

organ is relaxed, and it is easy to understand how air might enter. Indeed, in the post-mortem examination in one of the cases occurring in the practice of Mme. La Chapelle, it is stated that "the uterine sinuses opened in the interior of the uterus by large orifices (one line and a half in diameter), through which air could readily be blown as far as the iliac veins, and *vice versa*." The condition of the uterus after delivery also enables the air to have ready access to the mouths of the sinuses, for the alternate relaxation and contraction of the uterus, occurring after the placenta is expelled, would tend to draw in the air as by a suction-pump. Hence an additional reason for insisting on firm contraction of the uterus, as this will lessen the risk of this accident.

The precise mechanism of death from air in the veins has been a subject of dispute among pathologists. By Bichat¹ it was referred to anæmia and syncope for want of blood in the vessels of the brain, which are occupied by air. Nysten² attributed it to distention of the cavities of the heart by rarefied air, producing paralysis of its wall; Leroy, to a stoppage of the pulmonary circulation and consequent want of proper blood-supply to the left heart; while Leroy d'Etoilles thought it might depend on any of these causes or a combination of all of them. These, and many other hypotheses on the subject, have been advanced, to all of which serious objection could be raised. The most recent theory is one maintained by Virchow and Oppelzer,³ and more recently by Feltz, which attributes the fatal results to impaction of the air-globules in the lesser divisions of the pulmonary arteries, where they form gaseous emboli, and cause death exactly in the same way as when the obstruction depends on a fibrinous embolus. The symptoms observed in fatal cases closely correspond to those of pulmonary obstruction, and it is not unlikely that some cases attributed to other causes, may really depend on the entrance of air through the uterine sinuses. Such, for example, was most probably the explanation of a case referred to by Dr. Graily Hewitt in a discussion at the Obstetrical Society.⁴ Death occurred shortly after the removal of an adherent placenta, during which, no doubt, air could readily enter the uterine cavity. The symptoms, viz., "severe pain in the cardiac region, distress as regards respiration, and pulselessness," are identical with those of pulmonary obstruction. Dr. Hewitt refers the death to shock, which certainly does not generally produce such phenomena.

¹ Recherches sur la Vie et la Mort, 1853.

² Recherches de Phys. et Chim. Path., 1811.

³ Kasuistik der Embolien; Wiener med. Wochenschr., 1862; Des Embolies capillaires, 1868; and op. cit., p. 115.

⁴ Obst. Trans., 1869, vol. x. p. 28.

CHAPTER IX.

PERIPHERAL VENOUS THROMBOSIS—(Syn.: CRURAL PHLEBITIS—PHLEGMASIA DOLENS—ANASARCA SEROSA—CEDEMA LACTEUM—WHITE LEG, Etc.).

Peripheral Thrombosis.—We now come to discuss the symptoms and pathology of the conditions associated with the formation of thrombi in the peripheral venous system, or rather in the veins of the lower extremities, since too little is known of their occurrence in other parts to enable us to say anything on the subject.

The most important of these is the well-known disease which, under the name of *phlegmasia dolens*, has attracted much attention and given rise to numerous theories as to its nature and pathology. In describing it as a local manifestation of a general blood dyscrasia, and not as an essential local disease, I am making an assumption as to its pathology that many eminent authorities would not consider justifiable. I have, however, already stated some of the reasons for so doing, and I hope to show shortly that this view is not incompatible with the most probable explanation of the peculiar state of the affected limb.

