

Lecture.

REMARKS UPON PHLEGMASIA DOLENS, OR MILK LEG, IN TYPHOID FEVER, ESPECIALLY AS OBSERVED AMONG SOLDIERS.¹

BY J. M. DA COSTA, M.D., LL.D., HARVARD.

GENTLEMEN:—This morning I shall call your attention to phlegmasia dolens, phlebitis, or milk leg, in typhoid fever, especially as it is illustrated by cases in the ward occurring among soldiers. The first two cases among those who kindly consented to come before you were brought here from camp suffering from typhoid fever, and passed through the attack of fever without its being marked by any special event; but, at the end of the fever, they developed the peculiar complication, milk leg. I shall give you only a summary of the history of these cases:

CASE I. A. E., twenty-one years of age. When admitted to the Pennsylvania Hospital, September 15th, he was brought from camp, where he had been ill for about six weeks. He stated that when his illness had lasted for two weeks, he got out of bed and was up for two days, during which time he had improper diet. He then was obliged to return to bed, and a few days later he had intestinal hemorrhages. He remained in bed for four weeks and slowly convalesced.

The temperature was normal on admission, the tongue clean. The heart, liver and spleen were not enlarged, nor did they show anything abnormal; at the base of the right lung, prolonged expiration, increased vocal fremitus and resonance were observed, but no râles. The abdomen was tender all over; the urine contained no albumin and no casts. There was a bed sore over the sacrum. The patient was emaciated, anemic, and weak. The Widal blood-test gave the typhoid reaction. Double epididymitis appeared on the 24th, but soon yielded to warm applications. On the 30th he was allowed to sit up; a small abscess on his scalp was opened. He sat up daily until October 7th, gaining in strength and improving in appearance. At this date the scalp was well and the bed sore was smaller. He now developed pain and swelling of both legs; from the saphenous opening to the ankles the veins felt hard and were tender upon pressure. The symptoms having all subsided, a week later, October 15th, he was allowed to sit up for a few hours. The legs again become swollen and edematous; he had prickling sensations in the feet, and there was also a sense of numbness.

October 31st. He has been in bed since the last note. The bed sore is entirely well. As soon as he resumes the erect position the edema in the feet returns. The temperature is always normal. Since October 8th he has been taking the fluid extract of ergot, half a drachm, three times a day, and elevation of the limbs has been practised, with hot fomentations daily. These as well as the elevation of the limbs have been, indeed, insisted upon since the swelling manifested itself.

November 18th. He has steadily improved since the last note. Nitroglycerin, 1-100th of a grain, was substituted for the ergot.

November 23d. The Widal test was again made, with positive results.

November 30th. As he complained of headache, the nitroglycerin was discontinued. An ointment of belladonna and of camphor has been applied along the course of the veins. The legs now show no tenderness above the lower third, the feet are still tender. There is no edema, and no cording of the veins. The patient is sitting up.

In the case just shown the phlegmasia dolens was double, and so it was in this case:

CASE II. E. C. B., twenty-six years of age, was admitted to the ward October 26, 1898. He had been ill

since the 1st, but had not felt quite well for two months previously. The prominent symptoms were fever, frequent chills, diarrhea, headache, vomiting, and pain in the back and limbs. He had no cough or nose bleed.

The temperature on admission was 102°, the pulse 96, the respirations 20. The pulse was regular but dicrotic; the mind was clear, the body emaciated. The tongue, tremulously protruded, was slightly coated. No symptoms referable to the heart and lungs were observable. The abdomen was scaphoid but soft, and was covered with rose-spots. The spleen was large and palpable, and pain was elicited by pressure. The liver was large, not tender; gurgling was produced upon pressure in the right iliac fossa. The urine contained no albumin or casts, was acid in reaction, and the specific gravity 1.030. The Widal test gave a positive reaction. After a bath the temperature fell to 97° in the axilla. The case ran its course as one of typhoid fever of average severity.

No new or remarkable symptoms were observed until the fortieth day of the disease, when the temperature went up to 101.6°. He had pains in the calf of both legs and along the course of the veins, but no tenderness in the thighs; the legs were tender and somewhat swollen. Treatment by elevation, hot applications, and rest in bed was pursued, and on the 15th of November the tenderness had nearly gone. There was no edema; he felt well, and was very hungry.

The Widal test, repeated on November 23d, again gave a positive reaction. The symptoms gradually disappeared, and the patient was discharged, cured, on December 1st.

