



AN

INAUGURAL DISSERTATION

ON

Wounds and their Treatments

SUBMITTED TO THE

PRESIDENT, BOARD OF TRUSTEES, AND MEDICAL FACULTY

OF THE

UNIVERSITY OF NASHVILLE,

FOR THE DEGREE OF

DOCTOR OF MEDICINE.

BY

J. P. Neasey

OF

North Carolina



1851.

W. T. BERRY & CO.,
BOOKSELLERS AND STATIONERS,
NASHVILLE, TENN.

On Wounds, and their Treatment.

Generically considered, a wound may be defined to be a breach of continuity in the soft texture of the body, the result of mechanical or chemical injury.

Various names are adopted, to designate special peculiarities, according to the character of the injury and its situation, in the body. On these particular circumstances I shall not, for the present, make any comment, but being thoroughly impressed with the conviction, that, before a structure can be built, its foundation, must be laid, I first propose to examine the mode by which nature heals solutions of continuity in the animal organisms. If I have rightly viewed the subject, it is indispensable to the success of my endeavours in, the establishing of principles as to the mode in which, organic textures are repaired, that, as a premise, I comment on the process by which the animal organism, is first formed, and for the attainment of this end I purpose giving a brief outline of the functions of nutrition, and development.

That change is constantly going on in the animal frame is a physiological fact, obviously known, to all. It is for the purpose of repairing and

Compensating for that deterioration of texture that a wonderful provision has been laid in the vascular system, which is destined to convey to all parts of the body blood, the carrier of materials susceptible of organization.

The blood, as circulating through the vessels, consists principally of water, albumen, fibrin, pale and red corpuscles, fatty and extractive matter, and certain salts. It is, however, to the fibrinous and albuminous constituents that the vital fluid owes its reparative powers. The use of the red corpuscles is a question, by no means solved by the best inquirers; their use in the organism is most probably connected with the functions of respiration, and colorification, and with them it is not my province now to engage. I shall, therefore, examine the blood minus the red particles, viz. the liquor sanguinis. It is this part of the blood which, by the process of exosmosis, is transuded from the coats of the capillary vessels. At first it is clear and transparent. But, in virtue of its power of self-coagulation, granules appear in it, and these cohere so as to form cells for the foundation of various textures, into which the liquor sanguinis becomes effused.

3

From this brief sketch of the nutritive process, it behoves us as surgeons to draw important conclusions; first, that, for the reparative process of tissues, the indispensable process being Coagulation of fibrin, those circumstances upon which it is dependent must be maintained, or the process will be destroyed, Such conditions are, moderate Temperature, rest, and Contact of living tissue in a healthy state.

Secondly, if the process of fibrinous coagulation, be indispensable, which no sceptic, I presume, will deny, it is imperative that the blood should contain its natural amount of fibrin, otherwise this solidification of the tissues cannot possibly take place.

Thirdly, inasmuch as fibrin is acknowledged by Chemists and physiologists to be formed by the albumen of the blood, it is evident that one important condition for the reparation of tissue is, that the blood should contain its proper proportion of albumen, in order that the fibrin may be elaborated from it for the production of the animal textures. The healing process by which nature restores the most simple wound, namely,

a clean, cut incision, is by the exudation, of liquor sanguinis, followed by solidification, of its fibrin, and the production, of new tissue. It is, in fact, an extension, of the process of nutrition; consequently the inductions, which, we have established respecting the nutritive process are applicable to the reparation of wounds.

No one can doubt, but that, the process of adhesion, above described being the most simple and speedy by which, a wound is healed, is the one which, we, as surgeons, must invariably have in view to attain.

It, therefore, it is desirous to favour the adhesive process in our restoration, of solutions of continuity, those circumstances must be attended to which, have already been enumerated, viz, rest, contact, absence of all irritation, and, above all, blood highly charged, with albuminous matter whence new tissue may be formed. And here we establish, the fundamental principle, generally to be followed in, the treatment, of wounds, viz, absence of all sources of irritation, either mechanical, or chemical, and perfect rest, to parts, so as to favour the solidification, of the liquor sanguinis, but, above all, strictly abstaining from all measures which, are likely to impoverish, the blood, inasmuch, as we require the plastic elements of that fluid to heal the injury.

inflicted in the soft textures of the body; hence not only are we to abstain from withdrawing it from the system, so as to diminish its quantity, but also we are to guard against its being impaired in quality either by the inhalation of noxious vapors, or by the retention of excrementitious matters; whence we infer the important rule, that for the proper and speedy healing of wounds, it is indispensable that free ventilation be maintained and the natural excretory processes kept active.

