ON THE RAPID
ORGANIZATION OF LYMPH
IN
CACHEXIA.

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It is of high importance, in a physiological as well as practical point of view, to ascertain whether effusions of the organizable materials of the blood become vitalized by the production of new vessels and channels of circulation, more readily and sooner in cachetic than robust states of the constitution.

At first sight, it would appear probable that the feebler the power of the system, or, in other words, the weaker the force of the systemic circulation, the less quickly would living vessels become interspersed through the effused and solidified materials of the blood. Thus it is true that certain forms of what is always admitted to be inflammation, as puerperal peritonitis, will show fibrine and albumen mingled with serum and floating in flakes, in the cavity of

the serous membrane, from which they have been poured out ; and further, such matters, it is believed, are incapable of becoming organized with living vessels. In that disease, however, especially where the patient has survived the first collapse, the intestines have often been found glued together by a plastic effusion, which, by its very adherence to the part whence it proceeds, argues in favour of its vitality, although I am not aware of any attempt at its injection having been yet made. Still no argument can be adduced against the organization of fibrine in cachetic subjects, or in those in whom the powers of life are remarkably low, because of the frequency of the loose floating flakes in the peritoneal cavities of puerperal subjects ; since it is to be remembered, that a death-like collapse often ushers in the attack, from which the patient never sufficiently recovers to afford time for further change. There are, however, several facts which lead me to presume, that abnormal effusions from the capillary vessels, without direct rupture of their coats, are more speedily and completely organized with vessels capable of being permeated by our minute injections, in those feeble and depressed conditions of the system, which we denominate cachetic, than in the more vigorous and plethoric, where inflammations are more acute in the outset, and pass through more speedy and determined stages.

In acute inflammations, if the effusion be of blood properly so called, it probably occurs by rupture of the parietes of the vessels, and seldom, if ever, be-

comes organized ; at least, we have no proof of the fact, while we have divers proofs that it often becomes speedily absorbed.

Again, serous effusions, from their very nature, are never converted into solid bodies, and they appear rather to relieve local congestions, by diminishing the real bulk of the fluids circulating in the over-distended vessels. Nevertheless, we find direct exudations of fibrine in acute inflammations, in otherwise healthy and plethoric subjects, that undeniably become connected into organized membranes and new structures, unless promptly relieved by art.

These latter are the cases which should be placed side by side with those occurring in feeble conditions of the body, in order to enable us to judge of the question at issue.

Those who have been accustomed to witness ophthalmic diseases on a large scale, cannot fail to be at once struck with the greater tendency to the effusion and organization of fibrine on the surface of the iris in syphilitic cases than in those of idiopathic iritis, and there will be no difficulty in admitting that the specific cases occur, at least in this metropolis, in by far the greater proportion, in enfeebled constitutions ;—in those debilitated by excesses, irregularity of moral habits, or the mal-administration of mercury in the primary disease.

The first appearance of the tubercles of fibrine, which is the form such deposits generally assume, is observed at the annulus minor of the iris, where the capillary vessels are most numerous interlaced,

more minute, and constitute the extreme circulation of the part. Gradually, however, as the affection extends, we find these deposits occupying various spots of the anterior plane of the membrane, while from a yellowish colour they assume a red hue, more or less distinctly marked, manifesting the organization of the fibrine. I repeat that this state is more frequently and more decisively seen in the enfeebled than in the robust, although in the latter the other external symptoms appear to run a much higher and more aggravated course.

The most marked case I ever witnessed was in the person of a steward of a ship trading to the East Indies. This man contracted syphilis at Calcutta, and for the cure of the primary sores underwent a most severe and Indian course of mercury; during which he had to work at his usual duties through a very long and stormy passage home. As might have been expected, this person reached England in a miserably weak and shattered state, and about a fortnight after he landed became the subject of iritis.

At the time I saw him (a week after the attack), there were not less than eight or ten tubercles of fibrine, varying in size, the largest about twice the magnitude of a hempseed. Some were of a pale yellow, as if recently effused, some of a bright scarlet, and others again evidently commencing to suppurate. With all this the surrounding scleritis and vascular ring were not very remarkable

The patient was placed upon an animal diet, sar-

saparilla, and minute alterative doses of quicksilver and chalk. He rapidly recovered tone ; and at the end of about sixteen days every vestige of tubercle had disappeared, although the pupil remained nearly closed by organized adhesions.

