REMARKS ON THE PATHOLOGY OF WHITE LEG.*

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HAVING very recently had under my care three cases in which "white leg" occurred, I was induced to look through the notes of similar cases which I have attended, and which, from some special circumstances, I thought worth while carefully to record; and the collation of them has appeared to me of so much interest, especially as bearing upon the modern views of blood pathology, that I now bring them before you.

I have adopted the title of "white leg" for my communication for special reasons: 1. because "phlegmasia dolens" is commonly understood to be a disease peculiar to the puerperal condition; 2. because the existence of "phlebitis"—if by this term be signified a primary or adhesive inflammation of the inner coat of the veins—is doubted and denied, and, indeed, as far as experiment can show, disproved; moreover, because, in three of my cases, there was evidence that the arteries were also plugged; and, lastly, because, though I believe that "thromballosis or embolism" would be the correct term for the disease, "white leg", as denoting a special form or localised manifestation of it, exactly describes the prominent and characteristic condition.

By "white leg", then, I need hardly say I mean that state in which we find the limb swollen, tense, firm, white, and somewhat shiny, with well-marked pain, hardness, and fullness in the course of the vessels. Sometimes, the whiteness is interrupted by patches of finely ramifying distended capillary vessels, as in five of my cases, or even by distinct blotches of lividity, as in two. The remark which I made respecting phlegmasia dolens would lead you rightly to infer that I consider "white leg" and "phlegmasia dolens" to differ only in that the latter, belonging to the puerperal condition, perhaps involves the uterine veins—the sometimes supposed special affection of the lymphatics; being inconstant and secondary, and, moreover, equally to be found in non-puerperal cases. In fact, the consideration of my own cases, as of the many already on record, proves that "white leg" in no way, but as just indicated, differs from "phlegmasia dolens" either during life or in the *post mortem* evidences; and that it occurs not only in women who have never borne children, but even in men also.

Proceeding with these facts before us to consider the pathology of this disease, by whichever name we call it, the condition of the limb, the feel of the hardened distended vessel, and the uniform *post mortem* result, unequivocally point to the plugging of the vessels by coagula as its proximate cause; and the question we have to determine is the *rationale* of this plugging and coagulation.

In the first place, as to the vessel itself. When we remember that the internal coat of veins is entirely destitute of blood-vessels; that experiments uniformly fail to produce inflammation of this coat; and that, after death, there is no indication in these cases of the existence of inflammation—we are forced to conclude, with Cruveilhier, that the phlebitis is not the first change, at all events, but that the coagulation of the blood is anterior to it, and to look beyond the condition of the vessel itself for the real cause of the disease.

I would not, indeed, be understood to deny that local circumstances do, in certain conditions, produce morbid effects or inflammatory products in the veins. We see such when, in case of wounds involving the vein, the products of inflammation pass into the vein from the surrounding tissues; but, on the other hand, when in experiments the entrance of such products is prevented, no such results ensue. Nor would I say that, in particular states of the system, or, I should say, of the blood, external influences will not induce the plugging. For Dr. R. Lee showed that the presence of a malignant tumour on a vein was sufficient; and Bouillaud, whilst pointing out that he found that those who died from phthisis or cancer often suffered from the formation of clots in the veins, quotes one case in which the external iliac was filled with a coagulum induced by the pressure of intestine distended with feces; another, where the plugging of the vena cava was due to the presence of a tumour; and, a third, where a cancer, by pressure, caused plugging of the internal iliac vein. (Holmes's *System of Surgery*, vol. iii, p. 392.) Still farther, a case is recorded of a young man who had long been in St. Bartholomew's Hospital, dying of phthisis, with his thighs drawn up on his abdomen, in whom the femoral veins were found closed by coagula from the profunda to Poupart's ligament. The mere flexion of

the vessels, in such a condition as that of this patient, had determined the coagulation of blood.