Having thus elucidated the various incidental propositions required as introductory to my subject, I shall now revert to the primary definition of wounds, consider their special characters, effects on the organism, and mode of treatment.

A wound has been already defined to be a solution of continuity in the soft tissues of the body consequent upon the infliction of an injury, according to the instrument or agent which causes the breach of continuity, and various names are assigned to it. Thus an incised wound is inflicted by any clean cutting instrument. A punctured wound is so denominated when the depth is proportionably greater than the width. A lacerated wound is so termed because the parts are stretched before they

are separated, and to constitute a contused wound, it is necessary that the tissue be subjected to pressure before the breach is completed.

Incised wounds rarely occur as the result of accidents; most frequently they deserve our attention, as being inflicted by the scalpel in the performance of surgical operations. It is obviously prudent, in all such cases, to promote the healing process by adhesion of fibinous materials, this being the method by which parts are most speedily restored to their normal condition, and that, too, with the least suffering to the animal and detriment to the adjoining textures. For this purpose the divided surfaces must be brought in close approximation, and kept in a perfect state of rest by means of bandages and compresses, until the bond of union is firmly established. And always bearing in mind that inflammation is diametrically opposed to the development of tissue, it is evident that all precautions must be taken in order to prevent its recurrence, or to abate it should it have commenced. Cold applications to the part are therefore indicated, and the antiphlogistic regimen generally adopted is found beneficial, not only as a direct remedial measure, but as a preventive to ulterior ill consequences.

Whenever incised wounds are of considerable magnitude, as when Tumors are excised from some situation on the trunk, or when the incision is so situated as to preclude the possibility of maintaining the divided surfaces in contact by mere Compression, as, for instance, in wounds of the head, neck, and superior parts of the body, then it is requisite to have recourse to sutures as a method of bringing into approximation the edges of the wound, In order that the sutures may not frustrate our great end, union by adhesion, Care is requisite in their insertion, whether wire or thread be employed;

First, Not to draw the suture so tight as to cause irritation, by unnatural distention,

Secondly, Not to keep the suture in the living texture longer than forty eight hours, unless imperatively demanded; else by its action, as a foreign agent, it will produce excitement, and irritation in the part, and thus produce inflammation, with its results, suppuration, sloughing &c,

In many cases, by the aid of sutures or Compresses, we succeed in keeping the parts in continuity sufficiently long to favor the formation of a bond of union, frequently, however in spite of all

precautionary measures, local inflammation, is set up, and we must then abandon all hopes of the adhesive process taking place or becoming perfected.

The emollient-treatment is then to be had recourse to; in fact, the same principles are to be followed as are applicable to lacerated wounds.

Punctured wounds for the most part present a circular aspect, which is by no means favorable to the primary organization of lymph; but, nevertheless, is to be favored to the utmost extent.

With this object in view, the situation of the wound is to be ascertained with precision, as to whether or not it be in the vicinity of important organs, extending into a joint, or any of the large Cavities of the body; and having carefully withdrawn all foreign bodies, the parts are to be brought into the closest possible contact, by this means it frequently occurs that the greater part of the wound heals by direct adhesion. If this be not the case, inflammation is set up, and its usual results take place, namely, suppuration and granulation, and which require at the commencement poultices and other adjuvants, but at a subsequent period the warm-water dressing deserves the preference.

The occurrence is not unfrequent, that, owing to the excessive depth, of a punctured wound, and the narrowness of its orifice, the pus formed in its interior burrows in the adjacent soft textures, presenting the character of a sinus or fistula. In such cases the scalpel is to be used for dividing the parietes of the orifice, so as to give to it an oblong figure; in which, from the process of healing advanced according to the plan of incised wounds already alluded to, or of lacerated wounds, now to be made the subject of consideration,

Lacerated wounds we have already defined as being solutions of continuity in the soft textures, but which are stretched previous to their being separated. It is this kind of wound, which most frequently demands the attention of the surgeon, and owing to the extent of the injury and varied shape of the instrument, by which these lesions are inflicted, they demand some consideration in this part of my Essay.

