LECTURE XLI.

SUPERFICIAL AND DEEP DIFFUSE PHLEGMON OF THE FOREARM.

I. Two cases of subcutaneous diffuse phlegmon of the forearm, one with erysipelas, the other without erysipelas—Termination with rigidity, probably temporary, of the fingers and the hand. II. Deep or sub-aponeurotic phlegmon of the forearm, consecutive to a suppurative synovitis of the flexor tendons—Two theories to explain the propagation of the phlegmasia: that of synovitis, and that of deep lymphangitis—Termination by recovery with the deformity known as the claw hand.

GENTLEMEN: I. I spoke to you a few weeks ago of two patients affected with subcutaneous diffuse phlegmon of the back of the hand and dorsal face of the right forearm. One of them, 32 years old, occupying No. 38, ward Sainte-Vierge, had seen his affection develop in consequence of an insignificant scratch upon the back of his hand. He came to us, ten days after it had begun, with swelling, redness, and heat extending from the extremities of the fingers to the shoulder. Upon the back of the hand and forearm was the doughiness which characterizes the first period of diffuse phlegmon. The doughiness of the arm, where the redness occupied the entire circumference, was much less, and the appearance was rather that of a slightly œdematous erysipelas than that of a diffuse phlegmon. As moreover the intense febrile movement which characterizes erysipelas existed, I presented the patient to you as offering an example of phlegmonous erysipelas, or, if you prefer, of diffuse phlegmon with erysipelas, pointing out at the same time that the diffuse phlegmon occupied the hand and forearm, and the erysipelas chiefly the arm. The ultimate course of the affection confirmed my first opinion. Suppuration set inupon the dorsal face of the hand and forearm; I made several long incisions there, from which you saw an abundant quantity of pus flow, followed a few days afterwards by gray and whitish membranous strips composed of mortified cellular tissue. I showed you, however, that the suppuration was under the skin, and that it had not passed through the deep fascia; that no abscess had formed upon the palmar face of the limb, but that the inflammation had terminated there by resolution, at the same time that the erysipelatous redness had disappeared from the arm.

To-day, five weeks after the beginning of the disease, the general condition is excellent, and the wounds left by my incisions will soon be cicatrized. I have advised the patient to begin now to move his fingers, either with the corresponding muscles or with his other hand, for the articulations of these fingers have become rigid through their prolonged immobility, and their participation to a certain extent in the morbid process which was developed in their neighbourhood. If

we should do nothing for it, this rigidity would last for a long time, perhaps indefinitely, and we should thus have an infirmity succeeding to the affection. I hope that by the aid of spontaneous and communicated movements, to which we shall soon add a little massage, this rigidity will not last more than two or three months, and I have the more reason to hope so because the patient is still young, and, as I have often told you, articular rigidities, especially those of the small articulations, are less rebellious as the patients are younger.

Not far from this patient is another one, in No. 41, sixty years old, who presents an example of a similar affection, that is to say, of a subcutaneous diffuse phlegmon of the dorsal aspect of the left hand and forearm. But in him we find this difference, that the phlegmon has been neither preceded nor accompanied by erysipelas propagated to the arm and body, that the febrile symptoms have not been intense, and that as the suppuration was limited to the lower third of the forearm and the back of the hand, we have had to make fewer in cisions, and the suppuration has been less prolonged. This patient also is recovering; but the articulation of the fingers are stiff, and I fear, on account of the age of the patient, that this rigidity will last longer than in the preceding case.

II. The patient in No. 29, a baker's boy, 24 years old, hurt the palmar face of the little finger of his right hand near the articulation of the first and second phalanges with a saw a week ago. To what depth did the tooth of the saw penetrate; was the articulation opened? We do not know. Is the synovial membrane of the flexor tendon interested? It is probable, but we have no proof of it. The patient continued to work for three days; on the fourth a swelling appeared in the little finger, the palm of the hand, the thumb, and the forearm; at the same time general symptoms set in: insomnia, due to the pain, and fever. The patient, however, had no chills. To-day we see a suppurating contused wound occupying the middle of the little finger, a swelling of the thenar and hypothenar eminences, of the palm of the hand, and of the palmar face of the forearm extending nearly to the elbow; still the swelling of the hand is small. The forearm is the seat of a redness which is intense but which cannot be called erysipelatous, because at the beginning there were none of the general symptoms which precede this affection: violent chill, intense fever, vomiting. The redness appeared only after the swelling; and then it does not extend very far, and is limited to the phlegmon. If it had been a real erysipelas it would undoubtedly have extended beyond the tumefied and phlegmonous parts. The dorsal face of the hand and forearm does not present, so to speak, any swelling, differing in this respect from the other two patients.