Putting aside, then, the doctrine that the disease can be produced primarily by any condition of the vessels, we turn to that of the blood which coagulates in them; and we find ourselves at once entering on a wide subject, upon which modern pathological research has thrown much light, enough to indicate and illuminate, at least, if not to completely elucidate, the effect of morbid states of the blood; and we are involved in the contingent relations of the morbid conditions of the blood, and thromballosis, embolism, pyæmia, erysipelas, puerperal fever, etc.

It is not my object to enter upon this wide field. I shall only endeavour to show you how far my cases support the view that the proximate cause of this disease is to be found in the condition of the blood and not of the vessels.

For this purpose, it is not necessary that I should read them to you *in extenso*. I shall give you a short abstract of each, and then consider them in groups.

CASE I.—Mrs. H. sent for me a week after her confinement with her fourth child. Having a great aversion to be attended by a man, she had employed a nurse only. She lost much blood at and after delivery, and was, on the fifth day, attacked with white leg. There was no interference with the uterine discharges, nor with lactation.

CASE II.—Mrs. R., in her fourth confinement, lost much blood. I saw her ten days afterwards in consultation. She was then very blanched, and breathed with difficulty. She had white leg, with great hardness and tenderness in the femoral region. No pulsation could be felt. There were livid patches from distended capillaries about the thigh and buttocks. After some weeks of slow and precarious improvement, jaundice set in with enlargement and tenderness over the liver. At length she vomited and passed *per anum* a large quantity of pus, and rapidly recovered.

CASE III.—Mrs. R. was admitted at the Infirmary three weeks after her confinement. She was only 18, pale, anæmic. She suffered from sickness, want of appetite, and harassing cough. She had nursed her baby, but her milk was poor and scanty. She had the cough for several months (?phthisis). A week since, the left leg began to swell, first in the popliteal, then in the femoral region. On the twenty-sixth day the swelling having subsided, except about the knee, a collection of pus broke at the back and outer side of the knee, and discharged several ounces.

CASE IV.—Mrs. H., aged 49, mother of several children, had had severe attacks of flooding for the last year. She was very anæmic, blanched, and waxy-looking. I saw her in consultation for white leg, the right being affected. She slowly recovered.

CASE V.—Miss R., aged 25, a tall, anæmic girl, had not menstruated for twelve months. She had had severe pain in the left popliteal space, then in the femoral vein. She now had well-marked white leg. Under treatment, she menstruated on the twenty-eighth day, and soon recovered.

CASE VI.—E. S., aged 22, a pale girl, generally healthy and active, menstruates regularly but scantily, has pleurisy in the right chest, and pneumonia at the base of the left lung. On the ninth day, there was loud pericardiac friction. On the eighteenth day, the pleurisy and pneumonia had nearly passed, but the cardiac friction remained intense and dry. On the twenty-fourth day, the pericardiac friction having much subsided, a rough systolic murmur was audible at the base of the heart; and, next day, white leg on the right side commenced. It lasted twelve days. She recovered; but with damaged heart.

CASE VII.—J. D., aged 22, single, was admitted to the Infirmary March 25th, 1869. She had had rheumatism three weeks. The attack began with pain in the right thigh, then in the left; then it passed to the shoulders, arms, and elbows. On examination, her breathing was short. She had white leg on the left side, with excessive pain and hardness up to and above Poupart's ligament, in the course of the veins. She menstruated irregularly and scantily. She did so a week ago. After five days, she had difficulty of breathing, with loud dry friction over a space of about three inches under the left mamma. On the fourteenth day after admission, no alteration of vesicular breathing and no dulness having been perceptible, the friction disappeared. The leg also was nearly well; but a loud systolic endocardiac murmur, audible at the apex, presented itself; and the right arm had begun to swell, and was very tender in the course of the vessels. [This patient died some days after the meeting. The subsequent history and *post mortem* examination were as follows.]

This condition of the right arm lasted five days, and then the left became similarly affected; both returning to their normal condition. Vomiting of their yellow fluid now set in, with some blood also; and she died exhausted six weeks after admission.

* Read before the Bath and Bristol Branch.

