

ARTICLE IV.

ON THE TREATMENT
OF
COMPOUND AND COMPLICATED
FRACTURES.

BY WILLIAM J. WALKER, M. D.

FELLOW OF THE SOCIETY.

[Read at the Annual Meeting, May 29, 1845.]

‘Instruire les gens par Observations, c’est les instruire, pour ainsi dire, par figures, et par de vives peintures qui representent au naturel les maladies.’ *Petit.*

‘Those who are employed in recording cases on unquestionable facts, give us the true and only picture of diseases. They speak of none which they have not seen. But systematic authors, obliged to explain each disease in its order, give descriptions of diseases widely distant from truth, describing what manifestly they have not seen, and explaining, without the slightest remission of their wonted confidence, what they have not learned and cannot know.’ *John Bell, Principles of Surgery, Vol. III. page 99 Quarto Ed.*

‘Per varios usus artem experientia fecit
Exemplo monstrante viam.’

MR. PRESIDENT, AND GENTLEMEN
OF THE MASSACHUSETTS MEDICAL SOCIETY,

I PROPOSE on the present occasion to offer you some observations on compound and complicated fractures of the bones; confining myself principally to some of the most important practical points of treatment; illustrating my views on this subject by cases which have occurred under my own observation; and placing at their side the reports of similar cases treated by distinguished surgeons of the present and past ages; I have

adopted this course, believing with a writer* of the last century, 'That a publication of real cases is, without doubt, the only way of determining what it is of so much importance to know in surgery, 'Quid natura faciat, aut ferat.' I will likewise say, with the same distinguished writer, 'the present collection contains some remarkable instances of the surprising power of nature in the relief of injuries offered to her, such as theoretical reasoning would hardly allow us to hope for. They cannot therefore fail of being useful and agreeable to the followers of the healing art, if faithfully related; and I can assure the public, that it has been my aim to represent facts as they really were, not as they would tell the best.'

Aware that the value of detailed cases must depend upon the ability and accuracy with which they have been observed, as well as upon the fidelity with which they are reported, I have avoided bringing forward such cases as I might have found in journals and other ephemeral productions, and have confined my researches to the writings of men whose names are a sufficient guaranty of the truth and accuracy of their several memoirs.

Here, then, gentlemen, I place at your disposal several cases of compound and complicated fractures which have occurred under my own observation, numbered from one to six.† At the same

* Cases in Surgery, by Charles White, F. R. S.—*London*, 1776.

† See Cases annexed.

time, I present you with other somewhat similar cases, selected from the highest authorities, and numbered from seven to twenty-three, inclusive. These cases, as I think, prove the powers of nature in healing compound fractures, attended with great contusion, laceration, and loss of substance of the bones, and of the skin, and other soft parts, to be much greater than is generally supposed. They also show us that large portions of bone, when lost by accident, or removed by art, may be reproduced by the powers of nature: and they illustrate, in a striking manner, the truth and importance of certain practical precepts established by the older writers on surgery, with respect to the treatment of wounds, complicated with fractures of the bones. The precepts to which I allude are,

First, that all tendinous or membranous structures which obstruct the removal of foreign bodies, or unduly confine or strangulate the soft parts, when swollen by inflammation, should be promptly and freely divided.*

Second, that such dependent orifices should be preserved, or counter openings made, as will, when aided by position and dressings, secure the free

* But there are cases, as I have before said, in which a surgeon of resolution may preserve a limb, even where amputation may appear to be indicated. In such a case, besides attending to the general rules of treatment, he should never neglect making free dilatations of the membranous parts with deep incisions. By the use of such means, inflammatory swelling is dissipated and the cure rendered much more certain.—*Bordenhove, Mémoires de L'Académie Royale de Chirurgie. Vol. 5.*

discharge of all fluids which might otherwise stagnate within the wound.*

Third, that portions of bone protruding through the integuments, which cannot, easily and without violence, be reduced to their proper place, should at once be removed by the saw : † and that all foreign bodies, ‡ loose portions, or shivers of bone, should be promptly extracted from the wound.

Fourth, that great pain, inflammation, or nervous symptoms, depend rather on peculiar complication, than on the extent of the wound. And that they

* Un vrai chirurgien ne se contente pas de remédier aux accidens présens, il faut que son intelligence lui fasse appercevoir les événemens avant qu'ils arrivent. L'expérience a appri qu' on pouvoit prévoir dès la première inspection, le besoin d'une countre ouverture, pour suppléer, dans l'intention sus dite, aux ouvertures de la plaie moins avantageusement situées. On ne doit rien négliger pour le succès dans un cas aussi grave.—Martinière. *Memoires de L' Acad.* vol. 2 and page 23.

† Antequam reponantur, considerandum est an os eminens in propriam cavitatem, beneficio debitae extensionis, citra violentiam, et convulsionis periculum, restitui possit, nec ne? Si potest citra periculum restitui, restituatur; sin minus, non restituatur. Periculosam restitutionem indicant proëminentia magna, inflammatio, et pars, ob musculorum contractionem, dura. Quod, si ergo restitui nequit, eminens nudum forcipe præcidendum, et postea, fractura, per modicam factam extensionem, coaptanda. Melius enim est membrum aliquantum brevius reddere, quam ossa non coaptata relinquere vel violenter extendere. Quorum utrumque argrotanti convulsionem et mortem afferret.—*I. Sculteti. Armamentarium Chirurj. Renovatum et auctum Amstelodami.* 1671, Page 21.

‡ Richard Wiseman says, 'cleanse the wound first from all strange bodies, as bullets, armour, apparel, and shivers of bone. So shall the cure succeed more happily.' In another place, he says, 'Therefore to prevent sinuosities, you are to enlarge the orifice at the first, and keep it so wide open, that the matter which is daily there ingenerated may have free passage out.' Again, 'If you make not this dilatation in the beginning, you may afterwards, perhaps, be forced to do it, when the part is accompanied with great defluxion and pain, or when the bones are corrupt by retention of the matter: and what condition it will then be in to admit of incision, may be easily guessed by any one that hath common sense.' vol. 2, p. 178.

indicate great danger* unless rightly understood, appropriately treated and relieved.

As illustrative of the principles here advanced, I propose now to read to you a single case, selected from the second volume of Gooch's surgery, trusting that the other cases which I have selected and hereto annexed, as a basis of this essay, will repay you for the trouble of reading them at some leisure moment.

'July 11th, 1739, J. W. of B. about twelve years of age, had both the tibia and fibula, fractured, by the wheel of a wagon, heavily laden, passing obliquely over the limb in a deep rut, from just beneath the knee externally quite to the extremity of the heel, making the most horrid, large lacerated wound we ever saw, with about nine inches of the tibia projecting.

'At first sight we knew not how to act for the best in a case so dismally circumstanced; we de-

* Neither must you have lesse care of binding up and rolling the part, than of your medicines: For it doth not a little conduce to the cure, to binde it so fitly up as it may be without paine.—*Ambrose Paré. Translated out of Latin and compared with the Freuch by F. W. Johnson. London. Anno 1634, Page 424.*

J'ai un grand soin d'empêcher que le blessé ne souffre aucune douleur en quelque lieu que ce soit de la jambe.—*Traité Complet de Chirurgie. Par M. G. de la Motte. 3me édition par M. Sabatier. Vol. 2, Page 587.*

The whole welfare of the patient depending upon the easy bandage and position of the member.—*Chirurgical Treatises by Richard Wiseman, Serjeant, Chirurgeon to King Charles, 2d. 5th Edition. Vol. 2, Page 181. London, 1719.*

Again. If it (the bandage) could not have been so put on, I should have forbourn the use of them, the cure of these wounds consisting in the easy dressing and quiet position, without which you will not cure one of them.—*Wiseman, Vol. 2, Page 187.*

liberated upon it, and at length resolved to saw off a considerable portion of the bone, [according to Fig. 1 *; Pl. 16,] rather than instantly amputate the limb. We then snipped off the loose and tattered teguments, removed some sharp-pointed fragments of the bones, brought the parts into as good a state as we could, dressed in the common manner as lacerated wounds require, and placed the limb in a case of stiff paper, well lined with wool, tow, etc., and so contrived as to give as little disturbance to it as possible upon dressing; using the tailed bandage.