Symptoms.—The first symptom which usually attracts attention is severe pain in some part of the limb that is about to be affected. The character of the pain varies in different cases. In some it is extremely acute, and is most felt in the neighborhood of, and along the course of, the chief venous trunks. It may begin in the groin or hip and extend downward; or it may commence in the calf and proceed upward toward the pelvis. The pain abates somewhat after swelling of the limb (which generally begins within twenty-four hours), but it is always a distressing symptom, and continues as long as the acute stage of the disease lasts. The restlessness, want of sleep, and suffering which it produces are sometimes excessive. Coincident with the pain, and sometimes preceding it, more or less *malaise* is experienced. The patient may for a day or two be restless, irritable, and out of sorts, without any very definite cause; or the disease may be ushered in by a distinct rigor. Generally there is constitutional disturbance, varying with the intensity of the case. The pulse is rapid and weak, 120 or thereabouts; the temperature elevated from 101° to 102°, with an evening exacerbation. The patient is thirsty; the tongue is glazed or white and loaded; the bowels constipated. In some few cases, when the local affection is slight, none of these constitutional symptoms are observed.

Condition of the Affected Limb.—The characteristic swelling rapidly follows the commencement of the symptoms. It generally begins in the groin, whence it extends downward. It may be limited

to the thigh; or the whole limb, even to the feet, may be implicated. More rarely it commences in the calf of the leg, extending upward to the thigh and downward to the feet. The affected parts have a peculiar appearance which is pathognomonic of the disease. They are hard, tense, and brawny; of a shiny white color; and not yielding on pressure, except toward the beginning and end of the illness. The appearances presented are quite different from those of ordinary edema. When the whole thigh is affected the limb is enormously increased in size. Frequently the venous trunks, especially the femoral and popliteal veins, are felt obstructed with coagula, and rolling under the finger. They are painful when handled, and in their course more or less redness is occasionally observed. Either leg may be attacked, but the left more frequently than the right. There is a marked tendency for the disease to spread, and we often find, in a case which is progressing apparently well, a rise of temperature and an accession of febrile symptoms followed by the swelling of the other limb.

Progress of the Disease.—After the acute stage has lasted from a week to a fortnight the constitutional disturbance becomes less marked, the pulse and temperature fall, the pain abates, and the sleeplessness and restlessness are less. The swelling and tension of the limb now begin to diminish and absorption commences. This is invariably a slow process. It is always many weeks before the effusion has disappeared, and it may be many months. The limb retains for a length of time the peculiar *wooden* feeling, as Dr. Churchill terms it. Any imprudence, such as a too early attempt at walking, may bring on a relapse and fresh swelling of the limb. This gradual recovery is by far the most common termination of the disease. In some rare cases suppuration may take place either in the subcutaneous cellular tissue, the lymphatic glands, or even in the joints, and death may result from exhaustion. The possibility of pulmonary obstruction and sudden death from separation of an embolus have already been pointed out, and the fact that this lamentable occurrence has generally followed some undue exertion should be borne in mind as a guide in the management of our patient.

Period of Commencement.—The disease usually begins within a short time after delivery, rarely before the second week. In 22 cases tabulated by Dr. Robert Lee, 7 were attacked between the fourth and twelfth days, and 14 after the second week. Some cases have been described as commencing even months after delivery. It is questionable if these can be classed as puerperal, for it must not be forgotten that phlegmasia dolens is by no means necessarily a puerperal disease. There are many other conditions which may give rise to it, all of them, however, such as produce a septic and hyperinosed state of the blood, such as malignant disease, dysentery, phthisis, and the like. My own experience would lead me to think that cases of this kind are much more common than is generally believed.

History and Pathology.—The disease has long attracted the attention of the profession. Passing over more or less obscure notices by Hippocrates, De Castro, and others, we find the first clear account in the writings of Mauriceau, who not only gave a very accurate de-

scription of its symptoms, but made a guess at its pathology, which was certainly more happy than the speculations of his successors; it is, he says, caused "by a reflux on the parts of certain humors which ought to have been evacuated by the lochia." Puzos ascribed it to the arrest of the secretion of milk, and its extravasation in the affected limb. This theory, adopted by Levret and many subsequent writers, took a strong hold on both professional and public opinions, and to it we owe many of the names by which the disease is known to this day, such as *oedema lacteum*, milk leg, etc. In 1784 Mr. White, of Manchester, attributed it to some morbid condition of the lymphatic glands and vessels of the affected parts; and this or some analogous theory, such as that of rupture of the lymphatics crossing the pelvic brim, as maintained by Tyre, of Gloucester, or general inflammation of the absorbents, as held by Dr. Ferrier, was generally adopted.

