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AN

INAUGURAL DISSERTATION

ON

Inflammation and its Signs.

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BY

Ashley B. Poynor

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Let this pass.
Examined by D. F. C.

On Inflammation.

I shall confine myself almost exclusively to acute inflammation, in the few remarks which I expect to make upon this subject.
Inflammation is considered by Sir Astley Cooper to be a restorative principle; by which local injuries are repaired.
The late Robert Liston of London, in his definition of the term, goes a little farther than Sir Astley Cooper, and defines it to be an unnatural or perverted action of the capillary blood-vessels of an organ or part of the body, attended with redness, throbbing, swelling, pain heat and disorder of functions, as well as with more or less disturbance of the System.
There are two terms used to designate the degree or condition of inflamatory action; viz Morbid and Healthy.
Healthy Inflammation is that of which Sir Astley Cooper was Speaking when he denominated it a restorative principle. He says at page 28 in his Lectures that

inflammation has been too much regarded as a disease, for no wound can be repaired without inflammation; even the little puncture made in bleeding, would inevitably destroy life if this salutary process did not prevent it. A slight inflammatory action throws upon the edges of the wound adhesive matter by which they are permanently united and the divided parts closed. So when a ligature is put upon an artery, unless unless inflammation supervened it could be of no use in preventing secondary bleeding; the first thing nature does in this case is to form a clot of blood in that part of the vessel which has been tied, inflammatory action succeeds, adhesive matter is thrown out, and the clot of blood is united to the internal coats of the artery so as to prevent haemorrhage when the ligature separates."

In inflammation of the serous membranes this adhesive matter or coagulated lymph

,as it is denominated by Samuel D. Gross, is frequently thrown out in such quantities from their inflamed surfaces as to cause them to unite, as we see frequently manifested in pleuritis and in inflammation of the peritoneum.

This throwing out of adhesive matter or coagulating lymph upon the surfaces of ~~it~~ inflamed serous membranes is one of the grand laws of nature, instituted by an all-wise ~~Power~~ providence for the preservation of animal life.

When one portion of serous membrane becomes inflamed its opposing surface also takes on inflammatory action, adhesive mater is thrown out and the two surfaces are united. This sometimes takes place in Strangulated hernia; inflammation ~~from~~ supervenes at the internal margin or neck of the hernial sac and also in that portion of the bowel which is in contact with it; coagulating lymph is thrown out from either surface, the bowel and the internal margin of the neck of the sac unite,

the protruded portion of bowel sloughs and may give rise to that horrible disease, artificial anus, which prevents the dissolution of the patient.
We find that the same process sometimes takes place in intussusceptio; the invaginated portion of bowel sloughs, is passed by stool and the life of the individual is preserved.
The foregoing may be considered, for the most part, as the salutary effects of inflammatory action.
Morbid Inflammation on the other hand is that in which there is a morbid or unhealthy action going on in the capillary blood-vessels of the part, and its healthy functions are suspended. The adhesive matter, which is so indispensably necessary for the favorable progression of the restorative process, becomes changed both in quantity and quality and is sometimes almost entirely wanting.
The part on which the injury has been inflicted becomes, ordenarily, turnid, red,

hot and painful; there is a greater determination of blood to the affected part than is necessary to repair the local injury; the capillaries become so engorged with the red globules or disks of the blood that the circulation in them is impeded, the serum is thrown out, through their extremely delicate coats, into the surrounding cellular tissue; and if the violence of the inflammation is so great that the circulation in the part is entirely suspended, the blood is not merely stagnated, but is decomposed and the part itself undergoes decomposition.

We will next take into consideration the signs of inflammation as they are arranged by Liston: viz. Redness, throbbing, Swelling, pain and heat.

That redness of the surface of an inflammed part is produced by the capillaries containing more blood than they do in their normal condition, no one will doubt. This may be very readily

observed in the inflamed conjunctiva of the eye, and also in the web of the frog's foot, when Stimuli are applied. The question, then, naturally arises, - upon what cause does this accumulation of blood in the capillaries depend?, or in other words, what is the condition of the capillaries themselves?.

Many experiments have been instituted for the solution of this question, but the results of the experimenters have been various and conflicting.

"The most interesting observations," says Muller are those of Thompson, Wilson Philip, Hastings, Haltenbrunner, Wedemeyer, and Koch. In many of those experiments when common salt was applied, dilatation of the capillaries ensued after a few minutes. Wedemeyer observed, in his experiments, after the application of salt to the mesentary of the frog, that the small arteries contracted to the extent of 1/4th of their diameter. This was the first effect produced, and it was followed

by great dilatation. Thompson observed contraction of the vessels, with diminished rapidity of the circulation, after the application of ammonia; while Wedemeyer and Hastings found it produce dilatation of the vessels with Stagnation of the blood.