I have never observed, in any case of iritis, however severe, in an otherwise healthy person, so rapid a progress to the effusion and organization of fibrine, nor so rapid a recovery, though treated by what was anything but the antiphlogistic plan.

Again ; in those affections of the posterior part of the eye in children, which we have been accustomed to call malignant, almost every one has been surprised to observe, in the early stage, how healthy appear to be the subjects of this frightful malady. During the period of the existence of the bright and metallic reflexion from the deposit at the posterior part of the globe, the child appears to retain its ordinary health, although perhaps the disease may be going on to increase. But so soon as you begin to trace the organization of the fibrine, indicated by the red points, or ramifications of actual vessels, not only may you expect a great deterioration of the general health, but also the rapid progress of the affection.

It is then curious to inquire whether the decline of health precedes, accompanies, or follows this organization, or rather, whether it is the cause or consequence. I do not hesitate to declare my belief, that it is the cause rather than the effect ; first, be-

cause I have often seen the disease existing many months prior to the organization of the deposit, and upon an accidental impairment of health it has suddenly assumed an active form, and gone on unchecked to a fatal termination ; and secondly, because, when in a particular case, the health of the child had by great care been much improved, the disease itself appeared to have been checked, and the globe began to waste ; and lastly, because in this same case, when the negligence of the parents again allowed the health of the child to decline, the disease burst forth with redoubled activity, and went on rapidly to a fatal termination. This case, which during the more satisfactory part of its course, was under the care of my friend, Mr. Tyrrell, occupied a space of several months, affording a good opportunity of watching the various phases of the local malady, as compared with the general health of the subject.

Turning, however, to those ravages of disease which only *post mortem* observations, or the result of surgical operations afford us, we shall, I think, equally find, and where we least *a priori* expect, the same ready organization of the materials of the blood, in enfeebled conditions of the system.

A preparation which I wish to bring before the notice of the Society, is an abscess taken from a limb amputated by my friend, Mr. Liston, and beautifully injected by him. The case was one of long continued disease, with ulceration of cartilages, &c. of the knee-joint ; and it will readily be granted

that where such extensive mischief existed in so large a joint as the knee, and where hectic fever had already supervened, no vigour, local or general, could be manifested in that patient's constitution.

I need not describe the appearances of the joint itself, for it is to the abscesses alone, in the cellular tissue and amongst the ligaments of the knee, that I beg to refer. These particular cysts were of various sizes; all, however, more or less small, some containing pus, others a cheesy and almost concrete material. All the cavities, however, were lined with what at first appeared to be unorganized fibrine, varying from half a line to two lines in thickness, seldom smooth, but rather rugous, and on its free surface somewhat nodulated or granular. This fibrine was detached with so much facility from the vascular membrane lining the abscesses, as to lead one to conclude it was of recent origin, and had no vascular communications with the highly injected membrane, from which it was evident it had been poured out. When, however, some portions of this fibrine had been carefully removed, dried on plates of glass, and submitted to the microscope, it immediately became evident that it was not only organized, but minutely traversed with vessels, injected, *ex votis*, with coloured size.

When a portion of fibrine had been removed in adhesion with the vascular, or what is often called the pyogenic membrane, the continuity of the vessels from the latter into it was delicately exhibited.

If a portion of both was cut in profile, or if the fibrine was carefully reversed from the surface of the pyogenic membrane, the same appearances were exhibited. Again, when a portion of the fibrine adhering to the vascular web of the abscess was viewed from its free surface, the penetrating power of the instrument showed these delicate capillaries shooting up from below and ramifying to the surface of the effusion.

A case of scurvy under the care of Mr. Busk of the Dreadnought hospital-ship, presented a still more curious evidence of recent organization of the materials of the blood or of the blood itself.

A seaman was received on board the Dreadnought in the last stage of sea scurvy, of which he shortly died. One of the legs of this man was injected, and on examination it was found that a large deposit of coagulated blood adhered to the bone of the tibia, covered by periosteum, which was raised and separated from the bone from the tuberosity nearly to the ancle. On each of the three sides of the tibia was the same appearance observed. The clots measured from three to four inches in length, and in thickness from a quarter to half an inch. The periosteum which firmly adhered to the blood, was divided and reflected above and below, so as to expose the external surface of the clot. The injection had surprisingly succeeded, and the dark coagula were seen, even with the naked eye, studded in every part with red points, as of the torn mouths of vessels that had entered from the periosteum.