If the lacerated texture be limited in length and depth in many cases, by the aid of sutures or compresses, so as to bring the torn edges into contact, union may be effected without

70
the occurrence of much derangement of the system, or even of the parts. But when the laceration is extensive, a correct diagnosis must be made as to the nature of the damaged parts, and if any considerable artery be wounded, the arresting of haemorrhage by ligature or other means is an imperative duty. Having carefully withdrawn from the wound all foreign agents, the several edges now require support, and which, in the majority of cases, can only be effected by sutures.

Upon reflection, I cannot omit impressing on the mind of ~~the student~~ the necessity of abstaining from excising the lacerated edges of the wound. It is only with great expense that Nature can repair lacerations, and it behoves us to be economical in preserving tissue, not only as directly useful in healing wounds, but as a preventive against an excessive expenditure of Nature's powers. Having thus adapted to their normal position, the injured parts, the emollient, plan of treatment - viz, warm fomentations, and Cataplasms, are the only measures by which

we can hope for ultimate success. The reasons for which these soothing applications are applied is not, as many erroneously suppose, to set up inflammations, and thus to perfect the healing process, since inflammatory action, requires nothing to promote it; it invariably occurs as the effect of the injury, and, indeed, as we have already pointed out, is detrimental to the healing process, and requires abatement; for which purpose fomentations are highly beneficial, because during their evaporation, such a large amount of heat becomes latent - as to lower the temperature of the inflamed part; and thus to promote the object we have in view. But another great point is gained by the use of warm applications when the acute inflammatory stage has once subsided. Tonicity, the power by which arteries retain their caliber, is diminished, they become comparatively lax tubes, and permit with greater facility the transudation of their contents by exosmosis; and by this discharge of the superfluous contents of the vessels two great objects are attained - 1st. The vessels are relieved of their excessive distention, and, the nervous fibrilla being

no longer pressed upon, two leading symptoms of inflammation, namely, swelling and pain, subside. Finally, the materials which are exuded from the coats of the vessels are the elements of the liquor sanguinis, and precisely those by which, torn parts are reunited, and new tissue produced.

After the wound has been thus treated upon, the antiphlogistic plan, suppuration, and granulation will commence.

These processes involve many interesting points elucidative of physiological facts, and instructive of surgical principles. The formation of pus is first preceded by a layer of lymph from the inflamed vessels; through that lymph transudes the sanguinis, which contains fibrinous materials in the form of the deutoxide of proteine, partly in a solaced state and partly in the form of the pale corpuscles. By exposure of these materials to the air, or the influence of oxygen, the chemical union between the proteine compounds and an additional proportion of oxygen, is promoted, so that a trit-oxide of proteine is produced, and the solubility of it is that which gives to pus its opaque character, and also its enlarged

Corpuscles with Composite nuclei;

Those corpuscles of the blood which are imperfectly oxygenated albumen, when exposed to the influence of oxygen, acquire on their exterior the more perfect character of a vesicular envelope; in which state, being more susceptible of endosmosis, the corpuscule necessarily enlarges by the imbibition of fluid; while the granules of the fat in the interior of the corpuscule (acting as a centre, around which fibrine concretes, acquire a new and clear aspect,

When pus is produced according to the above named process, part of the liquor sanguinis or coagulable lymph, becomes consolidated, and in its blood vessels are formed from the subjacent tissue so as to develope conical vascular papillae, or granulation. It is by this continued production, that the chasm, becomes filled up; and when the new material reaches the level surface, the cuticle extends concentrically from the margin of the wound, and as it advances, not only does the extent of surface become diminished, but the suppurative action likewise decreases.

When this process of granulation, is

14
progressing, the best treatment, in my opinion, is that which does the least harm, viz, the least-active.

The most splendid of Nature's works - the nutrition of textures - cannot be improved upon; and therefore I conceive that all stimulating applications are sources of injury, so long as the healing process progresses normally. Upon this principle I give decided preference to the warm water dressing, as it possesses the advantage of soothing and allaying any local irritation, and at the same time promotes the conditions most propitious for the production of new tissue.

Occasionally the granulations are exuberant, that is, so much developed above the level of the adjoining parts, as to prevent the cuticle from overspreading their surface. Under such circumstances mild caustics are indicated for resupping them, and here I beg to allude to the mode of application of these agents.

It is usual to apply the caustic indiscriminately to the whole surface of the wound, from which at least one great evil arises, namely, considerable irritation, and further than this, the healing process is necessarily disturbed by the adoption of such violent measures.

10
When it is borne in mind that cuticle only advances from the margins of a wound, it is clear that the simple application of the caustic around the most exterior granulations sufficiently deprives them, so as to allow them to be covered by epidermis.

