ADDRESS IN SURGERY,

BY

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ON THE PREVENTION OF BLOOD-POISONING IN THE PRACTICE OF SURGERY.

WHEN honoured by the invitation of your Council to give this year the Address in Surgery, I had to consider on what subject I might venture to speak to you, I could not help regretting that one had not been chosen for me. I was embarrassed by the range of choice. Working as I am at surgery in general, there is no particular subject on which I am entitled to speak with especial authority; with any authority indeed beyond, or even equal to, that which many of those whom I address can claim. But then, on reflection, I could not doubt that, if the members of this Association had been called on to select a subject for this address, the majority at least would have chosen that which is, I think, not only in itself the first and largest in surgery, but also the one which of late years has occupied the attention of most surgeons far more than any other, and concerning which the most opposite opinions are entertained by those who have the fullest opportunity of studying it.

Need I say that I refer to the subject of Blood-Poisoning and its prevention? I think I am speaking advisedly when I call it the largest and the first; for it is not only an evil spread over the whole field of surgery—in what class of cases is its deadly presence unknown? but it is, if not the sole one, almost beyond comparison the chief evil which waits upon the surgeon's own work. It seeks its quarry not only in disease and accident, though here might be found scope enough for its powers of destruction; but it hovers over every operation, and by its fell swoop can destroy the best work and fairest promise of the surgeon. Yes; truly it has been the scourge of surgery. Is it so still? Would I could say it was altogether a thing of the past—of history only; that we are able now to cast it out. No; I cannot state this. When will some successor of mine in this honourable but responsible position be able fairly to affirm so much? But this I may say, that of late a vast amount of the best work has been done in this direction; of work so worthy, that if the demon has not been altogether exorcised, in its power of mischief it has been so trodden under foot that now, when it moves among us, we are startled as by some strange thing. Let those who think my language overcharged look at the records of surgery in the last generation only, and in this they will see somewhat of the good which has been wrought—but a fraction of it; for it is only in our own time that anything like an accurate record has been kept of the number of lives thus destroyed. How many lives were so sacrificed in former times, no one can tell? for the nature of the mischief being then unknown, its fatal work was set down to the account of various other causes. It is only in time within the reach of many of us, that its presence came to be recognised with sufficient distinction to have a name; and surgeons, you know, are not slow to find names for new things, whether real and actual, or mere imaginings. Yes, surely the chief triumph of this era of surgery is the successful war it has waged with blood-poisoning in all its various forms.

To avoid risk of confusion, let us consider for a moment what is to be understood by the term blood-poisoning. I shall employ it in its comprehensive sense, to express the sum of the effects produced by the introduction of matter changed by the action of septic poison into the blood. By septic poison, I understand matter capable of producing or promoting putrefaction. This septic matter is thus, of course, separated from all inorganic and vegetable poisons commonly so called, and by its effects, at least in the economy, from those zymotic poisons which produce such diseases as small-pox, scarlatina, measles, and the like. But I need hardly add that I include in this view, not only the affections called pyæmia, septicæmia, ichorrhæmia, and so on, but some others which perhaps would not be so universally accepted to be within the pale, as, for example, erysipelas, certain forms of erythema, boils often, and carbuncle, and some other affections more vague and transient, which perhaps I need not now further particularise, for on this subject I have already spoken elsewhere. Of course, I do not forget that concerning the pathology of erysipelas, for instance, contrary views are still entertained. For my part, I consider it to be fairly well established that erysipelas is due to some infection of the blood; that it is the result of some form of blood-poisoning, and very closely allied to the affections called septicæmia and pyæmia. Nor shall I now trouble you with any discussion of the relation of the affections called septicæmia and pyæmia to each other. But, in order to be clear, it is as well to

say that I do not think there is any evidence at all sufficient to show that these affections are different in kind or in nature. So far as I can see, they differ only in degree—a degree probably determined, at least chiefly, by the intensity of the poison which operates. I can find no reason for assuming a difference in the nature of the poison itself. For the grounds of this opinion, I must refer you to former papers on the subject.

The cause, then, of the blood-poisoning of which I speak is the introduction of putrid matter to the blood. I say its introduction, for if it ever originate in the blood itself, such an origin is at present beyond research. We know nothing of it. All we do know is, that it may be introduced from without. The current belief—may I say the established fact? is, that the agents of putrefaction exist in the form of solid organic particles, some so minute as to be beyond the range of the highest powers of the microscope, which float freely in the air, and are now commonly called germs, and which abound in decomposing organic matter of various kinds; notably, and this is of chief interest to us, in decomposing animal fluids.

Let it be observed however, in passing, that although the germ-theory in its present form is of very modern growth, the belief that the admission of air to recent wounds is in some way injurious is not a new one. It extends at least beyond the era of the introduction of subcutaneous surgery, which is founded on it.

Now it is necessary for me, in order to avoid being misunderstood in what I have to say hereafter, to state thus much; but I do not propose to enter further into, to disturb the vexed questions that arise therefrom. I am considering the subject now only from a clinical point of view. Therefore, I turn from any farther inquiry into the more precise nature of these septic particles. In what sense, for instance, they are entitled to be considered alive need not trouble us here, or whether they are more akin to vegetable or to animal life. That they are organic, and possessed at least of the fundamental attributes of living matter, seems proven by their behaviour, and by some of the tests that we can apply to them. It is enough for us that they are septic; that they can produce and promote putrefaction; and further, that fluids so changed by them may provoke those terrible effects which are only too well known as blood-poisoning. I speak thus of the fluid which poisons, saying changed by, rather than charged with, bacteria or their germs, according to evidence; but I need not now consider this question. You will remember that it was discussed in a masterly manner in 1878, by Dr. W. Roberts, in his Address on Medicine. Neither have I now anything to say concerning the particles of matter at present called bacteria. Everyone knows how they are prone to abound when putrefaction and kindred changes occur. For the most part, I suppose their presence may be regarded as the signal that such changes are in progress; but the exact relation they hold to such changes is at present with many a vexed question, and it is not necessary now to disturb it.

I have only one further remark to make on this portion of my subject. I have said that we have no knowledge that these mischievous particles ever originate within the blood. We do know that when fluids so changed by them find an entrance from without, they are prone to provoke grave mischief. But we also know that such fluids, potent for the gravest mischief, may be produced within the body, deep among the tissues, far away from any chance of direct communication with the air, and this without previous wound or injury of any kind. Upon the passage of such matter into the circulation, the most fatal form of blood-poisoning may supervene. This significant fact, which is beyond question, has been of late strangely set aside, I would almost say wilfully overlooked, in very much of what has been written within the last few years; a fact significant, indeed, in a twofold sense. But to this I shall presently return.

It will be admitted, I trust, even by those who unreservedly accept what is known as the germ-theory, that I have not been in any way unfair in what I have thus said on the subject. Some, I know, would not go so far as I have gone, but I am anxious not to do injustice to this view. But now I turn to another side of this great subject: a side which throughout the discussion has been curiously lost sight of; which, so far as I know, in the vast amount that has been said and written, has been almost entirely ignored. If the germ-theory in its past and present state contained the truth, the whole truth, and nothing but the truth, what possible explanation is to be given of that which is witnessed daily and hourly—the kindly repair of exposed wounds? I will venture to say that any one who had no clinical experience, but who accepted all that he could read on the germ-theory, would inevitably come to the conclusion that to expose any wound unguarded to the atmosphere would be to seal the fate of the patient. But what is the fact? Who requires to be informed? Then is it not clear that the whole truth has not yet been told? Nay, further still, not only are