Sections of this blood, made perpendicularly to the bone, exposed numerous branches all filled with coloured size, and which appeared at first sight as if they were the vessels that had originally passed directly from the periosteum to the outer lamella of the tibia, but raised and elongated by the separation of the membrane, and traversing the surrounding effused coagula. See Plate II. fig. 1.

When, however, thin slips of this mass were dried on plates of glass, and rendered transparent by immersion in Canada balsam, a most intricate arrangement of capillary vessels was seen, ramifying and inosculating under various angles, and in a somewhat arborescent form, throughout the entire mass of the clot. See Plate II. fig. 2.

Thus, although the larger vessels might possibly have been the original vessels of transmission from the periosteum to the bone, yet it was evident that the whole clot was minutely organized with innumerable new and minute vessels; whose arrangement was so determinate and uniform, as to leave no doubt of the entire dissimilarity of the organization of this tissue from the periosteum on the one hand and the bone on the other.

What the date of the first effusion of the blood, in this case, might have been, does not clearly appear; but it is nearly certain that it could not have been of long standing, since the coagula retained entirely the hæmotosine or colouring matter of the fluid.

Those who have seen one inveterate case of scurvy

well know the absolute prostration of the vital energies ; that it not unfrequently happens that a mere change from the horizontal to the erect, or semi-erect position, produces a sudden syncope from which the patient never recovers. And yet in this, a fatal case, where the patient died speedily from absolute exhaustion, we find an evidently recent effusion of blood, minutely and highly organized with red vessels.

There was in this preparation no extravasation or infiltration of injection into pores or cells of the clot, but round and regular vessels with distinctly defined parietes, and possessing a uniformity of arrangement, that speaks at once as proof of the reality of the organizing process.

The fact of effused blood becoming organized, is by no means new. Mr. Hunter mentions the phenomenon with much circumstantiality in his lectures upon surgery, and he succeeded in injecting coagula, in a case of hydrocele, where it was afterwards found necessary to remove the testis. Plates are also given of this case. Mr. Palmer, however, in a note to this portion of the lectures, throws doubts upon the fact, thinking that "the situation and definite forms of the coagula would rather favour the idea that they proceeded from effused lymph, which became more or less intermixed with blood. Such an appearance is generally observed in cases of wounds and operations, but I am not aware of any unequivocal example of pure coagula, which have been observed to become vascu-

lar, although it is scarcely possible that this should have escaped observation, if it were at all frequent.” (*Note of the editor of the lectures of John Hunter*, vol. i.) John Hunter further states that, “in many diseases, not inflammatory, the solids have a tendency to fall into those changes natural to animal matter, deprived of its preserving principle. The blood has no tendency to coagulate, nor the solids any power of raising inflammation, both having taken on the same tendency. In such diseases the principle and power are diminished, so that life is hardly able to preserve the matter from falling into the natural changes, though it has still a disposition to keep the vital parts or body moving.” (*J. Hunter, ibid.*) To this it may be replied that in scurvy both the principle and the power are diminished in an extreme degree, and yet in Mr. Busk’s case, not only was life able to preserve the effused blood from falling into a putrefactive state, but absolutely to organize it with innumerable vessels. May I not add that this is also “an unequivocal example” of true coagula becoming vascular, and capable of being most successfully injected?

It may be objected to the view that the organization of fibrine or other materials of the blood, if such exist, capable of becoming organized, is a speedier and more uniform process in weakened and cachectic constitutions than in others, that in cases of death within twenty-four hours after penetrating wounds in the abdomen, bands of fibrine have been found penetrated by new blood-vessels.

In such cases, the patient may have been previously healthy. Again, in some cases of strangulated hernia, an almost equally quick organization of fibrine has been recorded. In either of such cases, however, it may be observed, that the nervous power of the patient has received a shock, that places him *pro tanto* in a similar condition to one that has been previously reduced by disease. In each the pulse is quick, small or thready, the nervous energy depressed, and a state of collapse almost complete ; yet effusion of fibrine proceeds, and the commencement of organization is set up.

Where the accident has been still more severe, and where the nervous system is utterly prostrated, as in certain cases of rupture of internal viscera, the patient commences to die at once ; and no effort at the effusion of plastic lymph or production of new vessels is observed.

The growth of malignant, and perhaps of the more simple tumours, seems to afford another example of this theory. It is well known that the former become developed much more rapidly towards the close of life, when the patient has been worn down by confinement, want of exercise, and long suffering. And it is not improbable that occasionally the latter or more harmless forms of tumour are converted into malignant during some sudden or gradual deterioration of the general health.

