

ties had been found in some vessels, while they had not existed in others. In the present case there appeared to be a disposition in the blood of the second bleeding to undergo the same change, but in that of the third and fourth all tendency to it appeared to be lost.

WESTMINSTER HOSPITAL.

TUMOUR OF THE SCROTUM.

W. P., by trade a chimney-sweeper, aged 29, was admitted into the above hospital on the 27th August last, under the care of Mr. White, with a warty, malignant-like growth, involving the whole of the scrotum, about the size of a man's fist.

The man says that about five years ago he observed about the centre of the scrotum a bony projection, like a ram's horn (his own words) which, as it grew, he cut off with a knife, without experiencing any pain or bleeding. For near four years he from time to time removed this, until, about last November, a sudden alteration took place in its structure; it became soft and vascular, spread rapidly and considerably, discharging a thin, purulo-foetid secretion, but free from any great degree of pain; it continued to increase in size up to the time he entered the hospital.

On examination, from its situation and appearance, and the circumstance of the man being a sweep, it was by some considered to be cancer, deriving its prenomens from that class of individuals. A few topical applications were had recourse to without any idea of doing good, but merely until a consultation, *pro forma*, should take place, at which it was thought proper to extirpate the disease by an operation.

Some doubt existing as to whether the left testicle, at least, was not implicated in the disease, the operator (Mr. White) very judiciously observed he should give the man the benefit of the doubt, and merely remove the diseased integument, and if, then, either testicle, or both, was affected, it would be time enough to excise them.

The operation was performed by making a perpendicular incision through the centre of the tumour, through the whole of the diseased integuments, and a semicircular one on either side, extending from the commencement of the longitudinal, at the base of the penis, to the end towards the perineum, when, by carefully dissecting away the integuments, the testicles were found perfectly free from the disease, but diminished in size. No great hæmorrhage took place, and after cleansing the wound the edges were approximated by means of slip-knot suture, as, on account of the loss of the whole of the scrotum, the edges required to be drawn together gradually.

The man has had no untoward symptom, and is now doing well; by the caution used by the operator, the man's virility is preserved. The utility of giving a sufferer the benefit of any doubt that may exist, by which not only a severer operation was avoided, but an unnecessary step prevented, is apparent.

ON PUS IN THE BLOOD,*

IN DISEASES ATTENDED BY INFLAMMATION AND SUPPURATION.

By GEORGE GULLIVER, Esq., Assistant
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IN the prosecuting an inquiry in which I have been long engaged concerning inflammation and suppuration, I soon perceived the necessity of carefully examining the blood in these affections, and particularly in inflammatory fevers and hectic.

The result has been the detection of pus in the blood in almost every instance in which there was either extensive suppuration, or great inflammatory swelling, without a visible deposition of pus in any of the textures of the body; and the contamination of the blood by pus appears to me to be the proximate cause of the sympathetic inflammatory, sympathetic typhoid, and hectic fevers. The profession is now familiar with cases in which pus has been found in the veins, particularly after surgical operations, and in uterine phlebitis; but although the humoral pathology has of late years begun to assume some of its ancient importance, I am not aware that any writer has attempted to demonstrate the dependence of the fevers under consideration on the presence of pus in the blood.

I have detected pus in the blood, by examinations, very simple; partly chemical, partly by the microscope. Water has a rapid and energetic action on the blood-corpuscles: now, the globules of pus undergo no change after being long kept in water; accordingly, if the suspected blood be mixed with water, the blood-corpuscles will soon become invisible, and any globules of pus that may be present, will subside to the bottom of the vessel, and may be easily seen, and have their characters determined, with a good microscope. Ammonia instantly renders the blood-corpuscle invisible, while that of pus is acted on but slowly by the alkali; and the different action of acetic acid on pus and blood is equally remarkable. Hence, I have employed these agents advantageously in conjunction with the other means; and I have also seen pus-globules

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in the blood, though rarely, without any preparation. With water, however, the examination is most easy, if the observer be thoroughly familiar with the microscopic characters of the fluids under examination. A good instrument, nevertheless, is necessary; and the admirable deep object-glass of Mr. Ross is the one I have principally employed. It is hardly necessary to add, that chyle-globules are not likely to be mistaken for those of pus, since, independently of other distinctions, the medium diameter of the latter is at least 1-2666ths of an inch, which is above twice that of the former.