exposed and unguarded wounds constantly to be seen in healthy process of repair, covered with secretion which presents no evidence of putrefaction, but wounds are sometimes seen bathed in fluid, which, if injected into the blood, would forthwith produce all the effects of blood-poisoning in the most intense degree. And yet further: not only may such fluids lie in contact with open wounds without provoking any evidence of mischief, but a collection of the foulest fluid, in a state of the most active putrefaction, may be pent up in a closed cavity under considerable pressure; as, for example, in an anal or pharyngeal abscess or in an abscess around dead bone—I say a collection of matter large enough and poisonous enough to destroy a host of persons, if passed into the blood, may remain thus pent up in the body for a long period without any visible disturbance of the general health. It is obvious, then, that the contact of wounds and raw surfaces with even putrefying fluids is not always enough, for this is seen continually without evil effects. They must be transmitted to the blood. I hardly know what would become of the practice of surgery if this were a matter of course. In point of actual fact—a fact second in importance to none in surgery, but which it is the fashion just now resolutely to ignore—I say, in point of fact, it is very far from it. The transmission of such fluids, when they are present, is the exception, not the rule. Now, here again I am content to take the fact itself; and I do not propose to enter, at all events at any length, into any attempt at explanation. I do not think, however, that we are altogether in the dark. All wounds, except the most recent, when tolerably healthy, are covered, as we all know very well, by a newly formed delicate structure sometimes called granulation-tissue; sometimes presenting other but kindred forms; but which in any case constitutes a continuous layer interposed between the blood and whatever may be on the surface; and it seems to be pretty clear that this animal membrane has, like similar structures of the class, the property of separation; that it has the power of allowing the transmission of certain substances and of rejecting others, and that upon this simple action of dialysis health and life very often depend. I say this explanation has been made reasonable by observation and experiment; but whether it be wholly or partially true or not, the fact—the vital fact—which it attempts to explain remains. Pause, if only for a moment, to think of it: a fluid all-potent for mischief, intensely poisonous on the one side, the blood, to which if it gain access follows destruction on the other, and a very thin, very delicate, most fragile membrane only intervening! Truly enough, to the patient ignorance of this is bliss; and surgeons just now talk, and write, and practise, as if it were folly to be wise.

But such terrible transmission is sometimes effected, and there is blood-poisoning. It remains, then, to inquire under what conditions the poison can gain entrance to the blood. I think the clinical study of this subject impresses us with some striking facts. First of all, this mischief is least likely to happen in healthy wounds during the process of repair; and, when it does occur, it is either in a wound unhealthy in character or flagging in action, or in one so recent, or in which the process of repair has been so delayed, that little or no new and healthy tissue has been produced on the surface. In other words, when the newly formed tissue is healthy and entire, it is tolerably impregnable, and whatever interferes with its integrity gives the opportunity for mischief. I say the mischief is less likely to happen in proportion as the wound is healthy and repair is rapid; but exceptions to this we know to occur; and it is reasonable to suppose, in some cases at least it has been almost demonstrated, if in some obscure corner reparative action has not failed, that from some violence or accidental disturbance or other cause, the continuity of the new structure has been broken or its integrity somehow impaired, and so the poison has passed in.

And now I hasten anxiously on to prevent the possibility of misapprehension even for a moment. But no one, I trust, could imagine from what I have been saying, that I am not to the last degree impressed by the mischief which may arise from the presence in wounds of any kind of decomposing fluid; that in the most absolute and thorough cleanliness—not in the common sense only, but in a surgical one also—can a patient be at all secure. I shall return to this; but I shall not be in any way misunderstood here. My present purpose is to insist upon the fact that two conditions at least are required for the mischief of blood-poisoning; and that of late, in the concentration of attention upon the other, one of these has been strangely overlooked. There must be a fluid potent for evil, and there must be a surface ready to transmit it. Obviously, then, the means of preventing mischief, of conducting our patient safely through recovery from wounds and injuries, lies in fulfilling the opposite conditions: in the rigid prevention or exclusion, so far as it is practicable, of all putrefying or decomposing or foul fluid, and in keeping wounds in as healthy a state as possible, in fostering the soundest and most rapid process of repair. If either of

these conditions be fulfilled, the patient may escape the mischief we dread; but undoubtedly the duty of the surgeon is, by all means within his power, to secure both. He is below the mark if he can ever be satisfied with less than this.

Furthermore, be it remembered that these two conditions, as the rule, are found in company. The fresh fluid upon the surface of a wound which is healthy and in process of repair is innocuous. No mischief of this kind lurks in fresh healthy pus; and if the fluid which bathes the surface of a wound become foul or putrescent, the character of the wound itself is apt to change and the integrity of the surface to suffer. Therefore, a healthy wound in process of repair and a fluid on the surface which is innocuous, as the rule, go together.

Animal fluids exposed in open vessels to the air after some time become putrid, the length of time varying with the state of the air; and so it is forthwith concluded and argued by many that if fluid upon the surface of a wound be exposed to the air, it must while there become putrid too. But the fact is, that any one who cares to witness it may see fluid at any time upon the surface of exposed wounds which is not putrid. And the explanation of this most familiar fact is simple enough: that the fluid in the vessel has been kept until it has become foul, while the fluid upon the surface of a wound in process of repair which is duly watched and properly managed is ever being renewed. The same fluid ought not to be allowed to remain long enough to undergo mischievous change. There is, after all, some difference between stagnant water and a running stream.

Dr. Roberts, in his memorable address last year, said: "Before we can understand the pathology of septicæmia, we must have clear ideas on the relation of septic bacteria to our bodies. We see in our laboratories that dead animal tissues, when exposed to ordinary air or ordinary water, invariably breed septic organisms; in other words, contact of septic germs with the dead tissue never fails to produce successful septic inoculation. But this is quite otherwise with the same tissues when alive and forming part of our bodies. You cannot successfully inoculate the healthy tissues with septic bacteria. It has been proved over and over again that these organisms, when separated from the decomposing medium in which they grow, can be injected in quantity into the blood or tissue of a healthy animal, or applied to a sore on its skin, without producing the least effect. The healthy living tissues are an unsuitable soil for them; they cannot grow in it; or, to put it in another way, ordinary septic bacteria are not parasitic on the living tissues."

"This fact," he continues, "is of fundamental importance in the discussion of the pathology of septicæmia. We have a familiar illustration of its truth in the now common practice of subcutaneous injection; every time you make a subcutaneous injection you inject septic germs into the tissues."

Thus the surgery of the present day, in this respect, is characterised as antiseptic; that is to say, since surgeons have duly recognised this great impending evil, they have, as their chief aim, striven to avert it. Here, at all events, increase of power has followed closely on the advance of knowledge. One has not, I repeat, to turn far back in our literature before all evidence of any suspicion of what is now known as blood-poisoning disappears. Our knowledge of the fact of even the existence of such an affection is of recent date; and for several years after the subject first attracted the attention of surgeons, the comparatively clear and simple view of its pathology which at present prevails was for a while obscured by theories and doctrines which drew observation away from the actual cause to speculations on phlebitis, thrombosis, and other changes which are often associated with it. The history of our present knowledge of blood-poisoning is an interesting and instructive one. At first, all attention being naturally concentrated on the changes wrought in the body, the origin and cause of the affection was sought only within those limits. Then when the truth began to dawn that the actual poison was derived from without, the pendulum of opinion, according to its wont, swung at once to the opposite extreme, and I venture to think that of late the opposite error has prevailed, of regarding only the conditions under which the poison is formed, and losing sight altogether of the conditions under which it affects the blood.

Antiseptic surgery! Unhappily there is much confusion in the current employment of this phrase. This ought to mean—and with some, but a few only, it does mean—the principle which aims to secure healthy wounds and their repair as speedily as possible (for while they last there is always risk) by the most scrupulous cleanliness—by cleanliness, I repeat not only in the common, but in the surgical sense, which means the prevention or removal or destruction of all matter which may prove poisonous. This, I take it, is the only adequate conception of antiseptic surgery; and, as thus understood, the term antiseptic ought in

fact to become superfluous, being thus simply equivalent to good surgery. Less than this, should mean unwholesome practice. But somehow there is a weakness among us for exuberance of this sort. What a run the phrase "conservative surgery" had, for instance, nay, still has in certain quarters, as if surgery itself were worth anything, could have any value, or even deserve its name, if it were not in the truest sense conservative. The employment of the term conservative ought surely to mark an inadequate conception of our art, and I would fain say the same of the word antiseptic. If surgery be not antiseptic in the sense I have endeavoured to indicate, it must foster most dangerously, by covering with its sanction, the prevalence of mischief. But antiseptic surgery, as more commonly understood, implies the liberal employment in practice of special agents, which are collectively known as antiseptics; and the number of these—their name is legion—which has been introduced to the profession and the public, and the amount of many of them which is consumed, testify abundantly to the extent of opinion in their favour. But in this sense, again, I suppose all surgeons now-a-days practise antiseptic surgery. Perhaps an instance hardly ever occurs now in the treatment of a wound in which an antiseptic of some kind is not in some way employed during its progress; never, perhaps, in what should be called civilised surgery, if we allow—as we should allow—free ablution with clean water, adequately used, to be amongst the simplest, safest, best of antiseptics.