This treatment may be daily repeated, applying afterwards dry lint with pressure, until the whole surface is healed, which end will be speedily attained, since the process of nutrition and nervous sensibility are not materially impaired.

In some cases, however careful the surgeon may be, the healing process is by no means speedy; the edges of the wound become everted and tumid, the secretion of pus is thin, yellow, and offensive, the granulations are flabby, and upon the application of pressure they readily bleed, and are highly sensitive. These appearances are evidently the result of a defect in the plasticity of the lymph, which must consequently be promoted by stimulant applications.

In the consideration of contused wounds, or those solutions of continuity which are the result of violent pressure or concussion, before the soft parts are torn asunder, it is necessary to

distinguish, those cases in, which the vitality of the textures is simply impaired from others in, which it is definitely extinct. In the former the tissues are not dead, but injured, the capillary coats being torn, and blood extravasated. In the treatment of such cases it is necessary to bear in mind, that the adhesive process cannot occur, but such is the nature of the injury, that inflammatory action, to a greater or lesser extent invariably supervenes; it is, therefore, obvious that warm emollient applications are to be resorted to, the effect of which is speedily to promote the healing process in the same way as in lacerated wounds.

The contusions which more particularly require notice are those in which the tissues are killed, as the result of extensive injury, when, circulation, and nervous function, being destroyed, the parts are cold and senseless. That dead textures cannot form part of the living organism, is a well known fact; and it is, therefore, clear that tissues killed by contusion, require removal, and for the attainment of this end, Nature, in her wisdom, has amply provided,

The dead part soon becomes circumscribed by a ring of inflammation, and it has been a subject of speculation as to the manner in which inflammation is set up and the part removed;

The death of the part implies an arrest of blood, to which its vessels are no longer permeable, the vessels around must therefore be charged with that blood, which formerly supplied the now dead part; the very fact of blood accumulating in the capillaries constitutes the foundation of inflammation, which is completed by the repeated impulse of blood from the heart, and consequent upon the accumulation of blood we necessarily have its usual effects, effusion from the distended vessels; and the layer of lymph so deposited forms a barrier between the dead and living parts, and closes the vessels, so that when the dead tissue is removed, the occurrence of haemorrhage is prevented;

The increased flow of blood implies an augmentation of oxygen, in the part which is the seat of inflammation; and according to the views of Liebig, we can comprehend how, by the free supply of oxygen, exema causis or death of the tissue occurs; that process implies dissolution of substance,

10
which we well know occurs at the circumference of the part, and which must necessarily be removed as soon as it is wholly detached. Subsequent to the removal of the dead part, the remaining chasm, is filled up by granulations, and ultimately healed by cicatrization, as already explained in cases of laceration; and the same treatment is, in fact, applicable, in the one as the other. But we may additionally, remark that the value of poultices on extensive contusions is twofold; first, by evaporation, relief is afforded to the nervous excitement, and secondly, by warmth communicated the removal of the dead textures is facilitated.

Having completed this brief and therefore of necessity imperfect sketch of the peculiarities which wounds present, and their appropriate treatment, a few words more may not be misplaced as to the constitutional effects of wounds and the measures to be adopted for ascertaining them.

In case of slight injury little or no systematic disturbance is observed, but when the wound is extensive, symptoms of nervous and vascular excitement occasionally prevail, these are to be combated by strict antiphlogistic regimen, and

attention, to the state of the digestive organs, Sedative agents, also, are imperatively called for, and even bloodletting may be resorted to in extreme cases. On this head I would remark on the impropriety of withdrawing blood as a prophylactic, with the erroneous notion of preventing the ill effects of the injury. The nerves are the medium through which the general system becomes affected, and the vascular system is of secondary import; consequently, by bleeding soon after the injury is inflicted, we do not diminish the liability to systematic disturbance, but by debilitating the system we effectually prevent the possibility of counteracting the excitement with measures sufficiently energetic when it does occur.

I have already said, that in extreme cases alone is bloodletting to be resorted to, and for the obvious reason, blood is required to heal the wound, and consequently, the more that is expended by artificial evacuation, the less is reserved for structural consolidations.

One awful effect of wounds, viz, tetanus, I purposely omit, its importance, and the difficulties in accounting for its true pathology,

are motives which preclude me from attempting its introduction, while its consideration may be safely left to other and abler hands than mine—

All of which is most Respectfully
Submitted,

J. P. Mason