From the experiments of Oesterreicher, we find that, after the application of a weak solution of ammonia, the vessels dilated; while that substance in its concentrated form produced contraction of the vessels with Stagnation of the blood. Hastings observed, that alcohol, hot water, and ice produced contraction of the capillaries first, and afterwards dilatation

Now the inference to be drawn from the experiments of these distinguished philosophers, if in fact we can draw any, is that the capillaries in the # commencement of inflammation, or in the Stage of incubation, as it is denominated by some, are in a State

of excitement, their contractility is increased, their caliber diminished, and consequently the current of blood within them is accelerated

After this incited action, or increased contractility has existed for a certain length of Time, the vessels seem to lose their elasticity, and become flaccid; their caliber is, then, increased by the accumulation of blood within them; they become lengthened and tortuous on account of their flaccidity; consequently the blood cannot pass through them with such facility as it would though a strait elastic tube.

The engorgement of the vessels of an inflammed part, is not alone dependent on atony or inelasticity of the capillaries; but it is also dependent on the changes which take place in the blood within the inflamed vessels. The blood in an inflammed vessel, is said to be composed of red and white globules. The white globules possess a peculiar disposition to adhere

to the walls of the vessel through which they circulate, they are more compact in their structure than the red disks of the blood, and manifest a distinctly adhesive property.

It is observed, that these white globules, or lymph globules, as they are sometimes called, while circulating through a capillary vessel, move with extreme difficulty when they come in contact with its walls, and ~~the~~ if the circulation is not sufficiently rapid to force them onward, they adhere to the sides of the vessel, and to each other in such a manner that they form a complete barrier to the circulation.

We find redness, then, to be dependent on several changes which take place in the blood and blood-vessels of an inflamed part. Determination of blood to the inflamed part, with increased circulation through its vessels, is the ~~first and~~ proximate cause of redness. The vessels now become dilated, and lose their elasticity and contractility,

the lymph globules are formed in the blood of the affected part, and engorgement and increased redness are the consequences.

Throbbing is, almost, always felt, by the individual, to a greater or less degree, in the inflamed part. It is probably, owing to the obstruction produced in the capillary vessels by the accumulation of lymph globules, and to the determination of blood to the affected part.

The vessels becoming obstructed in consequence of the accumulation of lymph globules within them; the force of the heart and arteries is exerted upon them, the blood can not pass through them, and the circulation is carried on through collateral branches.

The condition of the blood-vessels in an inflamed portion of the body, may, with some degree of propriety, be compared to a large elastic tube ramifying into numerous small branches, and each branch closed

at its outer extremity, and folded successively upon itself. Let there, then, be a sufficient quantity of collateral branches or tubes passing off from those ramifycations to admit of the escape of an injecting fluid. Let those tubes, thus arranged, be connected to an injecting apparatus, and at every stroke of the piston, the obstructed tubes will dilate, and will, in some degree become straitened under the pressure of the injecting fluid; and consequently they will occupy more space than they would in their quiescent state.

The tubes with closed extremities are intended to represent the obstructed vessels of the inflamed part; whilst the collateral tubes with open extremities represent the vessels that are not obstructed.

Pain is the next Symptom enumerated; and also the one most distressing to the patient. It seems to be dependent on the intimate connection that exists between the blood-vessels and nerves; and to the pressure and extension exerted by on

the nervous filaments by the determination of blood to the affected part and the consequent dilatation of the blood-vessels. Consequently the more unyielding, the tissue the greater will be the pain. In enteritis, where the parts are yielding, there is, frequently no pain manifested, until pressure is applied to the abdominal parieties "Parenchymatous organs and mucous membrains being comparatively soft and yielding in texture, are not the seat of much pain when inflamed."

On the other hand, when the parts, surrounding the inflammation, are very unyielding, the pain is almost insupportable; as in paronychia, odontalgia, and in inflammation within the meatus auditorious.

The nerves, in an inflamed part are also said to be diseased, from inflamed capillary vessels passing through them. The nerves, then, are another source of pain in consequence of the compression and destension exerted upon them by

the engorged and dilated capillary vessels which pass through them. The next Symptom to be considered is ~~heat~~ heat. It is a Symptom of great importance to the physician; Since he is enabled by its presence to distinguish inflammation from congestion and nervous irritation. It is, said to be, dependent on the increased flow of blood through the inflamed part, hence the greater the determination of blood the greater will be the heat. In extensive inflammation the heat of the whole System is augmented, probably, in consequence of the increased circulation and respiration; and also by the repression of the perspiration and other exhalations, by which the body is naturally cooled. Swelling of an inflamed part is produced, in some degree, by the engorgement and distention of the capillary vessels; but principally by an effusion from them into the

surrounding cellular tissue. The degree of tumefaction will, therefore, depend on the texture of the affected part. If the structure of the part be dense and fibrous, the effusion from the capillaries into the surrounding cellular tissue will be prevented, in consequence of the inexpansibility of the surrounding texture. On the other hand, when the parts are of a parenchimatous structure, the swelling sometimes attains an enormous magnitude; as we see, frequently, exemplified in inflammation affecting the loose cellular tissue of the eyelids; also in inflammation of the spleen, of the liver, and of the testicle.