Gentlemen, phlegmasia dolens in typhoid fever is not a common occurrence. Murchison, in his classical treatise, estimates it at one per cent. The general proportion of cases presenting the complication in this hospital is not more than one to two per cent. But among the 215 cases of typhoid fever in soldiers brought here we have had 30 cases in which it occurred, or almost 14 per cent., and of 135 cases that were under my direct control or came under my observation after the febrile process had run its course there were 18 cases, making a proportion of 13½ per cent. You may be interested to know that of these 18 cases, in three the left leg, and in two the right leg, alone was affected; in thirteen the disorder showed itself in both legs, beginning, however, generally on the left side when not manifesting itself simultaneously in both. But, without going further into this point, it is certainly remarkable that for some cause which I cannot adequately explain these soldiers have shown a much greater tendency to the complication of phlegmasia alba dolens in typhoid fever than we usually meet with in private or in ordinary hospital practice. We may, perhaps, attribute it to the fact that the venous system in the legs had become relaxed and distended by marching, and that this predisposed them to the disease. Yet, excepting some from Porto Rico, these soldiers came here from training camps, where marching, after all, was not excessive, though much more than men just from civil life were accustomed to. We must also, I think, take into account the gravity of the blood infection, for nearly all the cases occurred in those in whom the typhoid fever had been very severe.

As regards the time of the appearance of this complication, let me state that it occurred mostly at the end of the fever or in early, sometimes in late, convalescence. This has also been my experience in these wards for many years. I cannot recall a single instance in which milk leg occurred at the height of the fever. It is therefore a disease of the close of the fever, or of convalescence. In one of the cases which you saw, it came on at the fortieth day; in another, not before

¹ Clinical lecture delivered at the Pennsylvania Hospital.

you (Wm. G. F.), on the fiftieth day; in another (E. V.) on the fifty-ninth day; in yet another it was not manifested until the ninth week of the disease. In two instances it appeared in a relapse, and in one of these (L. B.) before the relapse had terminated, and when the thermometer was still marking 103.8°. It may be preceded by a number of other complications, as it was in the case of F. R., who had had a double parotid bubo, then erysipelas, and who finally had phlegmasia dolens of the right leg before convalescence set in.

As regards the symptoms of this condition, the earliest noticed are generally a rise in temperature and pain in the limb, and they are very significant. The rise in temperature is usually slight, but is apt to be repeated every time there is a fresh accession, for the disease often manifests accessions. Chills also happen sometimes, yet they are the exception rather than the rule. I find among my notes of cases seen in private practice several in which chills occurred repeatedly as preceding the phlegmasia dolens. Pain is almost invariably present; sometimes it is severe, oftener it is only a dull but constant ache. It is, for the most part, associated with tenderness upon pressure, and this tenderness shows itself first in the calf of the leg. The swelling of the leg is generally obvious, especially from the knee down, and the swelling is tense and hard, though there may be some pitting around the ankles and the calf. The appearance of the skin is pale or white, yet here and there an erythematous blush is seen, or even a small ulcer. Besides the feeling of tension, itching is at times complained of. As regards the condition of the veins of the limb, they are, or are not, prominent; it does not follow that they must be prominent. They are, or are not, tender; it does not follow that they must be tender, as is supposed. The veins most likely to be affected are the internal saphena and the femoral, and especially the junction of the internal saphena and the femoral. Sometimes the affection extends beyond this into the iliac veins, and may even pass into the vena cava. Personally I have never seen such an instance.

It will be naturally a matter of interest to you to know what symptoms are present in other parts of the body during the occurrence of the phlegmasia dolens. None that are striking or invariable. The urinary secretion is not materially affected, though it may become more scanty, and show small amounts of albumin. As regards the heart, its action is generally feeble, and murmurs of blood origin are found. But in all the 18 cases which I am making the basis of this special lecture, not in one were noticed any signs of an organic cardiac murmur, or markedly changed condition of the cavities or walls of the organ. I have made some observations on local temperature, the cutaneous circulation, and on sensation of the affected side, especially in the foot, but as yet nothing definite enough to record has resulted.

I called your attention to the fact that the left leg is more frequently affected than the right. The most likely explanation given of this is the one adduced by Liebermeister, that, owing to the left common iliac vein being crossed by the right iliac artery, the flow of blood in this is not so free as in the right. Thrombosis would thus occur much more readily in the left. The series here analyzed does not show nearly as many cases of the disease occurring on the left side as I have previously met with, or, to speak more accurately,

it shows a much larger proportion of instances of double-sided affection than I have ever before seen.