‘The wound soon digested kindly, and the cure was effected by the usual treatment, without any ill accident of consequence intervening, which favorable circumstance we ascribed to our precaution in removing the fragments and splinters of the bones, etc., at our first dressing.

‘In about three weeks, I was sensible, as were also several surgeons whom curiosity led to see so uncommon a case, that the substance which grew in the space of five inches, entirely void of bone, had acquired, in the middle only, a greater degree of solidity than flesh; which circumstance, not agreeing with the general received notion of the generation of callus, we proved, beyond dispute, with a sharp pointed instrument; and we observed

* As the plate merely represented the portion of tibia removed, five inches long, it was deemed unnecessary to copy it.

that the ossification was gradually formed from that central point, which was considerably advanced before any exfoliation was cast off the ends of the divided bones. In less than four months, the whole space was so well supplied with callus, or, rather, new bone, that he was able to raise his leg, when the bandage was off, without its bending. About a month after, he ventured, without my knowledge, to stand upon it, when he thought it had stability enough to bear an equal proportion of the weight of his body; and a little more than half a year after the accident, he walked pretty well, even without the assistance of a stick. *The leg is well shaped, not half an inch shorter than the other; and some years after the cure, he told me he could walk forty miles in a day without pain.*

‘In thirteen compound fractures, I have sawn off a considerable portion of the tibia, and succeeded in both old and young subjects. This experience has given me fair opportunities of observing every day’s progress in the generation of *callus*; and I always found it had the appearance, externally, of granulations of flesh, changing gradually into bone; concerning which wonderful operation of nature, I shall not attempt an explication, but this, the preceding, and following paragraphs, are the more worthy of notice, as the preservation of limbs may prove the consequence of their being well considered.

‘When the external wound happens to be small in a compound fracture, an ample dilatation of it at the

very first dressing, is a point that demands particular attention; that any membranous structures, discoverable by gently introducing the finger, may be set at liberty by knife or scissors, and that coagula of blood, extraneous bodies, loose fragments, and splinters of bone, may be extracted before the parts grow tense, inflamed, and tender, in order to prevent the train of direful symptoms arising from irritation of the sensible parts, and should much of the whole substance of the bone protrude, sawing off a portion of it may hasten the cure, as well as give an opportunity of keeping the limb in a true direction.*

‘By this kind of treatment, and such applications as are generally used in large lacerated wounds, in conjunction with a timely observance of a proper regimen, etc., *the formidable accidents, as violent pain, fever, inflammation, etc., may in a great measure be prevented, as I have good reason to believe, founded upon experience, with such success, as makes me think this method, which I have long pursued, cannot be too much inculcated.*

* Case of compound fracture extracted from Benjamin Gooch’s Cases and Practical Remarks in Surgery. Norwich, 1767.

‘Many years ago, I was called to see a boy eight years of age, who, five days before, had received a fracture upon his leg, with a small wound, made by one end of the tibia passing through the skin, which ought to have been enlarged at first, and the end of the bone sawn off. The whole leg and thigh was now become emphysematous to a great degree; and this appearance extended even to the lower part of the abdomen on the same side. Incisions were forthwith made in different parts of both leg and thigh, whence air rushed out with an audible hissing noise, and the cellular membrane, which contained this rarified air, was mortified all the way, even where the skin was not so affected. Warm applications were made, and other proper measures taken, but to no purpose. The patient died two days after, in which time the emphysema approached almost to the navel.’

All the fractures, to which these cases refer, have occurred in the continuity of the bones, without involving the joints. It is to this class of fractures I shall especially confine myself; although I may speak of injuries of the joints for the purpose of illustration. They all appear to have been successfully treated, and there is no reason to believe they have been published as cures, while less fortunate cases, managed by the same authors, in a similar manner, have been suppressed. In my own practice, I assure you, there exists no unfortunate result to mar the satisfaction I experience in having abstained from amputating such limbs. Some of the cases here collected, particularly those of La Motte, have been severely criticised. Thus, Mr. Pott says,* 'That La Motte's patient escaped, I make no doubt, because he has said so; but the surgeon showed much more rashness in attempting to save such a limb, than he would have done in the amputation of it. The amputation would have been the more justifiable practice. I should be very sorry to be thought a patron or an adviser of rashness or cruelty; but in what I have here said, I believe I shall have every man in the profession who has either true humanity or sound judgment, founded on experience, on my side.'

But shall we not go on in such efforts, notwithstanding Mr. Pott's criticism, while experience shows us that similar accidents under the care of

* Sir James Earle's edition of Pott's works. Philadelphia, 1819. Vol 1, p. 266.

so many different surgeons, at different times and places, have terminated successfully? Will not the candid believe, that these cases should no longer be considered as mere exceptions to the sound principles of surgery, nor as examples of a single limb saved by sacrificing a dozen valuable lives on the altar of rash and unwarrantable experiment? * Will they not believe that the question ought to be raised, why so many apparently hopeless cases have done well? Why have not tetanus, mortification, irritative and traumatic fever more frequently occurred? or extensive abscesses, burrowing up and down the limb among the muscles, laying the bones bare, and producing hectic fever and colliquative diarrhœa? Will they not inquire why delirium, and severe pain and suffering, have had so little to do in most of these cases, while they so frequently occur, and even prove fatal, in other instances of even less apparent severity?

To bring the whole subject fairly under consideration, let us inquire what is the practice, and what the doctrines promulgated by the ablest surgeons, regarding the treatment of compound fractures. Let us examine these opinions, and compare them

* There can be no doubt but that some persons save their limbs contrary to the opinion of the faculty; but in most of these cases the limbs are useless, and for one saved under such circumstances, ten persons die.—*Guthrie on Gun-shot Wounds. Page 54.*

By a limb saved, I do not mean one with the wounds healed, having, nevertheless, the extremity contracted, bent, motionless, or otherwise useless: cases, which by a loose kind of phraseology, are often termed 'limbs saved.' The object of saving a limb is that it may be useful.—*Medico Chirurg. Trans. Vol 23, p. 246. Rutherford Allcock.*

with the opinions of surgeons of different times and places, and who practiced under different circumstances. In a particular manner let us look to results, and thence determine what course of treatment should be pursued, by ascertaining what results may reasonably be expected from following out one course of treatment or another.

In a severe case of compound fracture, the first question to be considered is, can the limb be saved and made useful? No one will doubt, that both duty and humanity require that amputation should be performed, whenever a member is carried away by cannon-shot; when so overrun by rail-road carriages, crushed by machinery, or by heavy bodies falling upon it, as to destroy the life of the part below the wound. Generally, however, the question is not so easily settled; but requires great care and circumspection in estimating the amount of the injury on the one hand, and the powers of nature on the other.

Yet, in deciding this most responsible question, the surgeon obtains but little aid from the rules or precepts laid down by systematic writers, even when he has time and opportunity to consult them. Baron Boyer, and in this he is supported by most other systematic writers, tells us,* 'It must depend upon the sagacity of the attending surgeon to decide if amputation be or be not necessary in

* C'est à la sagacité du chirurgien à décider la nécessité de l'amputation.—
Boyer Maladies des Os. Page 54.

any given case.' This state of things grows out of the nature of the case. It is the surgeon in attendance, alone, who can know and appreciate all the circumstances bearing on this momentous question. It is for him to ascertain and determine, as precisely as possible, the extent of the injury to each and every tissue interested; to what extent such lesion may impede or endanger the vital actions of the broken parts themselves, or of those contiguous to, or dependent upon them for support. It is equally his duty to determine what parts may have escaped injury, and what are their powers of supporting life.