It was not until the year 1823 that attention was drawn to the condition of the veins. To Bouillaud belongs the undoubted merit of first pointing out that the veins of the affected limb were blocked up by coagula, although the fact had been previously observed by Dr. Davis, of University College. Dr. Davis made dissections of the veins in a fatal case, and found, as Bouillaud had done, that they were filled with coagula, which he assumed to be the results of inflammation of their coats; hence the name of *crural phlebitis*, which has been extensively adopted, instead of *phlegmasia dolens*. Dr. Robert Lee did much to favor this view; and finding that thrombi were present in the iliac and uterine, as well as in the femoral, veins, he concluded that the phlebitis commenced in the uterine branches of the hypogastric veins and extended downward to the femorals. He pointed out that *phlegmasia dolens* was not limited to the puerperal state; but that when it did occur independently of it, other causes of uterine phlebitis were present, such as cancer of the os and cervix uteri. The inflammatory theory was pretty generally received, and even now is considered by many to be a sufficient explanation of the disease. Indeed, the fact that more or less thrombosis was always present could not be denied; and on the supposition that thrombosis could only be caused by phlebitis, as was long supposed to be the case, the inflammatory theory was the natural one. Before long, however, pathologists pointed out that thrombosis was by no means necessarily or even generally the result of inflammation of the vessels in which the clot was contained, but that the inflammation was more generally the result of the coagulum.

The late Dr. Mackenzie took a prominent part in opposing the phlebitic theory. He proved by numerous experiments on the lower animals that inflammation is not sufficient of itself to produce the extensive thrombi which are found to exist, and that inflammation originating in one part of a vein is not apt to spread along its canal, as the phlebitic theory assumes. His conclusion is that the origin of the disease is rather to be sought in some septic or altered condition of the blood, producing coagulation in the veins. Dr. Tyler Smith¹

¹ Tyler Smith: Manual of Obstetrics, p. 538.

pointed out an occasional analogy between the causes of phlegmasia dolens and puerperal fever, evidently recognizing the dependence of the former on blood dyscrasia. "I believe," he says, "that contagion and infection play a very important part in the production of the disease. I look on a woman attacked with phlegmasia dolens as having made a fortunate escape from the greater dangers of diffuse phlebitis or puerperal fever." In illustration of this he narrates the following instructive history: "A short time ago a friend of mine had been in close attendance on a patient dying of erysipelatous sore-throat with sloughing, and was himself affected with sore-throat. Under these circumstances he attended, within the space of twenty-four hours, three ladies in their confinements, all of whom were attacked with phlegmasia dolens."

The latest important contribution to the pathology of the disease is contained in two papers by Dr. Tilbury Fox, published in the second volume of the *Obstetrical Transactions*. He maintained that something beyond the mere presence of coagula in the veins is required to produce the phenomena of the disease, although he admitted that to be an important and even an essential part of the pathological changes present. The thrombi he believed to be produced either by extrinsic or intrinsic causes: the former comprising all cases of pressure by tumor or the like; the latter, and the most important, being divisible into the heads of—

1. True inflammatory changes in the vessels, as seen in the epidemic form of the disease.
2. Simple thrombus produced by rapid absorption of morbid fluid.
3. Virus action and thrombus conjoined, the phlegmasia dolens itself being the result of simple thrombus, and not produced by diseased (inflamed) coats of vessels; the general symptoms the result of the general blood state.