And lastly, the term antiseptic is employed, and this most commonly of all, to express a particular method of carrying out this great principle; the method which has attracted, and is still attracting, so large a share of attention. Of course, I allude to that which has been devised by Lister, and which is more precisely termed Lister's plan or method of dressing wounds.

It would be a matter of comparatively little moment in which of these senses the term antiseptic were used, if only the present degree of confusion could be avoided; but some mischief arises, I think, when the principle itself is confounded with any special mode of practice.

Now, since some light has been thrown on the nature and cause of this affection, what has surgery done to avert it? Yes, there are grounds for congratulation in this direction. This would surely be the answer given by the general experience of surgeons, and vague and full of fallacy as this necessarily always is, it must, and especially in this case, be allowed to go for very much. And this is the answer given by statistics, which, although too often laden with fallacy also, speak, I believe, plainly and conclusively on this point. I have no intention of trespassing on your patience now with any formidable array of figures; but rather by way of illustration than of complete proof of the truth of what I state, I would ask you to regard for a moment the facts set forth in this table.

Tables showing the Statistics of Blood-poisoning after Operation or Injury in St. Bartholomew's Hospital for the Years 1876-77-78.

	1876.				1877.				1878.				The 3 Years.	
	Male.	Female.	Total.	Per ct.	Male.	Female.	Total.	Per ct.	Male.	Female.	Total.	Per ct.	Total.	Rate per cent.
Cases of Injury	665	250	915	—	686	191	877	—	807	263	1070	—	2862	—
Cases of Operation	268	133	401	—	274	144	418	—	225	191	416	—	1235	—
Deaths after Injury	56	19	75	8.19	51	15	66	7.52	53	20	73	6.82	214	7.47
Deaths after Operation ..	24	3	27	6.73	17	6	23	5.5	14	8	22	5.28	74	5.82
Cases of Pyæmia after Injury	—	—	—	—	4	—	4	.45	1	1	2	.18	6	.29
Cases of Pyæmia after Operation	2	—	2	.49	4	1	5	1.19	3	1	4	.96	11	.89
Cases of Erysipelas after Injury	10	3	13	1.42	3	—	3	.34	4	2	6	.56	22	.76
Cases of Erysipelas after Operation	9	6	15	3.74	3	5	8	1.91	10	5	15	3.62	38	3.07
Deaths from Pyæmia after Injury	—	—	—	—	4	—	4	.45	1	1	2	.18	6	.29
Deaths from Pyæmia after Operation	2	—	2	.49	4	—	4	.95	3	1	4	.96	10	.80
Deaths from Erysipelas after Injury	2	—	2	.21	1	—	1	.11	1	—	1	.09	4	.13
Deaths from Erysipelas after Operation	3	—	3	.74	1	1	2	.47	2	1	3	.72	8	.64
Cases of Blood-Poisoning after Injury	10	3	13	1.42	7	—	7	.79	5	3	8	.74	28	1.05
Cases of Blood-Poisoning after Operation	11	6	17	4.23	7	6	13	3.11	13	6	19	4.56	49	3.96
Deaths from Blood-poisoning after Injury	2	—	2	.21	5	—	5	.57	2	1	3	.28	10	.42
Deaths from Blood-poisoning after Operation	5	—	5	1.24	5	1	6	1.43	5	2	7	1.68	18	1.44

All the operations, you observe, upon which this table is based are of some magnitude, most of them capital ones; trivial operations have been eliminated. From these calculations, too, for various reasons, you see that operations for hernia, ovariectomy, and operations on the eye have been excluded.

This short table, then, presents a summary of the results of the surgical practice of St. Bartholomew's Hospital, in this relation, during the last three years. I have had no hand in the work of preparing it. It has been drawn up by Mr. Macready, who is one of our surgical registrars; and I need not assure those who have the pleasure of knowing him that it is a faithful, independent, and trustworthy record. In the labour of it he has had no cause to serve but that of truth.

I may add that our hospital statistics are published yearly, of course on a far more extended scale, and that in those tables and in our own case-books the facts, which are open to any one, are fully set forth upon which these figures are founded.

What, then, is here shown? That in 1876 the absolute number of deaths from pyæmia after operation were 2, which is at the rate of .49 per cent.; or including erysipelas in the common term of blood-poisoning they were 5, at the rate of 1.24 per cent. In 1877, the number of deaths from pyæmia were 4, at the rate of .95 per cent.; or including erysipelas they were 6, at the rate of 1.43 per cent. In 1878, the deaths from pyæmia were 4, at the rate of .96 per cent.; with erysipelas 7, at the rate of 1.68 per cent. Once more, during the three years there was a total of 18 deaths from blood-poisoning after 1,235 operations, and this is at the rate of 1.44 per cent.

Now, so long as any instances whatever of this mischief occur, we shall regard our work in this respect as defective, and strive to do it better. I, at least, am ready to change my present plan of management when there is evidence of this character that better results can be accomplished by any other means.

Yes, I think it cannot be doubted that the occurrence of blood-poisoning during the progress of wounds and recovery after operations has been of late very far less common than formerly, and is, I venture to believe, daily becoming yet more rare. It is far less frequent now than it was, I will not only say many years ago, when we cannot estimate its frequency from lack of any adequate record—because, indeed, then its actual occurrence often escaped even passing notice—but it is now far less frequent than it was only a few years back, within even the memory of younger surgeons. But congratulatory, I had almost said triumphant, as are the statistics of the present day, I must own that it is necessary to regard these with a jealous eye, and in many instances at least not to accept them without reserve: for this chief reason. Since the prevention of blood-poisoning after wounds and operations has become the great theme of surgery, surgeons almost everywhere have been naturally and very laudably anxious to gain credit for the best results. A keen, active, and noble rivalry has sprung up between surgeons and between institutions. A splendid struggle now goes on throughout England, Europe, and the civilised world to reduce the mortality from this cause after operations to the lowest possible terms. Beyond all doubt, the gain to human life and health from this has already been immense—who shall say how great, or how much greater still it will be? But then, you know, in such a case it is almost inevitable but that the judgment will be swayed by the desire; that, in one's anxiety to escape what happily has become almost the disgrace of the occurrence of blood-poisoning in any case under one's care, the signs of it are rather open to be misinterpreted, or explained away, or called by some other name. The mischief that arises and perhaps kills is set down too readily to some other cause, to any cause rather than this. In short, it is met as a disreputable acquaintance and not recognised. But, gentlemen, even this is by no means without excuse, if only such sophistry is the outcome of enthusiasm and does not willfully pass beyond the limits of honesty. It leads nevertheless to error, and of course is to be avoided if possible. For my part at least, then, I do not accept statistics here (or for that matter statistics of any kind) without reserve. Statistics on this head, to be fairly trustworthy, should state not merely the fact of death, but in each fatal case after operation or injury, when not attributed to blood-poisoning, a plain statement of what is actually disclosed by an examination after death should be given; and this would be yet more valuable if such a record were made by some independent observer. Or, failing this, I would rather take as a standard the total number of deaths which occur after injury or operation, to whatever cause or causes they may be attributed; for, excepting distinctions which can be safely drawn, such as immediate death, or death supervening within an hour or so, and obviously from direct exhaustion or death from hæmorrhage, and excluding the results of certain operations—as tracheotomy and trephining, and those for hernia—in which death is often due rather to the disease or injury for which the operation is performed than to the operation itself, I should venture to say the difference is very small in-

deed between death after operation from any assigned cause whatever, and death from poisoning of the blood.

