvantage. This, however, will admit of doubt. Very often adhesion may take place, only partially; and in this case not only much is gained, but there is much to be lost, in rendering, by any method of dressing, such a result impossible.

There are three modes of dressing especially adapted to three classes of cases.

1. Union by first intention in whole extent, where amputation is performed in healthy

parts for chronic disease below, *not* of suppurative character; and union by first intention in *nearly* the whole extent, in all recent injuries, where amputation is performed in sound parts, or for chronic disease of joints, &c., where there has been no long-continued or wasting discharge.

2. Partial union by first intention in the manner I have described, where the amputation is performed in sound parts, is applicable to cases, whether of injury or disease, where a profuse and wasting discharge has long existed.

3. Consecutive union by the interposition of a fold of soft linen, charpie, or lint, between the diseased surfaces, until they assume a more healthy and granulating surface. This treatment being applicable to amputations, either for chronic disease or severe injuries, where the *parts divided in amputation are involved in suppurative disease*, with the upper extremities of sinuses remaining.

I cannot but hold that the advocates of either immediate or consecutive union, as applicable to all cases and circumstances, are both wrong, and act with little discrimination in adopting a similar treatment to cases so differently characterised. I anxiously hope that a treatment modified, upon fixed principles, in reference to *the nature of the cases*, will attract the serious attention of the profession, and ultimately meet with the favour but too often reserved only for extreme and sweeping methods, which seldom can be rational, and, at the same time, of universal application;—to all cases similar and dissimilar in their nature.

In reference to the period of healing, except in amputations performed in diseased parts (and even in some of these, the attempt was made), in the majority of the cases forming the series under consideration, the dressing was calculated to obtain union by first intention. Several appeared to succeed at the first dressing, but in many of them there was some opening out of the stump subsequently, either partially or to the whole extent, and some degree of suppuration established. Several of those patients who died presented stumps soundly healed by the twentieth day, or with the exception occasionally of a small point, clearly showing that if this rapid union does not in some cases add to the dangers of amputation, at least it is *no safeguard against the most fatal result*. I confess the whole bearing of my experience has been to attach far less importance, than has been and is still the habit of English surgeons especially, to the mere circumstance of immediate or consecutive union. In the most favourable cases for the former practice, if the latter mode of union goes on steadily and favourably, I firmly believe it to be safer for the patient. If the external circumstances are very unfavourable, such, for instance, as crowded hospitals, with sultry weather, bad attendance, necessity for transport, a prevailing epidemic,

Sec., then, indeed, I should rejoice to see my patients as rapidly as possible removed, by their entire cure from such deleterious influences. They would thus be saved from the danger to which all are exposed after a capital operation, and with an open wound, of some form of disease attacking them, when they are not only more susceptible of all morbid influences, but less capable of resisting their effects. Under such circumstances, however, as we meet with in private practice, or even in civil hospitals, I must declare that I believe the mere fact of immediate union a matter of very minor importance; and in many instances I am convinced the surgeon may have had cause of congratulation, that his best efforts to glue up the stump at once had but indifferently succeeded. How very heterodox

such opinions must seem to many English surgeons of the present day, I am perfectly aware; but it is an honest conviction formed upon the long-continued observation of facts. If we all speak with the same independence of general impressions—of dogma and preconceived opinions, I am convinced that if even error should be committed by one, yet truth will be the final result, and we shall insure a rapid development of correct principles of treatment.

Some further observations on the subject of union by the first intention, and on the relative periods at which stumps unite after the two different modes of amputation, together with the consideration of various questions in relation to the dressing and after-treatment, I must defer until the next lecture.

No. XVIII.—Amputations performed by Circular Incision.

		Total.				Cured.				Died.				Proportionate Mortality.
		Primary.	Intermediary.	Secondary.	Total.	Primary.	Intermediary.	Secondary.	Total.	Primary.	Intermediary.	Secondary.	Total.	
THIGH.	Cannon . . . . F.	1	1	..	2	1	1	..	2	..	..	..	..	0
	Musket } F. P.U. U.	4	4	7	15	2	2	4	8	2	2	3	7	2.1
		..	..	1	1	..	..	1	1	..	..	..	..	0
		8	4	2	14	1	..	..	1	7	4	2	13	1.
Total . . . . .		13	9	10	32	4	3	5	12	9	6	5	20	1.6
LEG.	Cannon . . . . F.	..	..	1	1	..	..	1	1	..	..	..	..	..
	Musket } P.U. U.	..	1	..	1	..	1	..	1	1	..	..	1	1.
		1	..	..	1	..	..	..	..	1	..	..	..	..
		1	1	..	2	1	1	..	2	..	..	..	2	1.3
Total . . . . .		3	4	2	9	2	2	2	6	1	2	..	3	3.
SHOULDER.	Cannon . . . . F.	1	..	..	1	1	..	..	1	..	..	..	..	..
	Musket } F. P.U. U.	1	..	..	1	1	..	..	1	..	..	..	1	1.
		2	..	..	2	2	..	..	..	..	1	..	1	1.
		..	1	..	1	..	..	..	..	..	1	..	1	5.
Total . . . . .		4	1	..	5	4	..	..	4	..	1	..	1	5.
ARM.	Cannon . . . . F.	2	..	..	2	2	..	..	2	2	..	..	2	1.
	Musket } U. F. P.U.	2	..	..	2	..	..	..	..	..	1	..	1	14.
		3	6	5	14	3	5	5	13	..	2	..	2	1.
		..	2	..	2	..	..	..	..	7	3	1	11	1.2
Total . . . . .		17	11	6	34	8	5	5	18	9	6	1	16	2.1
FOREARM.	Cannon . . . . U.	1	..	..	1	..	..	..	..	1	..	..	1	1.
	Musket } F. U.	..	1	1	2	..	..	1	1	..	1	..	1	2.
		1	2	1	4	1	1	1	3	..	1	..	1	4.
Total . . . . .		2	3	2	7	1	1	2	4	1	2	..	3	2.3
General Total . . . . .		39	28	20	87	19	11	14	44	20	17	6	43	2.