He further pointed out that the peculiar swelling of the limbs cannot be explained by the mere presence of oedema, from which it is essentially different; the white appearance of the skin, the severe neuralgic pain, and the persistent numbness indicating that the whole of the cutaneous textures, the cutis vera, and even the epithelial layer, are infiltrated with fibrinous deposit. He concluded, therefore, that the swelling is the result of oedema *plus* something else—that something being obstruction of the lymphatics, by which the absorption of effused serum is prevented. The efficient cause which produces these changes he believes to be, in the majority of cases, a septic action originating in the uterus, producing a condition similar to that in which phlegmasia dolens arises in the non-puerperal state.

[Although crural phlebitis is a rare sequel of the Cæsarean section, it has followed it and the Porro operation, both in this city and New York, in two cases of each, three of which were seen by the writer. It is most likely to occur in anæmic subjects or where there has been a secondary destruction of tissue from injurious pressure in a long labor. In my experience it is most likely to show itself about the middle of the third week. The disease may occur in delicate men and in unmarried women.—ED.]

There is no doubt much force in Dr. Fox's arguments, and it may, I think, be conceded that obstruction of the veins *per se* is not sufficient to produce the peculiar appearance of the limb. It is, moreover, certain that phlebitis alone is also an insufficient explanation not only of the symptoms but even of the presence of thrombi so extensive as those that are found. The view which traces the disease solely to inflammation or obstruction of lymphatics is purely theoretical, has no basis of facts to support it, and finds nowadays no supporters. The experiments of Mackenzie and Lee, as well as the vastly increased knowledge of the causes of thrombosis which the researches of modern pathologists have given us, seem to point strongly to the view already stated, that the disease can only be explained by a general blood dyscrasia depending on the puerperal state. It by no means follows that we are to consider Dr. Fox's speculations as incorrect. It is far from improbable that the lymphatic vessels are implicated in the production of the peculiar swelling, only we are not as yet in a position to prove it. There is no inherent improbability in the supposition that the same morbid state of the blood which produces thrombosis in the veins may also give rise to such an amount of irritation in the lymphatics as may interfere with their functions and even obstruct them altogether. The essential and all-important point in the pathology of the disease, however, seems undoubtedly to be thrombosis in the veins; and the probability of there being some as yet undetermined pathological changes in addition to this, by no means militates against the view I have taken of the intimate connection of the disease with other results of thrombosis in different vessels.

Changes occurring in the Thrombi.—The changes which take place in the thrombi all tend to their ultimate absorption. These have been described by various authors as leading to organization or suppuration. It is probable, however, that the appearances which have led to such a supposition are fallacious, and that they are really due to retrograde metamorphosis of the fibrin, generally of an amy-laceous or fatty character.

Detachment of Emboli.—The peculiarities of a clot that must favor detachment of an embolus are such a shape as admits of a portion floating freely in the blood current by the force of which it is detached and carried to its ultimate destination. When the accident has occurred it is often possible to recognize the peripheral thrombus from which the embolus has separated, by the fact of its terminal extremity presenting a freshly fractured end, instead of the rounded head natural to it. Such detachment is unlikely to occur, even when favored by the shape of the clot, unless sufficient time has elapsed after its formation to admit of its softening and becoming brittle. The curious fact I have before mentioned, of true puerperal embolism occurring in the large majority of cases only after the nineteenth day from delivery, finds a ready explanation in this theory, which it remarkably corroborates.

Treatment.—On the supposition that phlegmasia dolens was the result of inflammation of the veins of the affected limb, an antiphlogistic course of treatment was naturally adopted. Accordingly, most

writers on the subject recommended depletion, generally by the application of leeches along the course of the affected vessels. We are told that if the pain continues, the leeches should be applied a second or even a third time. If we admit the septic origin of the disease, we must, I think, see the impropriety of such a practice. The fact that it occurs in a large majority of cases in patients of a weakly and debilitated constitution, often in women who have suffered from hemorrhage, is a further reason for not adopting this routine custom. If local loss of blood be used at all, it should be strictly limited to cases in which there is much tenderness and redness across the course of the veins, and then only in patients of plethoric habits and strong constitution. Cases of this kind will form a very small minority of those coming under our observation.