And now, furthermore, by what particular means have these results been achieved? Hitherto, I say advisedly, the best results by the simplest means.

Forgive me if I refer again to the records of my own hospital—St. Bartholomew's—for evidence of this responsible statement. I claim from our statistics this—and if I am in error you will reject the claim—that the result to which they testify has not been, on the whole, surpassed. I believe they may challenge comparison with those from any other trustworthy source.

Now, considering all the various details in the treatment of wounds and the management of cases after operation, the practice of no two surgeons of the staff is precisely alike. Each one of the surgeons perhaps carries out certain details in some way different from the others, but on the chief objects in view we are undoubtedly in accord. We aim at the most scrupulous cleanliness, in the most comprehensive sense of the term. We strive to secure this by all possible means. We watch very carefully the actual state of wounds, and we use very freely antiseptics of various kinds. And, with cleanliness, we attach for the most part the highest importance to rest. We are careful to disturb wounds during the process of repair as little as possible. Cleanliness in its surgical sense and rest in its physiological sense may be said to be the leading aims. But we are by no means satisfied with directing attention only to wounds. We are most jealous of the state of the atmosphere of our wards. We keep the air as pure as possible. We have no particular or patent system of ventilation. Ventilation is effected only by open windows and large chimneys. But we are proud of the habitual state of our wards, even when most closed, as during the night-time. We should not for an hour tolerate any unpleasant or suspicious odour. We are very careful to avoid, as far as practicable, any tendency to overcrowding of wounds in the same ward, and each patient has from 1,100 to 1,400 cubic feet of space. Lastly, we attach the highest importance to the state of health and condition of our patient before operation, and never, when we have choice and opportunity, do we inflict an injury without previous inquiry in this direction very fully carried out. Well, what of all this? will perhaps be said. Of course, all this is done everywhere. So much the better. The results, you see, are not due to anything beyond the observance of the recognised principles of surgery. I have said our individual practice differs in detail; but my conviction is, that our results are due to the strict observance of sound principles of surgery. For the rest, I shall take the liberty of trying your patience for a few moments by describing somewhat more in detail the practice I follow, because I believe that results equal to the best hitherto obtained may be thus reached.

Well, then, taking a case—say, of amputation through the thigh, or of excision of the breast—I should treat the wound in the way following. Having carefully arrested all hæmorrhage, using most probably the carbolic catgut ligature, and having gently removed any particles of blood-clot that may have lodged on the surface, employing only clean water or sponges just rinsed out of it, I should, without any further interference with the surface of the wound, bring the edges together, adapting these as nicely as possible with silver wire sutures. I should not in this way attempt to close the wound completely, but I should leave spaces between the sutures, perhaps from one to two inches long. Then, over the course of the wound and for some distance on each side of it, I should place a layer of folded lint which had been previously well soaked in olive or almond oil containing one part in about fifty of carbolic acid. Over this again I should place two or more layers of dry lint, either with or without cotton-wool; so arranging this as, by gentle and equable pressure, to secure without any violence, as far as practicable, the accurate adaptation of the surfaces of the wound throughout, avoiding thus any considerable cavity in the interior. I should secure all this by strapping or bandage, or both, so adjusting these that they may be hereafter removed with the least disturbance. I should place the patient and the wound in the most comfortable position possible, having especial care to the fact that fluids, as they form, may flow outwards. Thus, for instance, after excision of the breast, I have, for some time past, placed the patient, not on her back, but on the opposite side, so as to make the inner angle of the wound the most dependent part of it. I am convinced that this assists greatly in promoting speedy and satisfactory repair. It is much better for fluid to escape at the inner than at the outer angle, and this more especially when the axilla has been disturbed by the removal of glands. The cellular tissue is so very much less abundant and less loose towards the sternum, that the chance of infiltration of it by fluid is very much less. As a rule, perhaps, I do not disturb this arrangement for forty-eight hours, although very often I change the dressing and inspect the wound after twenty-four. I am guided in this matter of time

chiefly by the state of the patient; whether spare or full-bodied; his sense of local and general comfort, freedom from or complaint of pain; and the season or temperature. But whenever I am in any doubt, I change the dressings. These, then, are removed with the utmost gentleness and the state of the wound carefully inspected. Especially is attention directed to whether there is any tendency to the lodgment of fluid; whether that which forms can escape freely; whether there is much tension of the edges. I am bold enough to think that a surgeon who understands his business can tell, without any painful handling, whether the surfaces of the wound are fairly in contact, or whether there is any tendency to the accumulation of fluid separating them. But if any doubt arise on this important point, a perfectly clean probe or director, lightly applied to some portion of the wound, will solve it, and secure ample vent; if at all necessary, I should not hesitate to remove one or two or more sutures. If the wound presented no other evidence than that of satisfactory repair, I should dress it as before, and proceed in this fashion, dressing and examining it daily or less frequently, according to circumstances. But if at the first dressing, or at any time afterwards, the discharge became at all profuse, or the surfaces did not remain in contact, or there were much tension or a blush at the edges, I should forthwith substitute a bread-and-water poultice for the previous dressing, and probably continue to employ this until at least all the deeper portion of the wound had closed. When I dressed the wound, I should wash it probably from the first with tepid water, perhaps containing some permanganate of potash in the form of Condy's fluid, or other potent antiseptic of the least irritating kind. I should accomplish this washing out, if I thought fit, portions or even the whole of the interior by the use of a syringe, avoiding contact of sponges or other substances with the wound. I aim here at the utmost possible cleanliness, having at the same time due regard to the avoidance of any unnecessary disturbance, that the process of repair be not interrupted. And withal I endeavour, by means I need not indicate, to secure for my patient the most complete rest and the purest air.

With regard to the substitution of a poultice or water-dressing, or some other form of application for the simple dressing used in the first instance, I think one can tell for the most part beforehand if they are likely to be required at all, or early in the management of the wound. In young persons in tolerably good health and spare, most wounds, when not worried, heal very directly. It is in those advanced in life, with flabby textures and much loose fat among them, that wounds give most trouble. These pour out fluid freely and are prone to flag, and, while the process of repair is delayed, may fall into mischief in various ways.

Now, I am sure you will allow that this mode of treating wounds in general which I have thus slightly sketched, is characterised by its simplicity and the entire absence of all novelty; my purpose being to interfere in the least degree possible with the work of nature. Some years ago, it would not be worth recording; and now perhaps it will excite surprise to find that any plan of treatment with so little in it is still adopted. Allow me yet to trouble you with a few comments.

In the first place, at the time of the operation, or immediately afterwards, you see, nothing is applied to the wound but water; as a rule, no antiseptic of any sort, provided the surface of the wound is healthy: because I believe that such healthy natural surfaces are in the state best adapted to satisfactory repair; and that, as a rule, in proportion as they are changed by the application of foreign agents, so are the changes which initiate repair hampered or arrested. I would ask, if it be wise: thus to wash the surfaces of recent wounds with antiseptics, why not treat all wounds so; as, for example, in the operation for hare-lip? Antiseptics, at this time especially, are irritants in some degree; and, unless they are very strong, and therefore very irritating, their power to arrest mischief is lost before the period for that mischief has arrived. Therefore it seems to me, for the employment of antiseptics from the first to become reasonable, the wound throughout its progress must be kept thoroughly under their influence; and of this particular plan I shall speak presently.