Having acquired this knowledge, it is for him, again, to estimate the powers of nature and of art in resisting and surmounting injuries, and in repairing their consequences. He should understand well the anatomy of the parts interested, and their functions; the circulation of the blood in the smaller arteries and capillaries, and the transmission of nervous influence; he should have studied well the laws of life in health and disease, the nature of inflammation and fever, their causes and effects.

He should be able accurately to estimate the influence of age, constitution, temperament, and all the conditions of life to which the patient may be exposed during the treatment. In a word, to a thorough knowledge of the principles of his

profession, surgical and medical,* must be super-added an acquaintance with the writings of the best authors on the subject, a knowledge of what able men have actually done in similar cases, and the means they have used. He must have enjoyed an opportunity of seeing these principles often tested in clinical practice, and possess a talent to learn by observation and reflection.

Fearful is the responsibility resting upon us, if we sit in judgment, without being properly qualified. We must not trust to precept alone; nor can genius, unaided by education, avail us. Surgical knowledge comes not by inspiration, nor by blindly following in the course of others.

All the circumstances of a given case having been duly considered, and amputation deemed indispensable, this most important question presents itself: shall such operation be performed immediately after the accident, or at some future time? Speaking on this subject, Mr. Bromfield,† an eminent English surgeon of the last century, says: 'As I would not mislead in the case of compound fractures, I therefore declare from experience, that when things are so circumstanced that the operation is unavoidable, the sooner it is

* Que la médecine pour le chirurgien, comme la chirurgie pour le médecin, ne seront jamais que la première des sciences accessoires. Ce fut là l'opinion constante de Desault, qui eût été, sans elle, moins grand chirurgien, par là même qu'il eût un peu plus brillé dans les sciences voisines de la sienne.—*Bichat Discours Prélim des Oeuvres de Desault. Page 3.*

† Vol. 1, page 44.

done, the greater will be the chance of saving the person's life.'

Again, Wiseman,* a man of great ability in his profession, and who had seen much service, both in naval, army, and civil practice, says: 'But it was counted a great shame to the chirurgeon, if that operation was left to be done the next day, when symptoms were upon the patient, and he spent with watchings, etc. Therefore you are to consider well the member, and if you have no probable hope of sanation, cut it off quickly, while the soldier is heated and in mettle. But if there be hopes of cure, proceed rationally to a right and methodical healing of such wounds.'

In several other places in his work, Wiseman cautions us against delay, and adduces examples of its danger and fatal results.

J. L. Petit speaks of the same advice being given him when a young man, (1693,) by a distinguished surgeon of his day, whom he consulted for a patient under his care.†

Ambrose Pare ‡ applies the same doctrine to the

* Vol. 2, page 176.

† Nous sortimes ensemble, et il me dit que, si pareilles blessures me tombaient entre les mains, il fallait couper la jambe, et ne point attendre que les symptomes m'y obligessent. Je lui en demandai la raison. Il se contenta d'ajouter qu'il n'avoit sauvé de parielles malades qu'en faisant l'amputation, mais qu'elle ne réussissait que quand on la faisait sur le champs. Le lendemain le pied du malade fut presque gangréné. Je fis l'amputation, et le malade mourut cinq ou six jours après.—*J. L. Petit, Maladin Chirurg. Page 803.*

‡ The wound must forthwith be enlarged, unless the condition of the part resist, that so there may be free passage forth for the sanies, or matter, as also for such things as are forced, or other ways contained therein; such as are

dilatation of gun-shot wounds: and Le Dran announces his judgment in the following words. 'Whenever, in case of a gun-shot wound, the surgeon foresees the indispensable necessity of amputation, he should do it at once.'

While such was the opinion of these distinguished men, the French Royal Academy of Surgery, in the year 1754, proposed the following question for a medal: * 'In what cases is it necessary to perform amputation immediately, and in what to defer it?' The prize was awarded to M. Faure, a military surgeon, for an essay which maintained that amputation should only be performed after the subsidence of the first symptoms, and the establishment of suppuration. Faure based his opinions on the results which he had seen of early and deferred amputation, as practiced on the wounded after the great battle of Fontenoy, which took place, May 11th, 1745. He states these results to be, that scarcely thirty escaped after early amputation, out of more than three hundred operated on; while of ten, amputated after the first symptoms had subsided, all recovered.

Some time subsequently, John Hunter and O'Halloran, in England, embraced the same views.

pieces of their clothes, bombast, linnen, paper, pieces of maille or armour, bullets, haileshot, splinters of bone, bruised flesh, and the like: All which must be plucked forth with as much celerity and gentleness as may be. For presently after the receiving of the wound, the paine and inflammation are not so great as they will be within a short time after.—*Ambrose Paré. Page 419.*

* En quels cas il fallait faire l'amputation sur le champ, et en quels cas il fallait la différer.—*Prix de l'Academie de l'année 1754.*

Hunter, in his work on Gun Shot wounds, speaking of early amputations, says, 'In general, surgeons have not endeavored to delay it till the patient has been housed, and put in the way of cure; and therefore it has been a common practice to amputate on the field of battle. Nothing can be more improper than this practice, for the following reasons; in such a situation, it is almost impossible for a surgeon, in many instances, to make himself sufficiently master of the case, so as to perform so capital an operation with propriety; and it admits of dispute, whether, at any time and in any place, amputation should be performed before the first inflammation is over. When a case is so violent as not to admit of a cure in any situation, it is a chance if the patient will be able to bear the consequent inflammation; therefore, in such a case, it might appear, at first sight, that the best practice would be to amputate at the very first. But if the patient is not able to support the inflammation arising from the accident, it is more than probable he would not be able to support the amputation and its consequences. On the other hand, if the case is such as will admit of being brought through the first inflammation, although not curable, we should certainly allow of it; for we may be assured that the patient will be better able to bear the second.'

Again, 'In the first case it is only inflammation; in the second it is inflammation, loss of substance,

and, most probably, loss of more blood ; as it is to be supposed that a good deal has been lost by the accident, not to mention the awkward manner in which it must be done.'

In another place, 'experience is the best guide, and I believe it is universally allowed by those whom we are to esteem the best judges, those who have had opportunity of making comparative observations on men who have been wounded in the same battle, some, where amputation had been performed immediately, and others, where it had been left till all circumstances favoured the operation ; it has been found, I say, that few did well who had their limbs cut off on the field of battle ; while a much larger proportion have done well, in similar cases, who were allowed to go on till the first inflammation was over, and underwent amputation afterwards.'

Here we see Hunter* appeals to the experience of other military surgeons. To whom he alludes does not appear from the text ; but it may

* Hunter became senior surgeon on the staff in 1760, went to Belle Isle and Portugal in 1761, and left the service in 1763. In the introduction to his treatise on inflammation and gun-shot wounds, he says that work was first arranged during the year 1762, being eight years after the award of the academy ; a period well calculated to give to the opinions of Faure and of the academy, all the currency and influence usually exercised over public opinion by great reputation, sustained by the authority of powerful and learned associations of men of distinguished and acknowledged ability.

The short period of service here mentioned, together with the appeal of Hunter to the experience of other military surgeons, rather than his own, leaves but little doubt, that the views of Faure had too much influence over his mind, and that he did not give the subject all the attention and comparative examination which its importance deserved.—*See Life of Hunter prefixed to his works.*

be he refers either to Faure himself, or to those who had entertained his views.