Let us now ask what the pathology of the malady is. What does the painful swelling mean? The general view is that it means a phlebitis. So great an authority, for instance, as Sir James Paget² unqualifiedly promulgates this opinion, and I must confess that until I had studied the subject carefully for myself, and had seen a considerable number of cases, I held it. But I hold it no longer. The real pathology is, I think, a thrombosis, or clot, which forms in the vein, and which, it is true, may afterwards become complicated with a phlebitis or a periphlebitis; but this is not the first step in the morbid process. The affection comes on from the sluggish circulation of the infected blood. This is the explanation of the fact to which I have already directed your attention, that you do not always have symptoms of inflammation of the vein, as evinced by pain, tenderness and prominence of the vein. The disease is primarily, I believe, a venous thrombosis, and in this you have the cause of the swelling of the limb and of the other symptoms; the thrombus fills the vein, and obstructs the circulation. The pain in the limb is the result of the swelling; secondarily, a phlebitis may happen, and produce tenderness of the veins. Whether, as Haushalter³ maintains, the thrombus is due to typhoid bacilli, that cause in themselves or by their toxins the clogging—and bacilli have undoubtedly been found in the clots—has not been definitely proved. It is to be hoped that this view will be found to be correct, as it will elucidate and greatly simplify the explanation of an obscure pathological point.

Most generally the thrombus is gradually disintegrated without serious symptoms, and the phlebitis, if any have occurred, slowly yields, or an adhesive inflammation results, and a collateral venous circulation is established. Cases have, however, been recorded in which pyemia resulted from the disintegrating thrombus, or death took place from embolism, by fragments being washed to the heart and into the pulmonary artery, as in the cases of Nauwerck⁴ and of Bouley.⁵ In the only fatal case that I have ever seen of phlegmasia alba dolens in typhoid fever death was the consequence of an embolic pneumonia following a thrombus in the right femoral vein. Gangrene is an occasional result of the state of the veins, and Dr. Keen, in his most interesting work on the "Surgical Complications and Sequels of Typhoid Fever," shows us that, when the gangrene results from venous obstruction, it is moist, while, should a clot form in the adjoining artery as the result of pressure, dry gangrene attacks the foot; and when we encounter a combination of dry and moist gangrene we may infer that we have thrombosis both of the arteries and the veins.

But all such consequences are very exceptional, and the cases recover in the vast majority of instances. Every one of the thirty cases we have had recently in this hospital recovered, and I have already told you that altogether I have met with but one fatal case. Yet the recovery is always slow; the clot is slow in disintegrating; the phlebitis, should it have occurred, slow in yielding. The leg, indeed, may remain swollen and clumsy for months, or readily become so after exercise. The superficial veins may show by their large

² St. Bartholomew's Hospital Reports, vol. xli, p. 2.

³ *Morc. Med.*, September, 1893.

⁴ *Correspondenzbl. Schweiz. Aerzte.*, 1879.

⁵ *Progrès Méd.*, 1880, viii.

and tortuous appearance how much the deeper venous circulation has been interfered with; or an adhesive inflammation that has been induced gives to the saphena or femoral veins a hard, corded feel. Even long subsequent to recovery the limb at times aches and it may never return to quite its normal size.

You may recognize some of the consequences of the disease in the case I now bring before you, and in which the corded condition of the large veins in both legs is very marked, and especially so of the internal saphena vein high up just as it enters the femoral. There is very little difference between the right and the left side, and, until a few days since, there was also pain and tenderness. It may be years before complete recovery, allowing the unrestricted use of the limbs, occurs in a case like this.

CASE III. E. V., twenty-two years of age, admitted on October 26, 1898. He had been ill in a camp hospital for twenty-three days prior to admission, with diarrhea and fever — from the history, undoubtedly typhoid fever. The temperature on admission was 98°, the pulse 86, the respirations 20. The patient was much emaciated, the skin was sallow, and the face marked with acne. The pulse was regular but feeble. Nothing abnormal was observed in the heart or lungs; there were no spots on the abdomen. The spleen and liver were both large and rather tender; the abdomen was not tender. No albumin, no casts, and no sugar were found in the urine, which was acid, 1.010, and cloudy.