Exp. 1. A weak solution of corrosive sublimate is injected into the subcutaneous cellular tissue of a dog's thigh. Great swelling of the limb. Death in 24 hours.—In the cellular tissue of the thigh, no purulent deposit.—Several pus-globules detected in blood obtained from the heart.

Exp. 2. A dog. Both tibiae injured by operations; great swelling of the limbs; violent fever; death after 43 hours.—Fibrine found effused into the cellular tissue of the extremities, mixed, in one, with a very little purulent matter.—Blood from the vena cava contained numerous globules of pus.

Exp. 3. An irritating fluid.—Injected into the peritoneum of a dog.—Great thirst; refused food; died in 3 days.—A large quantity of coagulated lymph and sanguinolent serum, with some pus, found in the belly.—In blood from the inferior cava vein many globules of pus were seen.

Exp. 4. Two ounces of pus injected into the left pleura of a dog; carefully confined there; thirsty and feverish for 55 hours. Then killed, 1 ounce of fluid, almost entirely serum, found in the pleura, and some fibrinous exudation on the membrane. Blood from the heart and vena cava, found to contain several pus-globules.

Exp. 5. A dog, $4\frac{1}{2}$ oz. of pus injected into the peritoneum; wound carefully closed; death in 37 hours. Only 9 drachms of a sero-sanguinolent fluid found in the peritoneum, and much coagulated lymph on the membrane. Pus detected in the blood.

Exp. 6. A dog, $\frac{1}{2}$ a drachm of pus, mixed with water, $\frac{1}{2}$ oz. gradually injected into the crural vein. Some fever followed; refused solid food for two days; recovered at the end of a week. A similar experiment with pus on the other crural vein; similar symptoms, and perfect recovery.

Exp. 7. A dog, 6 drachms of pus injected into the crural vein. In a few hours, very weak, stupid, thirsty, and refused food. In 30 hours almost insensible; respiration was hurried. Death in 36 hours.—In the blood of the inferior cava some pus-globules were readily detected.

Case 1. A girl died of confluent small-pox on the ninth day of the disease. Great swelling of the integuments. In the blood of the right ventricle, numerous pus-globules.

Case 2. A woman had confluent small-pox, uncomplicated with erysipelas or inflammation of the viscera. On the eighth day, in some blood drawn from the arm, several pus-globules were found.

Case 3. A male child, æt. 15 months, died on the ninth day of small-pox. Only a few imperfectly developed pustules appeared. There was considerable swelling in the face, slighter in other parts. *Post-mortem:* a small quantity of a white opaque fluid might be squeezed from the cut surfaces of the lymphatic glands of the neck and groin, having the characters of pus. In some blood from the right ventricle and inferior cava vein, pus was detected.

Case 4. A woman died of puerperal peritonitis. The peritoneum contained a large quantity of coagulated lymph, serum, and purulent matter. Pus in blood from the right ventricle of the heart.

Case 5. J. Green, æt. 27, admitted into hospital with an ulcer of the leg. In seven days the limb began to swell; hardness in the femoral vein; some redness in the absorbents on the inner side of the thigh. The swelling increased gradually; he had, first, pain in the head, thirst, and quick pulse; then purging, pain in one wrist, with restlessness, incoherency of speech, and offensive breath. Low muttering delirium, accelerated respiration, and coma, preceded his death on the twelfth day after admission. *Post-mortem:* the large veins of the limb were occluded throughout by firm clots of blood, mixed with pus and coagulated lymph, and the lining membrane of the femoral vein was in many places red and coated with fibrine. Several purulent deposits presented in the sheath of the femoral vessels, and in the intermuscular cellular substance. In blood from the right ventricle and vena cava, globules of pus were found.

Case 6. James Hawke, æt. 22, superficial wound of the tibia; pain and swelling. Pus in the subcutaneous cellular tissue. The case terminated fatally. Dissolution was preceded by subsultus, collapsed face, accelerated breathing, hiccough, and coma. The swelling was found to be produced by effusion of fibrine and sanguinolent serum. Pus-globules in blood from vena cava.

Case 7. M. Jackson, æt. 42. Erysipelas of the face, succeeded by jaundice and effusion into the pleura. Listless and low, with accelerated respiration. Death in six days. An ounce of turbid serum, with a little purulent matter in the right pleura; eight ounces of sanguinolent serum in the left. Blood from the larger veins greatly contaminated with pus.