When we remember that Hunter, in England, undoubtedly stood at the head of his profession, both in military and civil practice, that Faure enjoyed a high reputation from the great success which, he alleged, had crowned his efforts, that he was honored by the medal of the academy, and still more by the approbation, countenance and friendship of the distinguished surgeons who constituted that learned body; when two such men, under such circumstances, unite in recommending one course of practice as safe and proper, and at the same time tell us, that whenever that course is deviated from, the most disastrous consequences ensue; we cannot be surprised that their doctrines should exercise great influence over the opinions and the practice of the civilized world. Such has been the case here; and I believe I may state, that the practice of deferring amputation, when made necessary by casualty, until after the subsidence of the first symptoms, was enjoined upon the military surgeons of Europe, and generally approved by distinguished men in the civil exercise of the art, from the days of Faure to the time when, in France, Baron Larrey, and in England, Dr. Hennen and Mr. Guthrie, established the fact upon the fullest evidence, that both Faure and Hunter were in error, and that where amputation is necessary in consequence of gun-shot

wounds, and, I may add, of other casualties, such operation ought to be performed at once, or within twenty-four hours from the receipt of the injury; that when amputation is practiced before the access of the consecutive symptoms, it may be done with but little comparative danger; that when it is done after the appearance of such symptoms, and before suppuration is fully established, fever allayed, and the system restored, as it were, from its influence, the danger is urgent, and the result usually disastrous; finally, that if delayed until after all these symptoms have given way, swelling subsided, and suppuration has been established, a better chance of recovery may exist; but still, this chance is much less than if the operation had been done immediately, on the receipt of the injury.

In support of the propriety of immediate amputation, Baron Larrey adduces the testimony of Dubor, who stated, that during our revolution, the American surgeons performed amputation at once, and lost but few of their patients, while, among the French auxiliaries, the surgeons delayed it, in accordance with the doctrines of Faure, and lost a very large proportion of theirs.

He also mentions the testimony of Féroc* and

* 'Lors du combat naval du 13 Prairial, an. 11, (1er Juin, 1794,) il fut fait un grand nombre d'amputations l'instant après le coup. Soixante de ces amputés furent portés à l'hôpital de la marine, à Brest, et confiés aux soins de M. Duret. Deux seulement périrent du tetanos; tous les autres furent guéris: l'un d'entre eux avait eu les deux bras amputés.'—*Larrey Chirurgie Militaire. Vol 2, p. 459.*

other naval surgeons, that out of sixty patients on whom amputations were performed in the French fleet immediately after the combat of June 1st, 1794, but two died, and that all the rest recovered; one having lost both arms.

Mascelet also states, that immediately after the naval battle in Aboukir bay, eleven amputations were performed, all successfully; while, at the hospital on shore, three operations were performed, seven or eight days after the battle, and that all the patients died, notwithstanding the best care.

To all this Baron Larrey* adds the evidence of his long and careful experience; he says, 'Faure assures us that hardly thirty escaped after the battle of Fontenoy, out of about three hundred who underwent early amputation, while in our practice, more than three quarters have been saved and some of them with the loss of two limbs.'

The doctrines above stated are confirmed both by Dr. Hennen and Mr. Guthrie, in their inestimable works on military surgery; they also adduce the opinions of other military surgeons in support of their own. They examine closely the doctrines of Hunter, and admit that they must be erroneous. Mr. Guthrie says that previous to the termination of the war of 1815, the opinions of Hunter on the powers and capabilities of the human consti-

* 'Faure nous apprend que sur trois cents amputations environ, faites après la bataille à Fontenoy, une trentaine seulement furent suivies de succès, tandis que nous avons sauvé plus de trois quarts de nos amputés, dont quelques-uns ont même perdu deux membres.'—*Larrey Chirurgie Militaire. Vol 2, page 452.*

tution were universally received. As general principles, they did little mischief; but when they came to be acted upon, the results were not found to coincide with the principles from which they were deduced, and I do not believe, says Mr. Guthrie, that at the close of the war in 1815, there was one naval or army surgeon in the British service, who would have delayed, until the second period, an amputation which was clearly indicated to be necessary, although there were a few, in the French army, who preferred operating after the first inflammatory symptoms had subsided. This was not the case in private life. Many of the surgeons, in London and other places, advocated the propriety of delay, and the opinions of Hunter, and taught to rising surgeons, doctrines which had been found wanting in practice, and which could not be too soon exploded.

I may here observe, and it is a point of the greatest importance in understanding the question at issue, that Baron Larrey, Mr. Guthrie, and Dr. Hennen, confine the period of time, proper for primary operations, to the first twenty-four hours after the infliction of the injury. Baron Larrey tells us,* 'When a limb has been so injured by

* 'Lorsqu'un membre blessé par un coup de feu ne peut être conservé, il faut l'amputer sur le champ. Les premières vingt quatre heures sont les seules heures de calme que conserve la nature, et dont il faut se hâter de profiter, comme dans toutes les maladies dangereuses pour administrer le remède nécessaire.—Si l'on ne fait promptement l'opération, la douleur se manifeste, la fièvre s'allume, les fonctions sont dérangées successivement, l'irritation augmente, et il se déclare

gun-shot that it cannot be saved, we should amputate immediately. The first twenty-four hours are the only hours of quiet which nature enjoys. It is therefore during this favourable period that we should apply our remedies, in this, as in all dangerous diseases.'

In the sixth volume of the Memoirs of the French Academy of Surgery, page 118, we find the following excellent critique by Boucher upon the doctrines of Faure, written soon after the award of the academy. It is precisely the doctrine established by the experience of military surgeons of the present age. Boucher says,* 'Properly to discuss this important question, we should mark the different periods of time when amputation should be performed. And I will mention three. The first period, extending from the receipt of the injury to a short time before the

des mouvemens convulsifs. Si le malade ne succombe pas à ces premiers accidens, les solides, après avoir été distendus outre mesure, tombent dans une atonie complète ; ce qui produit dans le moignon la gangrène dont il est difficile de prévenir les suites funestes.'—*Larrey, Chirurgie Militaire. Vol. 2, page 453, 455.*

* Pour procéder avec ordre dans la discussion de cet objet important, il faut distinguer avant tout, les temps ou les divers périodes, dans lesquels l'amputation peut être pratiquée. J'en distingue trois.

Premièrement, le temps qui suit immédiatement le coup porté, et qui précède le développement des accidens. L'on sait que dans les plaies faites par armes à feu, la tension, le gonflement inflammatoire, les battemens, les douleurs vives, &c. qui en sont les suites ordinaires, n'ont pas lieu tout d'abord, et que ces symptômes tardent plus ou moins à se montrer selon la grandeur et la complication de la plaie à quoi contribue aussi le tempérimént ou la constitution du blessé.

Secondement, le temps, ou les accidens plus ou moins développés, sont plus ou moins propres à affecter l'économie animale.

Troisièmement, le temps, ou les grands accidens ont relâchés de leur violence ou sont absolument calmés—Temps requis par M. Faure, pour operer avec avantage.—*Boucher Mémoires de l'Académie de Chirurg. Vol. 6, page 118.*

appearance of the inflammatory symptoms. The second commences with these symptoms and continues during their influence. The third commences when the symptoms have become much mitigated in their violence, or have wholly subsided; the period considered by Faure as the only proper time for amputation.'