On November 5th, having steadily gained in strength, he was allowed to be out of bed. He did well until November 23d, when, although he had been walking about very little, phlegmasia alba dolens appeared in both legs, preceded by only a very slight rise in temperature. There was tenderness in the calf of the legs, but no tenderness in the thighs; the pain in the legs was considerable. Some swelling and marked sensitiveness along the course of the veins of the legs below the knees were observed; there was at first no cording of the vessels. The treatment was the usual one of elevation, hot applications, and rest in bed, and was followed by good results. But cording of the veins, both in the thighs and around the knees, became manifest; and there was swelling of the ankles when the man stood on his feet.

I will show you yet another case of double milk leg, similar to the last one, except that there has been much more edema of the legs, and that the patient walks with difficulty unless the limbs are tightly bandaged. There is still, as you see, considerable edema from the legs down and the feet are pale and puffy; there is also pain in the leg and tenderness in the calf.

CASE IV. Wm. G. F., admitted October 7, 1898, had been ill for twenty-one days at Camp Meade, with pains all over his body, occasional chills, fever and diarrhea. On admission the temperature was 99°, the body much emaciated; hebetude was marked. The pulse was rapid but regular. Many large typical rose-spots were found on the abdomen. The spleen was large and tender, the liver normal. The urine contained albumin, but no casts and no sugar; the specific gravity was 1.014. The Widal test was positive.

The patient did well, with no unfavorable symptoms, except that he worried very much over his condition. The temperature fell and became subnormal. On October 27th it was observed that the temperature suddenly rose to 102°, falling again to normal in the evening, without assignable cause. On November 5th both internal and external saphenas, and, to a less degree, the femorals, were tender, hard and prominent. Edema appeared in both legs, which were painful and swollen. No rise in temperature was noticed.

November 10th. The pain and swelling have much diminished, but the veins are still tender. No edema now exists when he is strictly confined to bed.

November 26th. The patient is stouter and much stronger. The veins are corded but scarcely painful. He can walk fairly well when the limbs are tightly bandaged but not otherwise.

Locomotion was still impeded when he left the hospital, and is likely to remain so for a considerable time.

Now, as regards the treatment. The first thing to do is to elevate the leg, endeavoring thus to restore the freedom of the venous circulation, and to relieve the pain and tension by the use of hot applications and of bandaging. The limb may be fomented with compresses wet with equal parts of hot lead-water and laudanum, or witch-hazel distillate. Generally, the lead-water and laudanum gives the most relief, and, though cold will answer, I prefer it hot. The bowels, if constipated, must be kept open by laxatives, although this is rarely necessary. If there be persistent pain, belladonna plaster in strips along the vein, or belladonna ointment applied in the same way, is often useful. The patient must be kept in bed — the rest must be absolute; indeed, the great aim in treatment is not to allow him to get out of his bed too soon. When he is finally permitted to leave it, and, indeed, prior, as soon as the fomentations are discontinued, the limb should be well bandaged, so as to give mechanical support to the veins. For a long time afterwards this mechanical support must be kept up, either by bandages or elastic stockings, in order to prevent swelling of the limb; in truth, it must be continued until the veins recover their tone and all symptoms of obstruction have disappeared. In cases in which the limb is painful and pale, and the circulation evidently impeded, and there is reason to think that a clot still exists, I have tried nitroglycerin, and I think it was of use. In some instances in which the veins remained tortuous, but there was no evidence of a thrombus remaining, I believe that I have seen benefit from ergot. Massage had better be avoided as long as there are any signs of venous disturbance.

Original Articles.

REMARKS ON INFANT FEEDING, WITH SPECIAL REFERENCE TO THE HOME MODIFICATION OF MILK.¹

BY CHARLES W. TOWNSEND, M.D., BOSTON.

It is, perhaps, not a futile dream to hope that some day, as a result of artificial selection and feeding, it will be possible to produce a cow that will yield milk closely resembling in composition woman's milk. At the present day, however, cow's milk differs so widely from woman's milk that it is necessary to alter, or modify it, to use the technical phrase, in order to make it resemble woman's milk.

How can this modification be effected? It can be done at a milk laboratory or at home. The first involves considerable expense, and may be impossible in the absence of a laboratory. The second, or home modification, although so simple in principle, is, owing to the complexity with which it has of late years been

¹ Read before the Boston Society for Medical Improvement, January 2, 1899.