From these morbid growths we must except those tumours which appear merely over-productions of some natural tissue ; as adipose tumours, true exos-

toses, and the like. These hypertrophic tumours will often attain an enormous magnitude, without exercising any more pernicious influence over the health of the patient, than their mere size and incumbrance account for.

Acute inflammations accidentally arising in healthy individuals frequently pass into the suppurative stage, and argue, therefore, I presume, *a priori*, an organization of new vessels, from which the pus is secreted. The same may be said of the regeneration of parts after ulceration or slough. Yet it is to chronic inflammation, principally, that are attributable the disorganizing of tissues by effusions, and the permanent existence of those effusions by the development of blood-vessels.

It can also be scarcely doubted, that chronic inflammation is generally assignable to want of power in the arterial system; or, if that be considered as begging the question altogether, that its maintenance and long duration are due to general cachexy, since depletions, and the antiphlogistic system, aggravate, rather than lessen, the existing disease.

From these chronic inflammations we see result the increase of bulk and induration of organs. The hepatization of the lungs, for instance, is the effect of exudation of fibrine in the parenchyma of the organ, which becoming organized, frequently remains, during the rest of life, a vital structure; the same may be said of indurations of the liver, and other similar organs. These acquire bulk, or at least ponderosity, but, the disease once checked,

do not go on to grow, as in hypertrophy, or as is the case in malignant forms of disease.

What the law may be that is impressed upon these last products, at the moment of their origin, we are, as yet, profoundly ignorant ; but simpler organized deposits appear eventually to take on the character of the tissue, whence they have proceeded. Thus granulations become cellular tissue and skin ; effusions from bone eventually bone ; loose cartilages in joints partake of the nature of the articulations ; old membranous bands in the chest or abdomen are smooth, and similar to serous membranes.

The difficulty of explaining the origin and formation of new vessels in effused fibrine, has been much increased by our present more exact knowledge of the terminations, so to say, of the capillary or intermediate system of vessels. The old Hallerian doctrine, which was implicitly followed by John Hunter, and all physiologists, until a very recent period, that vessels did terminate by open extremities, allowed the supposition that these vessels were actually continued into the effused material. That they were extended either by additions to their extremities, or that the molecules of the blood were driven into the plastic fibrine, and so formed new channels for the circulation.

Since, however, we have learned to believe, that no vessel terminates by an open mouth, that arteries are ever continuous with veins through the intervention of the capillaries, and that these latter

vessels are a continuous, highly intricate and variously arranged system of anastomoses, it becomes very difficult, if not impossible, to explain the mode of formation of new vessels in fibrine.

If we imagine that the parietes of the capillary system, under inflammation, lose their tonicity, and are dilated, (which last is certain,) they may also be elongated in the direction of their length. In this way, the force of the circulation, acting *a tergo*, may stretch and thrust them forward into the newly deposited fibrine, and constitute the first of those vessels seen therein, and which are always continuous with the original vessels of the part.

The extremely twisted and looped state of these vessels, especially as exhibited in the drawings of granulations, exhibited to the Society by my friend, Mr. Liston, remind one very forcibly of the varicose conditions of the veins of the lower extremity; and if we conceive the almost innumerable capillaries of the matrix of such granulations, or of the inflamed tissues effusing the fibrine, forced or prolonged into it, we may have a faint idea of the mode of their production.

It is also in the cachectic or generally enfeebled states of the constitution, that we should naturally expect to find the greatest want of tonicity of the capillaries, which first leads to the exudation of the liquor sanguinis, and subsequently to the dilatation and elongation of the vessels themselves into the fibrine when consolidated.

Although the liquor sanguinis, containing the

fibrine in solution, may permeate, by exosmosis, the parieties of the minute vessels, it is clear no blood-corpuscle can so traverse ; and hence no red globule can be found passing into the effused matters, unless the canals be continuous with the original capillaries.

If the red globules escape by rupture, we then find them in spots, more or less widely diffused, without order or arrangement, constituting true ecchymosis. This result is not unfrequently seen in acute inflammations, from the force and vigour of the circulation ; as well as in fungoid diseases, where the parietes of the blood-vessels seem to want, entirely, their proper tonicity, and are easily broken down.

The subject here briefly entered into is of vast extent, and appears to me interesting as a physiological inquiry ; at the same time, it cannot be denied that in practice it would become important, should future inquiry determine that the organizable materials of the blood become sooner and more completely organized in the debilitated and cachectic subject than in the healthier and more robust constitutions.

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