In speaking of the symptoms resulting from wounds, and the period of their access, Boucher says, 'We well know that tension, inflammatory swelling, and pulsating pains, fever, etc., do not take place at first; but that the period of their access is more or less influenced by the extent and complication of the wound, and by the temperament and constitution of the patient.* Faure's system appears to be founded wholly upon the unfortunate results which follow amputation, practiced during the second period, when all the symptoms are developed, since he alleges that the little success, which followed primary operations, was owing to the fact, that they were done in a time of trouble and disorder; when the whole machine was, as it were, in a state of ardent fever.'

* Boucher here gives us a most important principle, which should be well observed in practice. Baron Larrey confines the time proper for amputation, to twenty-four hours after the injury; experience having convinced him that the inflammatory symptoms usually commenced within that time. It is probable, however, that in some instances, the symptoms may be delayed beyond this precise time. It is even more true, that, owing to the peculiar complication of some wounds, the severe symptoms commence at a much earlier time. In confirmation of this opinion, see Larrey *Chirurgie Militaire*, tom. II, page 260; case of Gen. Lanusse. See also the cases lettered A. B. C. annexed to this essay.

He also remarks, 'After the battle of Fontenoy,* there was such lack of surgeons, that but few of the wounded could receive proper care.' Thus it seems, that Faure did not confine his observations to the first period of Boucher and of Baron Larrey. We may reasonably infer, from an accurate examination of the opinions, both of Faure and of Hunter, either that they did not recognize this most important practical precept, or that they disregarded it in practice.

If this be the explanation, and I doubt not that it is, then it is established, that in the days of Faure and of Hunter, as well as in our own, and I doubt not the same will hold true as long as time lasts, neither amputation, nor other operation of surgery, can be performed on the human body, while suffering under inflammation and fever, without incurring the greatest danger. I have labored this point, gentlemen, extensively, and I fear tediously, not only because it is applicable to military surgery, but for the stronger reason, that it is equally applicable in civil practice; alike to the treatment of compound fractures, and to any operation which may be proposed while the human system is in a state unfavorable for its execution. If, then, amputation is not to be performed in a compound fracture, from the commencement of the second

* Smollett says this battle was fought with great carnage and obstinacy. At first the French were driven from their position, but regained the field and a complete victory. The Allies lost 12,000, the French nearly the same. The English left all their wounded to the mercy of the French. This fact and the time the battle lasted confirm the views of Boucher.

day after the injury, until suppuration has been established, does it not follow, by a parity of reasoning, that we should avoid, during the same period, all acts which may promote or aggravate inflammation? Does it not also follow, that every thing possible should be performed on the first day,* and that every act which can, in any way, excite or aggravate inflammation or irritation,†

* I cannot here refrain from warning the reader of the necessity of making all his arrangements with the greatest care and forethought. It is not sufficient that he knows how to remedy difficulties when they arrive; he must foresee and prevent them. The medical treatment is of great importance. Is blood to be taken? If so, from what part? When? and how much? Similar queries present themselves as to purging,* diaphoretics, and opiates. The articles selected for diet should be such as best tend, in conjunction with other means, to subdue fever and irritation; yet such as may be most nutrient, consistently with the foregoing condition. The patient's apartment should be quiet, free from noise and interruptions, and thoroughly ventilated, having a southern and pleasant prospect. Perfect cleanliness should be observed. The attendants should be intelligent, firm, and uncompromising to baneful indulgences; yet still more noted for kindness, cheerfulness, and sympathy for human suffering. Such apparatus only should be used, as may retain the parts in apposition, without giving pain. The transportation of the patient home, without injury, is of great importance. On this subject, see the Memoir of M. De La Faye, Mèm. De L'Acad. Vol. 6, page 1; and for a translation of the same paper, see J. Aitkin on Fractures, page 79. London, 1800. See also Baron Dupuytren, Leçons Orales.

‘Hic tamen citra curationem notandum, primo, ut fiat extensio a chirurgo statim vocato, prinâ, aut ad summum, secundâ die, priusquam scilicet, parti gravis superveniat inflammatio. Si Chirurgus opportunè non fuerit accersitus, sed tertiâ, quartâ aut quintâ die, in quibus inflammatio vel imminet vel coepit, tunc tentanda non est extensio, donec septem, vel paulo plures dies praeterierint.’—*Scultetus. Page 90.*

† ‘Il y a long-temps qu'on a dit pour la première fois qu'on ne devoit negligier aucune precaution dans le traitement des maladies. L'omission d'une seule circonstance peut conduire a des resultats facheeux.’—*Baron Dupuytren Leçons Orales. Vol. 5, page 9.*

* ‘Purgatio enim per alvum plerisque vulneribus prodest.’

should be most studiously * avoided during the intervening time preceding suppuration ?

Is it not clear that all membranous structures, which, in consequence of the injury, have become so many bands, impeding or even arresting the circulation of blood, or the transmission of nervous influence, should be at once divided ? Shall we in compliance with the rules of our art, remove from our bandages both hem and seam, † lest they irritate or cause ulceration of the skin, and at the same time suffer rough, angular, loose fragments of bone or other foreign bodies to remain within wounds to irritate, inflame, and endanger the vital ‡ structures they may lie in contact with ?

Shall we any longer talk about the necessity of

* 'I am informed that amputation of the angular portions of fractured bones is not uncommon at the Leeds infirmary. Whether it has been attempted under such circumstances, and to such an extent as has been already detailed, I am not aware ; as important facts are frequently buried within the walls of an hospital. I must acknowledge, however, that on speaking to the venerable Mr. Hey, on the bad consequences of compound fractures in London, he assured me that he was persuaded, that it was not so much from the foul air, as from not removing the sharp ends of bones, which irritated the muscles and became a constant source of tetanus, or of those extensive suppurations so often followed by death. He told me, by adopting this plan, his practice was very successful.'—*Mr. Dunn, Medico Chirurg. Transactions. Vol. 12, page 176.*

† 'Fasciæ autem parantur ex linteis vetustis aliisque usibus ex parte attritis, ut sint tractabiliores, validis tamen, ne extentæ lacerentur ; nullas consutiones aut extantias habeant, ut æqualiter, ac sine dolore constringant.'—*Sculletus, page 83.*

‡ 'Those fractures are most dangerous, which are made so deep in the fleshy parts, that your hands cannot well come at them to extract the loose bones, and place the others right * * * so also those fractures made by splinters are exceeding dangerous, they generally shattering the bone to pieces : In which case, the nerves, tendons, etc. are grievously pricked and torn, and are subject to extraordinary pain, inflammation, convulsions and death, unless immediate remedy be had, by removing these bones, or by amputation of the member.'—*Wiseman, vol. 2, page 174.*

cleanliness, and busy ourselves with water, soap and sponge, in washing the external coverings of a broken limb, knowing full well at the time that this very limb is, within, full of all uncleanness?

Shall we recognize any longer as a principle of our art, that in such cases, it is nature alone which has power, after weeks of suffering and danger, to relieve our patients, by removing the complication of their wounds, whence all their sufferings and danger come?

It is on the above principle that we may explain the not unfrequent occurrence of serious consequences, or even death, after operations, deemed trivial, when practiced on inflamed parts; such even as cutting corns and paring toenails. I fear this subject has not received the attention it deserves from the profession, in private practice, and that principles, which may be said now to be well re-established among military surgeons, are not duly appreciated either in the hospital or private practice of Europe or America.