Then you see, as a rule, I do not employ drainage-tubes. Now, the employment in routine of drainage-tubes is so fashionable; they are just now, and for some time past have been, so high in favour with surgeons in general, that I must ask your indulgence to bear with me while I venture to criticise their action. The purpose for which they are so habitually employed is undoubtedly clear and sound enough: to avoid the accumulation of fluids in wounds. These fluids, when they have become changed, are the most common and active source of mischief; and the less lodgment there is of these in a wound, the safer it is for the patient. But is there no other means than this of providing for the escape of such fluids? You will perhaps gather, from what I have already said, that I for one believe there is, with ordinary care and skill. I think, if the edges of a wound be not allowed to close before the deeper

parts, and that by position the outlet be made sufficiently dependent, as a rule all dangerous accumulation may be avoided. There are instances, however—exceptional, I think, after operation, but of more frequent occurrence in other cases—in which the insertion of something between the edges of a wound, or deeply into its substance, or throughout may be very useful; and then for the most part I should employ a strip of thin gutta-percha or some threads of carbolised catgut. I am most disposed to insert something of this sort where I expect the process of repair to be least direct, where the wound is large and irregular, and where the secretion is likely to be profuse and rapid. For example, after the removal of a breast in a very fat person, I should probably, at one or two parts, insert a narrow slip of gutta-percha. But why not, then, do this in every case? Well, I think there is no material objection to it; and, where otherwise the progress of the wound cannot be watched in a trustworthy manner, it is better to adopt it. But I repeat that, as a rule, in the management of the simpler wounds, under the care of a surgeon who knows his business, there is no need of it. But, in my mind, there are positive objections of great weight to the employment of drainage-tubes. At first sight, indeed, for their chief purpose, they are very plausible instruments; but do they after all effectually discharge their duty? Does the greater portion of the fluid which forms in a wound where they are as a rule escape from them? From my own experience, I should say, No; and I do not think I am at all singular in this observation. It has been more than once publicly pointed out—and I am sure the fact must have been often witnessed—that when a drainage-tube is withdrawn from a wound, a gush of fluid will follow it; and almost always some fluid, more or less, trickles after it, more than enough to provoke mischief if it be poisonous and can pass into the blood. In any case, the fluid which forms in a wound will flow downward to the deepest parts, and not upward unless under pressure; and if from the position of a wound the aperture or apertures be at the dependent part, it will escape without tubes. If it be not, if there be a cavity within deeper than the outlet, what power, I should like to know, have drainage-tubes to draw it upward out of this? I think, then, if the position be satisfactory, and the vent sufficiently free, they are needless; if the position be not satisfactory, they are useless. I say, therefore, as a rule, drainage-tubes are not effectual instruments for their chief purpose. But, furthermore, their presence is often directly and actively mischievous. They are foreign bodies in a wound. They act, of course, as foreign bodies in almost all circumstances do; they irritate, they provoke suppuration and the formation of fluids. Those who are accustomed to witness with complacency the escape of fluids along drainage-tubes hardly reflect that the drainage-tube has been a cause—perhaps the prime cause—of the formation of the fluid which flows out. When I see these tubes moved to and fro in a wound with the escape of pus, I am forcibly reminded of what I have often seen in former years, the action of setons. A drainage-tube is, in fact, a seton. Even when they are retained only for a short time, not long enough to induce further mischief, they are fatal to the chance of direct union of a wound. And is this, the best of all results, to be now altogether given up as a visionary idea? Is union by the first intention to become a thing of the past? When I see, for example, a fatty tumour, small or of moderate size, removed from under the skin, and then the edges of the wound stitched closely together over a drainage-tube lodged throughout its length, it seems to me simply idle to talk of principles of surgery. That such wounds do at length close in spite of this treatment, I know; but I think I know also that they will heal more quickly and kindly, directly without disturbance, if they are simply closed in the way to which I have already alluded to. It is surely very rare indeed for such wounds, if thus naturally treated and duly watched, to give rise to any anxiety or trouble. For my part, I do not think the risk, such as it is, at all lessened by insisting on a more circuitous process of repair.

I do not contend that drainage-tubes ought never to be employed. In exceptional cases, I believe the advantage outweighs the evil of their use, as, for example, in the after-treatment of empyema, where they are very useful in enabling us in a far more satisfactory manner to wash out the chest; and this, by the way, is an advantage often claimed for them, and with some force, in other instances. But I do not believe there can be usually much difficulty in washing out the interior of a wound, without the necessity for that purpose of the permanent insertion of a drainage-tube.

And withal a word or two on behalf of that much abused application, a common bread-poultice. Its absolute and relative value in surgery can be determined only by experience; and, if the surgeons who condemn it have done so only after having given it a fair trial, then all I can say is that their experience on this subject is very different from mine. Having many years ago, like, I suppose, most surgeons at one time or another, been prejudiced against poultices (for, if not skilfully made, they are ugly and clumsy things), I have more than once cast

them aside in favour of some other application; but again and again I have been driven back to their use by the plain fact, as it appears to me, that they fulfil certain conditions better than any of their rivals. I do not undertake to explain how they are thus excellent. I find certain qualities possessed by them in an eminent degree; but to what precise extent these are instrumental in the result I cannot say. A well-made bread poultice (which I make bold to suspect some of you have never seen) preserves ample moisture and equable warmth; it is everywhere very soft, and adapts itself with singular uniformity to all irregularities of surface. In my experience, this homely article far more frequently draws from the patient the word "comfort" than any other form of dressing. "Yes, that is comfortable," is a familiar expression after the application of a poultice. Poultices, of course, like all other appliances, are liable to abuse; and I think that years ago they lost favour chiefly on account of the reckless way, as mere routine, in which they were employed, the faulty manner in which they were too often prepared, and the length of time during which they were allowed to remain unchanged. But I venture to repeat that, when applied in appropriate cases, they give, so far as my experience goes, more comfort to the patient and satisfaction to the surgeon than any other substance. Moreover, in certain cases of unhealthy wounds and of foul discharges, they become a most convenient vehicle for the use of charcoal and other agents; and I for one, in spite of all our present proud array of antiseptics, should be sorry to lose altogether the help of the old-fashioned charcoal-poultice.

But now I must pass on to speak of that particular plan of practice which aims at unconditional security—the plan the purpose of which is to exclude all risk of blood-infection by the rigid exclusion of living germs; notably of that particular method which has been introduced by Lister, and at present known everywhere as Lister's method. Now, the relative value of this mode of treating wounds may be tried—should be tried, I think—first by the facts which have been ascertained in regard to it; and, secondly, by the arguments which can be advanced for or against it.

First, then, with regard to actual facts: are there any trustworthy statistics to show that hitherto the results obtained by Lister's plan are better than the best results obtained by any other method? I think most will admit that this is a question of considerable weight. Well, I take, for instance, our hospital statistics, to which I have already referred, on the one hand, and—I seek in vain for any parallel results on the other. And, while this is so, I shall consider that I am justified in the conviction that hitherto the best results have been achieved by the simpler method. I must add too that one seeks in vain for statistics of any kind from sources from which I submit we are entitled to expect them. Why are such statistics withheld? Are they not worth the trouble of collection? And, if they have been collected, why are they not published? But let this pass. I say I know of no results from Lister's method like those which I have given. Indeed, many of the statistics which have been so triumphantly presented to us make but a sorry figure by the side of the best, and they admit only of excuse by comparison with former results from the same place. And here I cannot help thinking that confusion and fallacy prevail on this matter; that, to answer this prime question, old and new results are constantly compared. Some hospitals, in which for several years the results have been much more unfavourable than those which can now be shown, have adopted this method, and the contrast has been striking; that is, the old and new statistics of the same institution have differed widely; and this shows that a great improvement has been wrought there by the adoption of Lister's method; but it by no means shows, as many seem to accept that it does, that the best results of all can be obtained by this plan. For the fact is, conclusions drawn from comparisons of former and present practice at the same hospital are, in all probability, charged with this fallacy: that almost everywhere, from the attention which has now been for some time past directed to the subject, and from the greater care and caution exercised, the mortality after injury and operation has been considerably reduced. I might give you illustrations of what I mean in figures which have been published in triumphant demonstration of the superiority of this method. What do they actually show? Why, that, while the adoption of Lister's plan has effected a vast improvement in the death-rate of a particular institution, the results obtained by it are still far below those which have been obtained by other methods. The contrast between the results of Lister's plan and the records of what I would fain hope may now be called former days is most marked where the previous mortality was highest; and it is easy to understand why the most enthusiastic reports in its favour come from those places where the sanitary conditions are worst. Beyond all question, I should say, in too many instances, it has proved far better than that which it has replaced; but

to conclude from this that it is better, or in its results equal to every other plan at the present time adopted, is to set the simplest rules of logic at defiance, to foster error and confusion. No; Lister's plan must be tested (it would be an insult to its author to propose less), not by contrast of former with present statistics, but by comparison of its results with the best results which now are obtained otherwise.