(Notes of four other cases are recorded.)

The preceding instances by no means comprehend the whole number in which I have found pus in the blood. The observations of Dr. Davy tend to confirm their accuracy.

He detected pus in the blood of consumptive patients, after my general results had been submitted to him, but before I had turned my attention to the state of the blood in phthisis. He has lately informed me that he has found pus in the blood in seventeen instances after death, in sixteen of which there was declared suppuration, and in one none could be detected: in the latter, the patient died of acute inflammatory disease. The opinion has often been expressed in this country, that the globules of pus are nothing but those of blood, modified by the inflammatory process. On the continent, M. Gendrin adopts the same theory, supported by very ingenious experiments, which have been generally considered conclusive on this subject.

I have repeated the experiments of M. Gendrin with great care, and although I see no reason to dissent from the above conclusion, I have not observed the phenomena related in his work. By cauterising the web of a frog's foot under the microscope, or by elevating on a lancet the edge of a wound in the part, he assures us it is easy to see the blood-particles gradually transformed into those of pus. I have not succeeded in this observation. After repeated trials I could not induce suppuration in batrachian reptiles.

With regard to the conversion of clots of fibrine into pus (according to M. Edwards), some experiments render it extremely probable that the matter often found in the centre of such clots, in the heart and great vessels, is nothing more than softened fibrine, which presents neither the chemical nor the microscopical character of pus.

In idiopathic or traumatic phlebitis, the manner in which pus may become mixed with the blood is obvious enough. There are cases to which the term phlebitis is commonly applied, which are probably not examples of inflamed veins. The total failure of inflammation in them would seem to have left open their wounds, so as to favour the entrance of pus into them from the neighbouring parts.

I think my experiments will render it probable that suppuration is a sort of proximate analysis of the blood. Suppuration would appear to be a physiological rather than a pathological phenomenon—pus being an excrementitious discharge—a part of the blood which has become effete and noxious during the reparative process.

With regard to the correct observation of Müller, that the smaller capillaries have only the diameter of a blood-corpuscle, I shall show that these vessels become sufficiently enlarged during inflammation to contain a row of pus-globules.

If it should be remarked that pus is often formed without any obvious addition of fibrine to the neighbouring parts, it should be recollected that this is not a healthy, but

a diseased form of suppuration; and the distinction and explanation are not difficult.

It remains to deduce the conclusions from the experiments and observations related in this paper.

The term *Suppurative Fever* is not new, and its signification is probably now extended; for it seems to be an appropriate one for the different forms of constitutional disturbance under consideration. If the presence of pus in the blood, and the fever in these cases, be not related as cause and effect, the coincidence would appear to be no less interesting than remarkable.

In small-pox, it is a popular belief that "the striking in," as it is termed, or suppression of the pustules, is a bad symptom; and this is so far true, that the worst cases of this disease are those in which there is great swelling of the integuments without the due formation of pus in the usual situation. In every instance in which I have examined it, I found pus in the blood of patients affected with small-pox.

In the fourth and fifth experiments the pus which was injected into the serous sacs would appear to have been absorbed. A more careful inquiry, however, would be requisite to warrant this conclusion.

I have related instances of pus in the blood, independently of suppuration out of the vessels: this fact appears to be of some importance, for it must be inferred that the pus was not absorbed, but formed in the blood.

Of the inflammatory, hectic, and low typhoid fever, it seems hardly necessary to observe that they appear to be all comprehended under the common designation of constitutional irritation in the interesting work of Mr. Travers, which I had not read till my attention was directed to it by Mr. Liston, after this paper was written. Under the term typhoid, I have included that grave form of fever in which the vital powers sink rapidly, as I believe, from somewhat sudden and extensive mixture of pus with the blood, as sometimes occurs after operations on veins, or amputations, or even independently of wounds.

I cannot conclude this paper without expressing a hope that it will lead to a still more careful and extensive examination of the blood in various diseases than has hitherto been attempted. The microscope may become as important an instrument to the pathologist, and even to the medical practitioner, as the stethoscope. If my results should be confirmed, it is hardly too much to expect that some important discovery, particularly in diagnosis, may be made by a patient investigation of the blood in many malignant diseases, such as cancer: it is not long since the urinous fever, as it is called, was found to depend on the accumulation of urea in the blood.