To elucidate this point, I will mention a single case which came under my knowledge some twenty years since. An industrious middle-aged man,* foreman of a distillery, residing in a neighboring town, had been afflicted a long time with a corn on each foot, over the joint of the little toe and its metatarsal bone. On each foot, the corn had caused ulceration into the joint. The bones

* The late Mr. Burrage of Medford.

were carious, and the patient suffered much from lameness. To obtain relief, a surgeon was consulted, who recommended the removal of the little toe and a portion of its metatarsal bone; but he added it could be safely done, only after the patient had confined himself to a recumbent posture, appropriate diet and regimen, with such medicine as might be needed to subdue all inflammation, swelling and tenderness. This course was adopted, and the toe, which had given the greatest pain, removed at the proper time. No bad symptom ensued; cicatrization took place in a reasonable time, and the patient then regretted that both feet had not been served alike. On returning to his labors, the man experienced so much relief from the operation, and so much pain from the remaining toe, that he determined to lose that also. He again applied to the same surgeon, but declined wasting, as he termed it, so much time in preparation. He said there was almost no pain in the part, except when he walked; that it was very different from the other, and that now he must have his own way. Finding his surgeon inexorable, he applied to another, who entertained no such scruples. The operation was done expertly and quickly, but it caused great suffering in its execution. Within a few hours, there ensued most agonizing pains. Opium was resorted to, but without relief; the patient became delirious, agitated, and sleepless.

The wound assumed a bad appearance, soon mortified, and death was the result.

In considering those cases that heal without suppuration, it may be well to inquire how far fortunate results are dependent on treatment, and how far on peculiar complications.

Sir James Earle, in a note to his edition of Pott's treatise on compound fractures, considers all the aggravated symptoms as dependent upon the admission of air into the wound, among the fractured bones. In support of this opinion, he reasons from analogy, and says that large extravasations of blood may remain harmless, and that psoas abscesses may exist for a long time, and increase to great size, without producing trouble to the system; but hectic fever and other grave symptoms supervene as soon as an opening is made and air admitted. But it may be well questioned if the analogy holds good in compound fractures. These views are certainly not sustained by the cases collected and hereto annexed, as neither hectic fever, inflammation of a grave character, or severe pain, or nervous symptoms have occurred in either of them, where the wound was at once sufficiently open, drained of liquid discharges, and freed from all foreign bodies: while severe symptoms have attended some of the other cases, where these precautions have not been sufficiently regarded: yet here, on several occasions,

the severe symptoms * vanished, as soon as the needful treatment was adopted.

I will only add, that I have, on many occasions, known compound fractures heal readily as by first intention; but this result has been obtained only in cases where the wound has been inflicted on the bones and muscles, without splintering, or other important complication; while the severest symptoms have followed such fractures as have occurred in tendinous and membranous parts, where the bone was much splintered, and the skin but little broken. Most English and American surgeons, however, have adopted the views of Sir James Earle, and have endeavored to convert compound into simple fractures, by closing the wound by means of adhesive plaster and bandage, in the hope of healing by first intention.

Now although there may be but little objection to gently drawing the lips of the wound together by adhesive plaster, in the simpler kinds of compound fractures, I mean such as are compound by definition, not by complication, yet I apprehend much mischief may flow from the practice, if extended to the more complicated forms of fractures, especially when, in addition, graduated compresses and bandages are made use of to prevent the undue

* In support of the opinion, that air may be freely admitted to the cavity of compound fractures without injury, see case No. 7. See also, the cases lettered D. E. F. G. These cases and No. 6 also illustrate the value of draining all fluids from the wound, at the commencement, and during the whole course of treatment.

rising of the bone.* Under such treatment I doubt not that inflammation and sloughing have often been attributed to the original injury, which would never have existed, had it not been for undue constriction over the wound.

Closing here our remarks on the cases in which amputation has been pointed out as the appropriate remedy, and on those which are so little complicated, that they may be healed with little or no suppuration, and without inducing aggravated or dangerous symptoms, let us consider those intermediate cases, where alone the question of dilatation, and the extraction of foreign bodies, properly arises.

In the commencement of this investigation, the inquiring mind is struck by the fact, at once curious and instructive, that the older surgeons, both English and French, the Parés, the Wisemans, the Petits, the Bromfields, the Le Drans, and the Bouchers, agree in recommending immediate action, both as applied to amputation, the dilatation of wounds, and the extraction of foreign bodies therefrom, whenever such cases were so complicated as to render such proceedings necessary. And it appears that their doctrines and practice

* On doit éviter les bandages unissants tels que la capeline, et autres semblables ; ils gênent et fatiguent les parties, en s'opposant à l'engorgement favorable et nécessaire pour produire une bonne suppuration.—*Larrey. Vol. 2, Chirurgie Militaire, page 451.*

Fasciæ etiam minus stringuntur, quam in fractura sine vulnere, ne compresso vulnere, dolor et inflammatio orientur.—*Scultetus. Page 90.*

were recognized as correct, and followed, up to the time of Faure and of Hunter; that since that time, the opposite principles and practice, as taught by the two last mentioned writers, have been established, both in military and civil surgery, and, except so far as before pointed out, in regard to the time of performing amputation, continue to this day to be generally regarded as correct.

The older surgeons * above cited, allege that severe and dangerous symptoms supervene in wounds complicated with broken bones, unless tension be prevented or removed by incisions, and foreign bodies extracted, before the commencement of inflammation; and that these symptoms are dependent upon the complication of the wound † and may be relieved, controlled, or even prevented by appropriate and seasonable treatment. Baron Larrey embraces the same views, and Dr. Hennen

* As long as there is any strange body or different substance to keep off the union, you must not hope to make any cure of the wound.—*Wiseman, vol. 2, page 43.*

Wiseman, vol. 2, page 158, having advised immediate extraction of all foreign bodies, says in the succeeding paragraph :

‘In the Armado naval of Dunkirk, where the surgeons were oft employed in this kind of work, we, after every fight, went together, visiting one another’s wounded men. It was thought amongst us a great shame, if any thing of this work of extraction were then to be done : For after the first and second day, the wound proveth tumefied, also the neighbouring parts are inflamed, and so changed in their temper, that they conceal from your sight both the bullet and his companions, so that the place they are caught in can hardly be known ; Or, being discovered, you can not, without hazard of your patient, or great trouble of the part, make extraction of them. In which case, it may then be reasonable to defer that work, and by lenients to hasten digestion.’

† See case No. 18, as exemplifying cause and effect between dilatation and relief of the severest symptoms.

and Mr. Guthrie base their doctrines of immediate amputation upon the same principles. They all appeal to experience and cite many cases confirming the doctrine. On the other hand, Faure and Hunter appeal to their experience, and to that of others, to prove the success of treatment diametrically opposite. How, then, are we to reconcile this difference of opinion with regard to matters of fact? No one will believe that either Faure or Hunter would deceive themselves or willingly mislead others. Some mistake must obviously have existed, and I have already adduced the authority of Boucher, proving, as it seems to me, that Faure actually did fall into the error of confounding the first and second periods of Boucher and of Larrey. Consequently, all his deductions fall to the ground, as they in no wise militate with the views of the opposing party. We are therefore compelled to believe, that the error lies in not understanding, or in disregarding the principles so clearly laid down, above, on this subject, and we realize, with painful emotions, how much more creditable it had been for science, as well as fortunate for humanity, if both Faure and the members of the Academy had studied and appreciated the criticisms of Boucher, and governed themselves by his wisdom. Nor is it less certain, that Hunter fell into the same error: his writings contain strong internal evidence of this fact. He insists that patients should be housed and put in a

way of cure, before any operation is performed; thus causing delay and wasting most valuable time. He says, 'that the extraneous bodies do not come out from wounds, at first, so readily as they do at last, because the inflammation and tumefaction, which extend beyond that very opening, keep them in:' thus showing, conclusively, that he speaks of wounds only when inflammation and tumefaction have already supervened, and when the favorable moment for action has passed by. In another place, he considers tension and inflammation as the consequences* of wounds, and that dilatation must increase them both, inasmuch as it extends the original wound. Hunter, and Pott, and Abernethy, speak much of the injury arising from any effort to remove foreign bodies, or fragments of bone, except such as are loose and superficial, until after suppuration has been established; thus showing, that they speak only of the case during the second period, the period of inflammation. They object even to the use of probes, as a violence offered to the parts, and neither recommend early dilatation for the purpose

* A reason given for opening gun-shot wounds is, that it takes off the tension arising from the inflammation, and gives the part liberty; this would be very good practice, if tension or inflammation were not a consequence of wounds; or it would be very good practice, if they could prove that the effects from dilating a part that was already wounded, were very different, if not quite the reverse of those of the first wound, but as this must always be considered as an extension of the first mischief, we must suppose it to produce an increase of the effects arising from that mischief: Therefore this practice is contradictory to common sense and common observation.—*Hunter on Gun Shot wounds.*

of draining,* or of preventing, or relieving, tension, or for the removal of foreign † bodies ; nor do they in any way mention, or allude to, the reasons assigned by the older writers, for urging these important and necessary operations;‡ much less do they meet their arguments and show them to be fallacious.