But on this question of actual fact I must remark farther that, from observation of the method in cases in my own hands or under the care of my colleagues, I am impressed with the conviction that, as a rule, wounds heal more satisfactorily, more directly and quickly, under simpler plans. But an error of a like kind prevails here. An operation is performed in a sufficiently simple and straightforward case; this mode of dressing is adopted; all goes well; the wound heals; and the result is forthwith registered as demonstrative. The majority of wounds heal very well under various plans; heal, for the most part, in spite of many hindrances, if these do not exceed certain limits; and the majority of wounds heal under this particular plan. But I need hardly observe that the great question at issue is not at all touched by this kind of evidence.

I ought, however, to allude to a fact of which I, and probably many others, possess some evidence, that Lister's method has been both charged and credited with results that do not belong to it. A satirist might, indeed, have found ample scope for indulgence during the last two or three years in the treatment to which wounds have been subjected under the auspices of this plan. Very often, I should say, they have been converted into germ-traps and hotbeds for the cultivation of bacteria. But I repeat my conviction, that when the plan is accurately carried out, as a rule, it delays the repair of wounds.

The use just now of the word logic recalls a curious instance of the kind of evidence which in various ways has been offered on this question. In the November number of the *Fortnightly Review* for 1876, Professor Tyndall published a discourse delivered before the Glasgow Science Lectures Association, entitled "Fermentation and its Bearings on the Phenomena of Disease". In this article, after remarking "that while against unsound logic a healthy mind can always defend itself, against unsound experiment without discipline it is defenceless"; and "it is only by practice among facts that the intellect is prepared to judge of facts, and no mere logical acuteness or literary skill can atone for the want of this necessary education", at page 562 he tells the following story.

"A few years ago, I was bathing in an Alpine stream; and, returning to my clothes from the cascade which had been my shower-bath, I stepped upon a block of granite, the sharp crystals of which stamped themselves into my naked skin. The wound was an awkward one, but, being in vigorous health at the time, I hoped for speedy recovery. Dipping a clean pocket-handkerchief into the stream, I wrapped it round the wound, limped home, and remained for four or five days quietly in bed. There was no pain, and at the end of this time I thought myself quite fit to quit my room. The wound when uncovered was found perfectly clean, uninfamed, and entirely free from matter. Placing over it a bit of goldbeaters' skin, I walked about all day. Towards evening, itching and heat were felt; a large accumulation of matter followed, and I was forced to go to bed again. The water bandage was restored, but it was powerless to check the action set up; arnica was applied, but it made matters worse. The inflammation increased alarmingly, until finally I was ignobly carried on men's shoulders down the mountain and to Geneva;" "where, on the morning after my arrival, Dr. Gautier discovered an abscess in my instep at a distance of five inches from the wound. The two were connected by a channel, or *sinus*, as it is technically called, through which he was able to empty the abscess without the application of the lance."

And the Professor continues: "By what agency was that channel formed; what was it that thus tore asunder the sound tissue of my instep, and kept me for six weeks a prisoner in bed? In the very room where the water dressing had been removed from my wound and the goldbeaters' skin applied to it, I opened this year a number of tubes containing perfectly clean and sweet infusions of fish, flesh, and vegetable. These hermetically sealed infusions had been exposed for weeks both to the sun of the Alps and to the warmth of the kitchen without showing the slightest turbidity or sign of life. But two days after they were opened the greater number of them swarmed with the bacteria of putrefaction, the germs of which had been contracted from the dust-laden air of the room. And, had the matter from my abscess been examined, my memory of its appearance leads me to infer that it would have been found equally swarming with these bacteria—that it was their germs that got into my incautiously opened wound; and that they were the subtle workers that burrowed down my skin, dug the abscess into my instep, and produced effects which might well have proved fatal to me" (pp. 562, 563).

Now what is to be said on the "soundness" of such "scientific data" as these? Those who know anything of the details of the practice of the "antiseptic system" will smile at the professor's mode of excluding germs by "dipping a clean pocket-handkerchief into the stream". If such an all-important condition can be fulfilled in this way, what is to be said of the sprays, lotions, and dressings; of the elaborate details which have been contrived to kill or exclude them? One can imagine with what scorn the professor would have replied to anyone who pretended to exclude germs by the application of a "clean pocket-handkerchief"; how triumphantly he would have appealed to the "searching beam"; how he would have introduced tiny fragments of the handkerchief, and perhaps drops of the stream, into his skilfully prepared infusions, and have shown them presently swarming with bacteria. But to go on. "The wound when uncovered was found perfectly clean," etc. Now in days of yore, this very harmless and simple plan of treating wounds was common, and no one wondered to see them, after four or five days of rest, "perfectly clean, uninfamed, and entirely free from matter". But what followed? He "walked about all day. Towards evening, itching and heat were felt", etc. If there be any difficulty in explaining the facts here set forth, surgery has assuredly long been under a strange delusion regarding the influence of rest and motion and position on the course and progress of wounds. Then "arnica was applied, but it made matters worse". Of course. But Dr. Tyndall throughout all his trouble can see no agency at work but the germs.

Some may say, perhaps, that Professor Tyndall is not a surgeon, and has, therefore, no claim to be heard on this subject. But whatever Tyndall says or writes must have weight, and is sure to be heard by many, let him speak on what subject he will. And after all, this is not so much a technical question of surgery, but rather one on the nature of evidence. Moreover, it is an eminent example of the kind of testimony which to an overwhelming extent has been published, and much of it even by surgeons, on this question. I think, therefore, no apology is needed for what some may consider a digression. I have even introduced the narrative at length, that you might lose none of the charm of his luminous style.

But, failing evidence of this kind, it is said that, under this plan, we are enabled to perform certain operations with success, to achieve results in surgery which cannot be attempted with any reasonable prospect of success by other methods. I take leave to doubt whether these assertions are borne out by facts. In my humble opinion, operations are sometimes performed, both with this method and otherwise, which in any case had better be left undone; but I believe that patients have escaped with life after operations as full of risk to it, with other methods as with this. But this sort of statement, because it admits of no direct refutation, is never wanting in favour of any novelty. Has any new plan of treatment ever been proposed, unsupported by abundant illustrations of its excellence? Are those who can tell of wonderful results from this method in a position to state that none equal to them have been accomplished in other and more simple ways? If it were not for the interests at stake, one might find some amusement in hearing and reading, in the light of experience, of the surprising triumphs of "antiseptic surgery". But this is an old story; a tale too often told. With reference to this, Bryant has well said, "The publication of isolated cases, however good, proves nothing, whereas the withholding of the whole suggests much".

So far as actual facts, therefore, are at present concerned, and it seems to me that the time has arrived when we may use such records, if I am to adopt that line of practice in which the mortality is lowest, I cannot see that I have as yet adequate grounds for relinquishing the plan of treatment I at present follow.