On *post mortem* examination, very little fluid was found in the pleural cavities. There were no adhesions nor lymph, nor roughness of the pleura pulmonalis or costalis, even where the loud rubbing had been audible. The lungs were emphysematous, otherwise healthy. There was a little fluid in the pericardium. The heart was sound, but for some small warty vegetations on the auricular surface and edge of the mitral valve. The stomach was very large, V-shaped, the limbs passing high up in each chest; other viscera healthy. The left femoral vein and the iliac vein, from the point where it joins the trunk, to the leg, was very small and agglomerated, as it were, with the tissues, from which it could not be cleanly dissected. Its calibre was occupied by a clot passing into its branches. The clot was firm; in some parts dark, in others rusty red; it was closely adherent to the wall of the vessel, yet easily separable, and, when separated, left the lining coat of the vessel smooth and glistening in most parts, but here and there deeply stained purple, with a somewhat sloughy look. The arteries were healthy. The uterus was very small and hard. The hymen was perfect.

CASE VIII.—M. K., aged 21, single, for six weeks had had cough and palpitation after unusually hard work. She menstruated regularly but scantily; did so five days before admission. The day after her admission to the Infirmary, without assignable cause, "white leg" on the left side set in, with distinct cord-like ramification of the superficial veins. After a week, the left leg improving, the right began to swell, and was very tense, white, and shining, up to the hip. On the tenth day, a loud systolic *bruit* was audible at the apex of the heart and along the aorta and subclavians, with a cough and oppression of the chest (which, however, from her condition, it was impossible to minutely examine). She completely recovered.

CASE IX.—George H., aged 25, was admitted to the Infirmary, under my care, with ptosis on the left side, partial facial paralysis on the right, and impaired motor power and sensibility in both lower extremities, and the right upper. He was very dull and stupid. He had been a patient under me two years previously, with rheumatism. The heart was not then affected. For two months he had now suffered from severe pain in his head. For a month he was blind in both eyes. He was somewhat wandering and incoherent. He continued in much the same condition for a month after admission, with no cardiac, renal, or other perceptible cause. Then, his right leg swelled, with all the conditions of white leg, and no pulsation in the arteries. In four days, he suddenly became comatose and apparently moribund. The coma, however, passed off, convulsive movement in all the limbs ensuing. In seven days, pulsation was perceptible again, and the swelling began to diminish. He still wandered and talked incoherently, his hands being spasmodically clenched. In six days more, consciousness having returned, and the spasmodic condition passed, the right leg being well but for a numbness, the left leg began to swell, and went through just the same course as the right. The swelling subsided in six days, leaving only some oedema of the feet, and great want of heat and sensibility. He has since (for six years) been following his occupation as a porter, and has had no subsequent ailment, but is somewhat excitable and irascible.

To these cases I must add one which I find in the Proceedings of the Pathological Society of London, reported by Dr. Moxon. It is a case of thrombosis of the renal vein, from a man who died in a state similar to typhus, with albuminuria, and with white leg of a few days' standing. After death, there was found to have been acute meningitis. The spleen was full of embolic patches. There was a clot in the femoral vein, and the veins of both kidneys were filled with thrombi. There was an excess of white corpuscles. Mr. Pick also showed specimens from a corresponding case, but with gangrene of the lungs and two pulmonary abscesses.

In analysing these cases, we find that three occurred in women after childbirth, with rather severe hæmorrhage; two after severe hæmorrhage; and the third hardly to be connected with any uterine condition, as it was three months after her confinement in a phthisical patient. Four occurred in women anæmic; one from constant flooding, the other three with scanty and irregular menstruation. In two, an endocardial *bruit* preceded the attack of white leg. In two, and probably a third, pleuritis without effusion occurred either antecedently or concurrently. In three, pulsation in the arteries was not perceptible. In six, the left leg was affected; in three, the right; in two, both.