* The English custom of healing wounds in general by the first intention, as well as Hunter's doctrine of the vitality of the blood, and its power of becoming organized, together with his views of the bland and inoffensive nature of pus, have all, I doubt not, tended, in common with the views of Sir James Earle, to establish the practice here alluded to. Consequently, the deleterious influence, on health, of matter being retained and burrowing among the soft parts, and the danger of purulent absorption or infection, have, till within a few years past, been too much overlooked, or disregarded. As illustrative of the baneful influence of matter so retained, I have placed, in the appendix, one case from the works of Ambrose Paré, lettered G, and one of my own, lettered F. I likewise make the following quotation from Tulpius, to show that physicians, as well as surgeons, of his day, agree on this subject : ' Sed in diutinâ suppuratione, languet, vel potiùs emoritur tantoperè, vis expultrix : Ut multo facilius expellat onus suum, perviam declivem quam sublimem. * * * * Dirige itaque cursum tuum, o Medice, per lineas hic signatas : Et excipe gratè quod praeferitur lumen : Sed seca maturè constantibus viribus, et integris visceribus : Alias educes quidem pus vel cruorem : Sed neutiquam ex periculo aegrum.'—Nicholai Tulpîi Observationes medicæ Editio Quinta Lib 2, Caput 5, Lugduni Batavorum 1716.

† Mr. Abernethy, in his lectures, says, when speaking of compound fractures much comminuted, ' I do not see what advantage can be derived from picking away the smaller pieces of bone. The only mode in which the fracture can unite is by the separate pieces of bone becoming vascular, and the probability appears to me that they will become more so, when the pieces are small, than when they are very large. If there should be any projecting, detached pieces of bone which appear very much to disturb the proper position of the fracture, you should take them away ; but you must be much guided by circumstances : if you can replace the different pieces of bone, and by giving the part a moderate degree of support, retain them there, I think you had better not take them away.'

‡ ' There still prevails, among foreign surgeons, and particularly the French, a strong prejudice in favor of the immediate scarification or dilatation of all gun-shot wounds. This practice originated in the idea, that the wounds were poisoned : to allow, therefore, of a free discharge of the poison, and to admit of the more ready application of antidotes, was a leading indication. To change the figure of the wound was also another object ; for the older surgeons had observed, that the more malignant and obstinate ulcers were of a circular form. But the employment of scarifications had its opponents, and was reprobated by Leonardus Botullus, one

All that they say of the bad effects of early operations on broken limbs, has been recognized as true when applied to such operations performed during inflammation,* both by the older surgeons and by the military surgeons of the present day; and we can account for the fact, that but one in ten escaped under the care of Faure, and that under that of Hunter, but few recovered, who underwent early

of the most judicious of the older surgeons. Our own Hunter, between whose opinions and those of Botullus there is a very remarkable coincidence, has contributed very much to show the inutility of the practice. And among English surgeons, the knife is now rarely, if ever, employed in the first instance, except for the purpose of extracting balls, or splinters of bone, and other extraneous bodies; or for facilitating the application of ligatures to bleeding vessels.—*Hennen. Page 60.*

* The idea here advanced, by Hunter, that tension is the consequence of wounds, and increased by dilatation, must be considered as remarkable. An abscess, forming beneath the fascia of the palm, is attended with great pain, throbbing and fever, even when the quantity of matter is small. Here, say we, is tension. We cut at once through the firm, unyielding textures, and let out the matter. Our patient is relieved and his hand recovers its full powers. If this be not done, the matter burrows downward and upward, even through the annular ligament, or perforates the hand, and there finds an insufficient outlet, and the hand often becomes crippled for life. In parts not covered by membranous tissues, much greater suppurations occur without acute or pulsating pain or fever. Hence is it clear, that tension is only the secondary effect; in other words, depends on complication. Why should not this doctrine and practice be applied in treating compound fractures? All wounds, in order to heal, must inflame and swell, to a certain degree. It is inordinate swelling, only, which requires the interference of surgery. The absence, or the entire subsidence, of swelling, on the third day, or at any subsequent time, before suppuration, even when unattended by other bad symptoms, indicates great danger. Witness the following history, viz: 'A person having been shot in the arm, and the wound undigested, I being consulted, advised the laying open of the wound, and the extraction of the bullet, rags, &c., but was overruled by others, and it was deferred to farther consideration. Two days after, I visited the patient, and asked the chirurgeon whether he had laid open the wound? He replied there was no need, for he could turn his finger in it, and pull out the bullet and rags if it was necessary. As I was going out of the house, I met the physician, who, inquiring of me the patient's health, I replied that the chirurgeon had unwittingly given me the certain sign of his death. For, 'In magnis vulneribus et parvis, si tumores non appareant, ingens malum.'—*Richard Wiseman. Vol. 2. Page 213.*

amputation, only upon the supposition, that both these distinguished men had fallen into the unfortunate mistake we have attributed to them.

Thus bitter and fatal are the fruits of error in our profession, and thus are illustrated the truth and pertinency of the language of Bichat, applied to the merits of Desault, who says, 'We can appreciate the merits of great men only after the lapse of time. It is time alone which can separate the valuable truths they have taught, from the errors which have escaped them. Whoever would accurately estimate their merits, must examine their works in an age subsequent to that in which they have lived.'*

By comparing the results obtained under these two opposite modes of practice, we find the picture by no means flattering on the side of Hunter and his followers. As evidence of the fact, I offer you an abstract of several clinical lectures delivered by Mr. Guthrie,† in London, during the winter of 1837-38.

In beginning, he assumes that compound fractures, whether caused by gunshot, or by heavy bodies crushing a limb with its bones, are nearly similar, and require nearly similar treatment.

* 'Tel est en effet le sort des savans ; leur merite ne s'epure q'au creuset du temps, les verités qu'ils ont tracés, ne s'isolent qu'en s'eloignant de nous, des erreurs qui leur sont echappées. Qui veut bien les voir, doit se placer toujours dans la posterité.'—*Bichât, Eloge de Desault, Page 2.*

† See Appendix to Johnson's *Medico Chirurg. Review* for April, 1838, and compare it with the authors mentioned in this essay. See *Extracts, Letters*, H. J. K. L.

With Hunter, he objects to dilating the wound, at first, although he says it must be done at a later period. He says, when suppuration is fully established, the splinters may be very gently sought after and removed. Again, he says, it must be borne in mind, that the pieces of bone cannot all be removed at once, or at the first, or at succeeding examinations; and as they cannot come away of themselves, except they are small, incisions must be made for their removal, and before any quantity of new bone can be formed around them. Mr. Guthrie considers the danger of dead pieces of bone, being inclosed by new formed ossific matter, as very great, and he exhibited to his class several morbid specimens, which had so annoyed the lives of his patients, that they obtained relief only by amputation, or death.* To prevent this state of things, he directs that as soon as it can be ascertained, by passing a probe through a hole in the new forming bone, that a portion of dead bone is so imprisoned, we should cut down upon the part and remove it by the chisel.