What has been said of the pathology of the affection tends to the conclusion that active treatment of any kind, in the hope of curing the disease, is likely to be useless. Our chief reliance must be on time and perfect rest, in order to admit of the thrombi and the secondary effusion being absorbed, while we relieve the pain and other prominent symptoms and support the strength and improve the constitution of the patient.

The constant application of heat and moisture to the affected limb will do much to lessen the tension and pain. Wrapping the entire limb in linseed-meal poultices, frequently changed, is one of the best means of meeting this indication. If, as is sometimes the case, the weight of the poultice be too great to be readily borne, we may substitute warm flannel stupes covered with oiled silk. Local anodyne applications afford much relief, and may be advantageously used along with the poultices and stupes either by sprinkling their surface freely with laudanum or chloroform and belladonna liniment or by soaking the flannels in poppy-head fomentations. It is needless to say that the most absolute rest in bed should be enjoined, even in slight cases, and that the limb should be effectually guarded from undue pressure, by a cradle or some similar contrivance. Local counter-irritation has been strongly recommended, and frequent blisters have been considered by some to be almost specific. I should myself hesitate to use blisters, as they would certainly not be soothing applications, and one hardly sees how they can be of much service in hastening the absorption of the effusion.

During the acute stage of the disease the constitutional treatment must be regulated by the condition of the patient. Light but nutritious diet must be administered in abundance, such as milk, beef-tea, and soups. Should there be much debility, stimulants in moderation may prove of service. With regard to medicines, we shall probably find benefit from such as are calculated to improve the condition of the blood and the general health of the patient. Chlorate of potash with diluted hydrochloric acid, quinine either alone or in combination with sesquicarbonate of ammonia, the tincture of the perchloride of iron, are the drugs that are most likely to prove of service. Alkalies and other medicines, which have been recommended in the hope of hastening the absorption of coagula, must be considered as altogether useless. Pain

must be relieved and sleep procured by the judicious use of anodynes, such as Dover's powder, the subcutaneous injection of morphia, or chloral. Generally no form answers so well as the hypodermic injection of morphia.

When the acute symptoms have abated and the temperature has fallen, the poultices and stupes may be discontinued and the limbs swathed in a flannel roller from the toes upward. The equable pressure and support thus afforded materially aid the absorption of the effusion and tend to diminish the size of the limb. At a still later stage very gentle inunctions of weak iodine ointment may be used with advantage once a day before the roller is applied. Shampooing and friction of the limb, generally recommended for the purpose of hastening absorption, should be carefully avoided, on account of the possible risk of detaching a portion of the coagulum and producing embolism. This is no merely imaginary danger, as the following fact narrated by Trousseau proves: "A phlegmasia alba dolens had appeared on the left side in a young woman suffering from peri-uterine phlegmon. The pain having ceased, a thickened venous trunk was felt on the upper and internal part of the thigh. Rather strong pressure was being made, when M. Demarquay felt something yield under his fingers. A few minutes afterward the patient was attacked with dreadful palpitation, tumultuous cardiac action, and extreme pallor, and death was believed to be imminent. After some hours, however, the oppression ceased and the patient eventually recovered. A slightly attached coagulum must have become separated and conveyed to the heart or pulmonary artery."¹ Warm douches of water—of salt water, if it can be obtained—may be advantageously used in the later stages of the disease, and they may be applied night and morning, the limb being bandaged in the interval. The occasional use of the continuous current is said to promote absorption, and would seem likely to be a serviceable remedy.

When the patient is well enough to be moved, a change of air to the seaside will be of value. Great caution, however, should be recommended in using the limb, and it is far better not to run the risk of a relapse by any undue haste in this respect. It is well to warn the patient and her friends that a considerable time must of necessity elapse before the local signs of the disease have completely disappeared.

¹ Trousseau: *Clinique de l'Hôtel-Dieu*, in *Gaz. des Hôp.*, 1860, p. 577.