I have already occupied too much of your time to venture upon any further remarks upon this analysis; and I refrain from doing so with the less reluctance, from the conviction that, considered with regard to what we do know of embolism, pyæmia, and septicæmia generally, and the more or less obvious mal-condition of the blood in each of these cases, they sufficiently speak for themselves.

THE INDICATIONS FOR TRACHEOTOMY IN CASES OF LARYNGITIS AND DIPHTHERIA.

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WHEN the symptoms of laryngitis, whether in a child or in an adult, continue and increase and threaten life, or when, in a case of diphtheria, the extension of the disease to the larynx causes the same threatening symptoms, we ought to have recourse to tracheotomy; and by this operation we may not unfrequently save a life which must otherwise inevitably be lost. The operation is more frequently successful in cases of simple laryngitis than in diphtheria—for the reason that, in the latter disease, the exudation often extends into the trachea and bronchi; so that an artificial opening in the windpipe does not counteract the cause of the apnoea. It is more frequently successful in adults than in children, and more frequently in older than in very young children. In adults, I have rarely failed to save life by the timely performance of tracheotomy; but in children I have rarely succeeded. In very young children, the trachea is so small that it is scarcely possible to introduce a metal tube; and the operation is, therefore, impracticable. The youngest child that I have seen saved by tracheotomy was one about two years old, who, while suffering from inflammatory croup, was operated on by Sir W. Fergusson.

Excluding those cases in which the operation is impossible on account of the small size of the trachea, the principles which should guide us in our determination to resort to tracheotomy are the same, whether the patient be a child or an adult.

In general terms, then, it may be stated that, when, in spite of prompt and judicious treatment, the obstruction in the larynx and the consequent dyspnoea continue and increase, and when there is commencing lividity of the lips and face, the time for tracheotomy has arrived. When a laryngoscopic examination is practicable, and when, by this means, we discover such an amount of structural change within the larynx as must obviously require several days, and perhaps even weeks, for its removal, the necessity for the operation will be still more apparent.

In considering the question of tracheotomy, it must continually be borne in mind that, if the operation be too long deferred, although it may remove the distressing sense of constriction in the throat, it will not save the patient's life. The reason is, that a prolonged partial apnoea gradually induces a condition of lung and of pulmonary artery which is irremediable and fatal.

The order of events appears to be this. The obstruction in the larynx limits the supply of air to the lungs; the blood in the pulmonary capillaries is imperfectly aerated; and some partially aerated blood passes on into the systemic arteries. At the same time, the minute pulmonary arteries, by their contraction, lessen the supply of blood to the pulmonary capillaries in proportion to the limited access of air. This contraction of the minute arteries is doubtless called into action by a nervous influence transmitted from the capillaries. A message is telegraphed to the arterial stopcocks, requiring a diminished supply of blood so long as the respiratory changes are partially suspended. The blood, therefore, accumulates in the trunks of the pulmonary artery, in the right side of the heart, and in the systemic veins. The distension of the superficial veins renders the lips and the skin more or less livid; while the retrograde engorgement of the bronchial veins and capillaries, which belong to the systemic venous system, results in a serous effusion into the bronchial tubes. This serous exudation gravitates towards the bases of the lungs, filling the air-cells and smaller tubes, and thus still further impeding respiration. Meanwhile, the slowly moving, partially stagnating blood in the pulmonary artery becomes more and more viscid, and at length partially coagulates. Hence, on *post mortem* inspection, fibrinous coagula, which had evidently been in process of formation for several hours before death, are often found in the pulmonary artery. A state of partial apnoea, therefore, exceeding a certain limit in degree and in duration, results in oedema of the lung, and coagulation of blood in the partially obstructed pulmonary artery; and these changes in the lung and in the artery may, alone, suffice to destroy life. Tracheotomy, then, to be successful in rescuing the patient from fatal apnoea, must be resorted to before the lungs have become highly oedematous, and before the blood in the pulmonary artery has lost its fluidity.

When the laryngeal obstruction has been of recent origin and rapid in its course, it is the more likely that life may be saved by the prompt