Such operations, he says, cannot be all done at once, but only in successive times, as evidence of the imprisoned condition of the bone may be obtained.

Here let us remark, that the time pointed out by Mr. Guthrie for the performance of these operations, is the period when the soft parts are tumid from preceding inflammation: when they are so massed

* See Authorities lettered H. J. L.

together that we can with difficulty recognize the several tissues; and when it would seem that nature should not be interrupted while she needs all her powers, aided by the skill of the surgeon, to complete the restorative process.

Again, it would be difficult to assign a reason, why these important and necessary operations should be delayed to so late a period, since Mr. Guthrie recognizes the necessity of amputating before the access of inflammatory symptoms, for reasons as applicable in the one case as they are in the other.

In Benjamin Bell's System of Surgery, well known, until a few years since, as a textbook for students, we find the following remarkable paragraph.

‘From the difficult treatment and uncertain event of compound fractures, practitioners have been very universally disposed to consider the amputation of the fractured limb as necessary.’

And Sir James Earle * tells us, that the surgeons of London, who attended on Mr. Pott for a compound fracture, had actually decided upon the necessity of amputating his leg. That he, (Mr. P.) had given his consent to such proceeding, that the instruments and dressings were actually got in readiness, and that this cruel operation was prevented only by the fortunate arrival of Mr. Nourse, who thought the leg might be saved. Mr. Pott's

* See life of Pott, prefixed to his works.

fracture healed by the first intention, and Sir James would have us believe, that this fortunate result depended upon the oblique course of the bone through the integuments, and the exclusion of air from the cavity of the wound.

But I fancy, gentlemen, you will assign a very different cause for this result; and I trust no fellow of this society will have occasion to regret having advised amputation for the cure of a fracture, so little complicated as to admit of reunion by first intention.

According to Mr. Pott, the great objects of fear and apprehension in a compound fracture are pain, irritation, and inflammation. That these are to be avoided, prevented, and appeased by all possible means, let every thing else be as it may. In these views Mr. Pott agrees perfectly with the older surgeons. On both sides, therefore, is it admitted, that such symptoms indicate great danger, and that the patient's safety requires that they should be promptly relieved. As to the cause of the aggravated symptoms, however, Mr. Pott differs from the older writers, and attributes their existence to the original injury, or to faulty treatment on the part of the surgeon, and not to complication. True to this bias, he resorts only to antiphlogistic remedies for their removal.

But, according to his own account, his success is by no means great; as he says of compound fractures which do not heal by first intention, they

are attended with high inflammation, multiplied abscesses, and large suppurations, demanding all the surgeon's care and skill, and even then sometimes ending in the loss of limb, of life, or of both; or that all our efforts prove fruitless from the beginning, and that gangrene and mortification are the inevitable consequences of the accident.

Now if the extent of the injury be the true measure of danger, in compound fractures; if the surgeons of London can in any way be excused for the opinion given in Mr. Pott's case; or Benjamin Bell's advice be sustained: or if Mr. Pott's opinions be founded on pathological truth — then should it follow, that no one of the cases, which I have the honor to lay before the society this day, could have been brought to a successful issue.

Yet have they all recovered. Mr. Pott and others may say they are exceptions to the sound principles of surgery; but if we examine carefully, we shall find, that the very extent of the wound has prevented tension in the circumference of the limb, by dividing the membranous fasciæ which might otherwise have produced it; that the shortening of the bone, by loss of substance, has prevented tension in the direction of the length of the limb, by the relief it has given to the muscles, when suffering under inflammation or engorgement, or from infiltration of blood or other fluids into their textures; that the open state of the wound has also provided a free draining of all fluids, and thus prevented the

lodgment of pus and the formation of burrowing abscesses ; and that the extraction of all the foreign bodies, fragments, and shivers of bone, have ensured freedom from pain and other aggravated symptoms, by removing the complications on which such symptoms alone depend.

It was my intention, gentlemen, originally, to consider each of the precepts at first alluded to, separately ; to lay before you more fully the arguments adduced by the older surgeons in support of their opinions, and to cite more extensively from their works, cases, proving their opinions to have been practically correct. I also intended to discuss the subject of bandaging, and to compare the effects of too tight binding with those of tension in the circumference of the limb, hoping, thereby, to put the profession on their guard against what, I doubt not, has been a fruitful source of ill success in the treatment of compound fractures. I meant, likewise, to consider the injury of blood-vessels and nerves, and to pass in review the principles and practice advocated, in this particular, by White, Gooch, Delpêch, and Dupuytren, and to bring out in relief, if I were able, the very lucid and invaluable observations of Mr. Guthrie on this subject, which are to be found in his treatise on the Arteries. Lastly, I intended to allude to the great number of cases of compound dislocation of the ankle, (cured without amputation, particularly when part of the bones have been removed,) to be found, scattered

here and there through the annals of surgical literature, and, in a particular manner, to notice the papers of the late Mr. Henry Earle, and of Mr. Rutherford Allcock, in the *Medico Chirurgical Transactions*, and to have compared the cases here collected, and the doctrines here advanced, with the doctrines and practice inculcated by the invaluable treatise of the late Sir Astley Cooper, on fractures and dislocations of the joints. But as that treatise is now in the hands of every Fellow of this Society; as the great truths therein contained, are given in language so graphic and plain, that 'he that runs may read;' and as nothing therein contained, can, in the present state of our knowledge, be altered for the better, I will only ask of the Society to compare, at their leisure, the doctrines of the one with those of the other, and determine if the work of Sir Astley does not confirm the views here advocated.

But I find I have neither the time nor the ability to do justice to this important theme. I will, therefore, here close, referring you to the works of these great masters of our art, where you will find the subjects ably and candidly discussed; and the appropriate practice accurately described and clearly pointed out. And I trust, when you shall have either formed or renewed an acquaintance with Paré, with Wiseman, with Petit, with Gooch, with Martiniere, with La Motte, with Bordenhave, with Percy, and Cannac, you will readily lend your aid

in rescuing and in preserving their names, their merits, and the truths they have uttered, from being buried and lost, beneath the lumber of the thousand volumes, which a prolific and indiscriminating press is now heaping upon them.

And now, gentlemen, let me congratulate you on the return of this our anniversary; on the high attainments of the profession throughout our happy land; on the manner in which these attainments are appreciated and requited by a liberal and enlightened public; on the joy we feel in knowing, that every county throughout our extended Commonwealth, is here represented by talents and acquirements, which would do honor to the medical standing of any community. Here, then, let us exchange congratulations. Under the auspices of the gifted author of the dissertation on Self-limited diseases, let us devote a part of the day to social enjoyment, pledging ourselves to each other, with renewed zeal and energy, to continue and increase our efforts in promoting the cause of medical science, philanthropy, and the public good.

Let me remind you, gentlemen, that since our last meeting, sixteen of our number have been removed by death. Let us mingle the tear of sympathy with the friends and kindred of the deceased. Upon us devolve the duties they have so worthily discharged; to us, also, have they left the pleasures, the fleeting pleasures of life. While we enjoy the one, and strive faithfully to discharge the other, let

us acknowledge, appreciate, and honor the virtues they possessed. They have been taken from us; some in the vigor of life, most of them, however, in the maturity of years. They have been stricken from the tree of life, never again, in this world, to be reunited to the parent stock. Yet are they not wholly dead. Dust unto dust. But let us indulge the hope, that what once animated this dust, is now ripening into the rich fruit of infinite existence, knowledge, and happiness.