To the next point. This particular plan of dressing wounds is founded on the accepted fact that the germs in the air are the sole cause of blood-infection, and its purpose is the prevention of this by their rigid exclusion or destruction. Is then, let it be asked first of all, this purpose by this means fulfilled? Does blood-poisoning ever occur in this practice? In point of fact, it does from time to time occur, and sometimes proves fatal. Everyone is aware, of course, of the answer which is given to this, that it is due to the mode of dressing being imperfectly carried out; to some flaw in the management of the details. To this again it may be replied that, although the contrary does not, from the nature of the case, admit of proof or actual demonstration, such a catastrophe has undoubtedly occurred; does still not unfrequently occur in skilful and experienced hands, in the practice of excellent surgeons, enthusiasts in this method. And if this be so, it practically, you see, amounts almost to the same thing. If the plan be only ideally perfect, and liable, in spite of such care and dexterity, to fail in practice, it still misses its aim. Indeed, here is the critical question: If it be not absolutely, unconditionally protective, in what relation does

it stand to other methods? Why, so far as we have facts to guide us, as I have already stated up to this time, it has not made out its case. And, then, are there no positive objections to it? It shuts out the wound from view—to my mind, no trivial drawback. The wound cannot be examined without an elaborate process of change of dressing always involving disturbance, if not risk; and although it may be said that confidence in the safety of this plan dispenses with such need, the question again arises whether it is reasonable to give such confidence as this. But it is further urged that one can tell by other signs what is going on in the part; that local mischief is revealed by rise of temperature or of pulse. Yes, after a while, but not until the system has been disturbed by it. I think that when a wound or injury is under ready inspection, we may detect the tendency to go wrong earlier than this; and upon the earliest detection of such tendency I think very much may turn. I do not believe this objection can be explained away. Then this mode of dressing very often irritates; as the rule, more or less, sooner or later. This local irritation, as the result of their repeated action, is, I should say, one of the most annoying objections to the use of antiseptics in general. They will do this; and although for a great end, this may, within limits, be endured as a comparatively trivial circumstance, yet it not unfrequently proves to be of more serious moment by interfering with and so delaying the process of repair. Thus certainly their employment in this way is not favourable to the best results of surgery in the repair of wounds by the simplest and most direct process. But while I think it must be conceded that this mode of treatment is not favourable to union by the first intention, it is claimed for it that, when wounds close by a more circuitous route, this process is shortened and simplified. I say to this—not proven; on the contrary, that the evidence is the other way. It has been affirmed that, under this plan, the constitutional disturbance, as indicated by rise of temperature which usually attends the repair of considerable wounds, is very much reduced in degree. I have often heard the assertion made that there is usually little or none. I have reason to believe that many very exaggerated notions prevail in regard to the amount of constitutional disturbance attending the repair of wounds when managed otherwise. As a rule, there is more or less constitutional disturbance shown by rise of temperature during the repair of large wounds under any plan; but the evidence at present before us by no means shows that with this method it is less than under any other.

Again, much has been made in this matter of the formation of pus. It was, I believe, once contended that the formation of pus is prevented by this means; and now, that the process of suppuration is very materially reduced; that it is serum or a serous fluid, rather than pus, which wounds so treated pour out. Well; but when wounds have to heal by granulation, is laudable pus a cause or sign of mischief? I am not speaking of profuse and long continued suppuration, which is really out of the question here; but of such suppuration as usually occurs during the repair of a wound. For my part, I confess I am neither ashamed nor afraid to see well formed pus covering the surface of granulations; nay, I accept it as a very favourable sign. I am accustomed to watch it carefully; for I think, in the change of character of this secretion, we have often the first signal for good or for evil, and, as a rule, the condition is satisfactory under a layer of laudable pus. I say, then, even accepting the statement, it remains to be shown that a serous speaks of a better state of things than a purulent discharge.

Then, for me at least, and for the reasons I have given, the constant and prolonged employment of drainage-tubes is a serious objection. I am convinced, I repeat, that they too often prove sources of local and general irritation. Thus I have seen a large chronic abscess opened and dressed carefully with the rigid precautions of Lister's method. I have seen the patient day after day but little disturbed, with a temperature one or perhaps two degrees above the normal; and then, at the end of a week, or of nine or ten days, I have seen all the dressing hitherto applied suddenly removed, the drainage-tube withdrawn, and a common bread-poultice applied to the now fully exposed surface. The result has been that the temperature has quickly fallen to the normal point; and my belief is that, in more than one instance, the reduction of temperature was mainly due to the removal of the tube, which, as a foreign body in the wound, was a source of irritation.

I say, then, I cannot admit the claims of Lister's method; because, although undoubtedly very good results are to be obtained by this practice—better ones, no doubt, than most of those which were reached in former years, or are still in many places—yet that it has not shown results superior or equal to those which have been otherwise achieved; that it has, moreover, grave drawbacks from which simpler plans are free; that if it fail, it is worse than useless by increasing the risk; and, therefore, that it has not established any title to supersede all other methods in the practice of surgery.

The principle of Lister's practice is an easily intelligible, and, there-

fore, a very attractive one to the public—I mean the more educated portion of it, even to men of scientific attainments, who have little or no knowledge of clinical surgery; for the one fact can be seen so plainly, while all other questions which are forced on the attention of the surgeon are shut out from them.

But the principle on which it rests is a sound one; the logical outcome of established facts. Granted most freely and fully, so far as in this direction it goes. But is every other plan of treatment without principle and opposed by logic? Let me recall your attention to some words which appear to me to be among the wisest which have been spoken on this subject. In 1877, in his Address on Medicine, Dr. Roberts said: "We should probably differ less about the antiseptic treatment if we took a broader view of its principles. We are apt to confound the principle of the treatment with Lister's method of carrying it out. The essence of the principle, it appears to me, is not exactly to protect the wound from the septic organisms, but to defend the patient against the septic poison. Defined in this way, I believe that every successful method of treating wounds will be found to conform to the antiseptic principle. Take, for example, the open method of treating wounds, which is sometimes compared in its results with Lister's method. What is this treatment but another way (only less ideally perfect than Lister's) of defending the patient against the septic poison? Because, if the surgeon succeed in providing such free exit for the discharges that there is no lodgment of them in the wound, either they pass out of it before there is time for the production of the septic poison, or, if any be produced, it escapes so quickly that there is not enough absorbed to provoke an appreciable toxic effect." Which plan, after all, takes most cognisance of all the facts before us? While it is true that the air contains germs which can so change animal fluids that if then they pass into the blood they may poison it; it is also true not only that fluids which have never been in direct contact with the atmosphere may be pent up, far from the surface, in various parts of the body without infecting the blood, but also that open wounds may be and are continually freely exposed to the air, and yet remain all the while healthy, being the process of repair carried on without let or hindrance, or any disturbance of the health; that fluids which bathe the surface of wounds may be saturated with the air and all it contains, and still escape before they have undergone any mischievous change; that, lastly, and not least, fluids may thus become changed to putridity on the surface, as in the interior, and yet may not give rise to infection of the blood. In the discussion of this great question, it is too often implied, though not explicitly expressed, that if the unpurified atmosphere be allowed to come into contact with wounds it produces mischief. And if it be said that, assuming the risk to be ever so small, why not adopt means which avoid it altogether? the answer is, that it has not yet been shown that any such means exist. Blood-poisoning from wounds, though happily now in the best places extremely rare, still, under whatever mode of practice be followed, does occasionally occur; and so it seems to me most reasonable to follow that practice which is shown to be, on the whole, safest by its results, it being, moreover, the simplest and least objectionable in other ways. In short, it is clear enough that Lister's plan, while it deals with one cause only of danger, provides by no means absolute security against this. When seriously tested by a bad atmosphere, it has hitherto obviously left a wide margin of mischief. Compare, for example, German and other statistics with our own. And when hygienic conditions are as favourable as possible, the risk from the single source of which this method takes heed is so far reduced that the good it can effect, beyond other measures in this direction, is not equivalent to the harm it does in other ways; as, for example, by irritating the wound, and so interfering with the process of repair.