## No. XIX.—Amputations performed by the Flap Operation.

	Total Number of Cases.				Cured.				Died.				Mor- tality
	P.	I.	S.	Total	P.	I.	S.	Total	P.	I.	S.	Total	
HIGH...Cannon.. P.U.	1	..	..	1	..	..	..	..	1	..	..	1	1.
Musket } F.	2	..	5	7	1	..	2	3	1	..	3	4	1.7
U.	3	..	..	3	1	..	..	1	2	..	..	2	1.3
Total.....	6	..	5	11	2	..	2	4	4	..	3	7	1.5
LEG.....Cannon.F.	..	..	1	1	..	..	1	1					
Musket.U.	1	..	..	1	..	..	..	..	1	..	..	1	1.
Total.....	1	..	1	2	..	..	1	1	1	..	..	1	2.
Cannon.F.	1	..	..	1	1	..	..	1					
P.U.	1	..	..	1	1	..	..	1					
SHOULDER-JOINT..F.	1	..	..	1	1	..	..	1					
Musket.U.	2	..	..	2	1	..	..	1	1	..	..	1	2.
Total.....	5	..	..	5	4	..	..	4	1	..	..	1	5.
ARM....Musket } F.	1	..	..	1	1	..	..	1					
U.	3	..	..	3	..	..	..	..	3	..	..	3	1.
Total.....	4	..	..	4	1	..	..	1	3	..	..	3	1.3
FOREARM...Cannon F.	1	..	..	1	..	..	..	..	1	..	..	1	1.
Musket.U.	1	..	..	1	1	..	..	1					
Total.....	2	..	..	2	1	..	..	1	1	..	..	1	2.
General Total ..	18	..	6	24	8	..	3	11	10	..	3	13	1.84

## RESEARCHES

INTO

VALVULAR DISEASES OF THE  
HEART,

IN CONNECTION WITH THE

SOUNDS OF THAT ORGAN;

ILLUSTRATED BY CASES.

By THOMAS MOORE, Esq., M.R.C.S., late  
Secretary to the Dublin Medico-Chirurgical  
Society.[Read before the Dublin Medico-Chirurgical  
Society.]

(Continued from p. 619.)

CASE 2.—Permanent patency of the auri-  
culo-ventricular openings resulting from a  
shortening, puckering, shrivelling, and appa-  
rent absorption of their structures; bellows-  
murmur (bruit de soufflet) intermitting in  
distinctness and duration, accompanying first  
sound; aortic and pulmonary valves with the  
coats of the arteries healthy; second sound  
perfectly normal; emphysema of both lungs;  
disease of liver, &c.

*Symptoms on Admission.*—On September  
5th, 1839, Mary Burke, a woman upwards

of fifty years old, was brought into hospital  
so "blown in the wind," and so troubled with  
palpitations, that latterly, on using ordinary  
or unusual exertions in walking about her  
apartment, ascending the stairs, or any height,  
her breath was almost taken away; her  
heart fluttered, faltered, and again beat with  
so much violence, that, to use her own expres-  
sion, she imagined "it was jumping into her  
mouth." Her expression of countenance was  
that of great suffering and anxiety; the face  
was flushed, of a dark red, approaching to a  
purple hue; the eyes clear and glistening;  
the jugular veins, the right in particular, pre-  
sented a considerable degree of turgescence,  
with a well-marked, wave-like motion com-  
mencing at the clavicle, proceeding upwards  
towards parotid gland, and terminating at a  
point midway between angle of lower maxilla  
and mastoid process; two or three distinct  
undulations were observed to follow in toler-  
ably quick and regular succession: these  
undulatory motions then intermitted for sev-  
eral seconds, and were succeeded by others  
much less distinct, and not passing beyond  
the middle of the neck; by placing the finger  
opposite the thyroid or circoid cartilage, and  
intercepting the flow of blood, a slight im-  
pulse could be perceived, at each forcible