Observe, if you please, that I am not saying that Lister's practice is to be in every case, and under all conditions, eschewed. I can very well imagine—nay, I know of circumstances where I have no doubt it would be far safer to employ it than to run the great risk of exposure. It is preferable to a pestilential atmosphere. But I submit that, while in such places and with such arrangements, if operations must be performed or wounds treated, this, or something like it, should be adopted, it would be far better, wiser, more humane, to stop the practice of surgery altogether until these places had been made clean and reasonably pure. I refer again to the records from Germany. When we observe the rate of mortality before and after the adoption of Lister's method, we are tempted to ask, what would have been the result if all possible care and forethought had been directed to the improvement of the sanitary state of the hospitals? Why should they have been, why are they still, so far behind others in this respect? You will remember the story of the Norfolk and Norwich Hospital as Mr. Cadge told it; and you are not likely to forget the ghastly sketch Lister drew after his visit to some of the continental hospitals only four years since. It is the evil of this, or of any special or peculiar plan of dressing, that it tends to limit our view, and, by fixing the attention on a number of details, each of

which is made of prime importance, diverts the mind from the observance and consideration of far larger questions. Yet notwithstanding the veil which has for a time been drawn before the eyes, there are already signs that the field of vision is extending. It is now many months ago that I read of a distinguished German professor using, as he tells us, extraordinary precautions: "that, on an operation morning, he gets up early, and washes himself all over; that his assistants wash themselves; and that the patient is also washed"; and although a famous Scotch surgeon, who relates the story, adds, "Surely all these washings are unnecessary", let us hope that, in interests besides those of surgery, the expectation, at least of an operation, may become of daily occurrence. We cannot, indeed, render the air absolutely or "optically" pure for the practice of surgery; but I think, under fairly favourable conditions, and with the means at our command, operations may be performed and wounds treated in an atmosphere not so impure but that, on the whole, the least risk is run by the practice I have ventured to advocate.

One word farther. I have spoken without reserve—as I take it I was bound to do if I spoke at all—of this now famous plan of treatment. By this I think I have shown the truest respect for the author of it. If I esteemed the practice of Professor Lister less, it would have been easy to offer him the homage of flattery, to congratulate him on his renown. It appears to me that I have evinced more regard for his authority, and placed a higher estimate on his work, by studying to the best of my ability the method he has introduced; by not expressing an opinion adverse to it in public, or from a position of responsibility such as this, until my conviction had grown clear and strong; and then I think I best mark my appreciation of his purpose by thus speaking out freely and fully. And though I am thus—not on principle, but in practice—opposed to him and many others whose ability and knowledge I admire and respect, I know very well that on a yet greater issue—the advance of surgery—we are heartily together; and, with unfeigned diffidence of my own judgment, I have yet farther consolation in the assurance that, if I am in error, these words of mine, even from this place, will prove no serious obstacle to the progress of truth.

Whatever defects may be charged against surgeons in the practice of their art, indisposition to accept new ideas, or lack of zeal in testing new proposals, cannot be reckoned among the number. And if in some the desire may appear to be excessive, it must be remembered that this is the natural outcome of discontent at the inadequacy of the resources they can at present command, and that such dissatisfaction is the parent of progress and improvement. A curious list, indeed, might be drawn up of the numerous novelties which from time to time have been introduced into surgery, and which, after attracting much attention, have been tried and found wanting. And if it so happen that this particular mode of dressing wounds should share their fate, still, like many others, it will have served some useful purpose; for it will at all events have helped largely to fix the attention of surgeons on a great source of danger from wounds. Nor is it perhaps likely to be superseded altogether by any plan of management which does not include among its chief objects the reduction of this risk to the utmost extent possible. Henceforth, no doubt, as the result of all the attention and discussion which have been given to this matter, the words cleanliness and purity will have a wider, deeper, fuller significance for the surgeon. Hospitals and all institutions where the practice of surgery is carried on will soon, let us trust, be no longer open to the shame of even a suspicion of their state. They must not only be made free from all doubt that in their wards mischief may be fostered; but they must offer year by year in their records the surest guarantee that they are the safest places for patients. At present, in the worst, antiseptics are the only means employed for counteracting this gigantic evil; and its proportions may, perhaps, in some degree, be measured by the lavish manner in which antiseptics are consumed. But, after all, they fulfil their purpose but imperfectly, and are themselves not free from evil. Is it rash to affirm that the future practice of surgery will be most successful when it is carried on, not where antiseptics are most largely used, but under conditions least in need of antiseptics? Nay, is not this so now?

The study of blood-poisoning, the attention which of late has been directed from all sides on this great subject must prove of advantage to surgery in another way. For some time past, and to the prejudice of our profession, a wall of partition between medicine and natural science has been gradually built up. Physicians and surgeons finding enough, and more than enough, to do in their own immediate work, have of late years passed by the study of natural science, even that branch of it which most immediately concerns them—physiology or biology—with hardly a glance. And the loss from this, which was formerly allowed to be considerable, comes now to be actually questioned in some quarters as a fact. Nay, those who have never made any effort to find opportunity for this pursuit are wont to assert boldly the uselessness of it, and speak of it plainly as waste of time. The study of blood-poisoning in its pre-

sent form has effected for us in our profession this great good. It has led us back into paths which have been too long untrodden, and forced upon many of us, in a most attractive way, some little knowledge at least of the first principles and leading facts of biology. It has, at all events, in great measure imposed silence on those who have been accustomed to talk loudly of what they call practical work, and to meet every inquiry not likely to pay with the vulgar version of *cui bono*? And while, on the one hand, we have been thus forcibly reminded that surgery can never, without degradation, be divorced from physiology; on the other, this fertile field has proved to be common ground on which natural philosophers and surgeons may with mutual advantage, and in furtherance of the same immediate result, work together. It is true enough that no progress of any kind can be made in natural science without advantages in which medicine and surgery must always largely share; but still it is something just now to have a subject like the present one, in which the truth is made so plain upon the tables that he may run that readeth.

And it may be remarked that surgery, while it works in this direction, fulfils its highest purpose, for it aims at the prevention of disease. Heretofore our art has not escaped the reproach that, whatever it may have effected in the way of relief or cure, it has done little or nothing in the work of prevention. But what shall be said of the progress which has been made in averting the occurrence of blood-poisoning; in preventing the most fatal of all affections, which waits alike upon accidental wounds and the surgeon's own work? In accomplishing so much, it has not only thrown light over one of the darkest regions of pathology, but also, by reflection, on the laws which govern health and life.

ADDRESS ON PUBLIC MEDICINE,

BY

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PREVENTATIVE OR STATE MEDICINE.

WITHOUT wasting your time in apology or preface, allow me to introduce State Medicine, past, present, and future, dwelling specially on the two first as the subject of my remarks at this time. Up till a comparatively recent date, the public mind, both professional and lay, seemed thoroughly impressed with the idea that the whole function of medical men began and ended with the treatment, and if possible the cure, of the sick. This led to a twofold evil; it first produced too strong a belief in drugs, and tended to make the profession degenerate into a mere trade, the success of which greatly depended on the quantity of drugs the unfortunate patient could be got to swallow. The second evil was the neglect which it occasioned of all preventative medicine. It is gradually dawning on the present age that medical science can possibly do a little more; and that, in addition to the treatment of disease, something may be done towards its prevention. Hence we have what is supposed to be a new department of medical science; namely, preventative or State medicine. I use the word "supposed" advisedly, because I hold that State medicine as a very important branch of the medical profession is not new, but reaches back into times of the most remote antiquity, and was then probably better understood and more thoroughly carried out than any other branch of the healing art. If you will turn to the thirteenth chapter of Leviticus, you will there find a medical officer of health endowed with absolute authority to separate the sick from the healthy, and also to isolate infected persons so completely as to prevent the disease from spreading further. Due provision is made that the isolated patient be inspected from time to time, so that, in case of recovery, or of the disease assuming a non-infective type, he might be set at liberty. No doubt, science has made great progress since the time of the Mosaic dispensation; but if we are ever to get quit of zymotic diseases, it will be by adopting the laws of Moses in regard to them—rigorously separating the sick from the healthy. Let us hope the time is not far distant when every medical officer shall be endowed with the same stringent powers as were possessed in the time of Moses, who, we must not forget, in what he did for Israel, acted directly under the Divine authority and guidance, as well as being learned in all the learning of the Egyptians, at that time the most cultivated race in the world.