Can we detect fluctuation? In the hypothenar eminence there is a soft swelling, but it is without elasticity. The thenar eminence presents a considerable swelling; if we compress it with one finger we feel a mingled sensation of elasticity and softness; if we place the two fingers at a certain distance from one another and make pressure with one while the other remains immovable, we feel a sensation which resembles that of fluctuation. But it must be remembered

that this region gives, in the normal condition, false fluctuation, and we might almost say that, in phlegmasia, the presence of pus here is only certain when fluctuation is no longer as marked as it is normally.

This is the eighth day of the accident, but the fourth of the inflammation: it is not probable that there is yet any pus; still, in order to be certain, I made three punctures with a pin, and without any result; no pus came.

Is there any fluctuation in the forearm? I have not found the slightest sign of it.

This then is a phlegmonous inflammation which has not yet suppurated, and, as it is extensive, we may call it a diffuse phlegmon. In the preceding patients also the affection was a diffuse phlegmon, but it was subcutaneous, while here it is deep, sub-aponeurotic.

My reasons for this opinion are the following: There is a considerable swelling, without the superficial doughiness which is seen at the beginning when the phlegmon is subcutaneous. We see at the wrist the raised lines formed by the tendons, and in the middle of the forearm we have that peculiar sensation of softness given by the muscles through the skin; but these muscles are slightly tense, and as if raised by something behind them. All these signs indicate a deep inflammation; and another argument in favour of this opinion is the propagation to the forearm of the phlegmasia starting from the hand. It is evident that in the latter the inflammation is not superficial; for by pressing upon the wrist we can feel the annular ligament and the tendons, notwithstanding the enormous swelling; now, if the swelling was subcutaneous these parts could not be felt, and we should find a superficial tumefaction which would mask the rest. For a moment I asked myself if it was not the muscular hypertrophy which is often found in bakers, but the other arm shows nothing similar. It is certain then that it is an inflammation: now, so soon as we decide that the inflammation is not superficial, we have to admit that it is sub-aponeurotic and submuscular, and that it is situated between the pronator quadratus and the deep layer of muscles.

Is this development of an inflammation in a finger, and its propagation to the deep parts of the hand and forearm, an unusual occurrence? Not at all. I have had occasion to show you several similar cases, and a year never passes without our having two or three examples of it here. You have not forgotten the explanation which I gave of these facts: the suppurative inflammation starts from a finger (the thumb or little finger) to the extremity of which the main synovial bursa of the palm of the hand extends. It is propagated to the latter, and thence to the deep cellular tissue of the forearm, by virtue of a peculiar aptitude possessed by the subcutaneous and tendinous synovial bursa to transmit to the surrounding connective tissue the phlegmasiæ, and especially the suppurating ones, of which they become the seat. I remind you also that I showed in this amphitheatre a specimen in which the course of the suppurative inflammation within and beyond this tendinous synovial bursa was very evident (page 327). It is true that since I showed you that specimen another

explanation has been offered. Prof. Dolbeau[1] thinks that the starting point of these deep phlegmons of the forearm is a lymphangitis of the deep lymphatic vessels which accompany the arteries. He bases his opinion upon this incontestable fact, that the suppuration sometimes appears in the forearm without at the same time occupying the hand and the whole length of the finger in which the affection began. I have sought, on other occasions, to explain this peculiarity by telling you that the inflammation propagated from a finger to the synovial bursa and to the deep cellular tissue might remain plastic or adhesive at some points and might suppurate at others.

Furthermore, I offer four objections to Professor Dolbeau's theory: 1st. It cannot be proved anatomically. 2d. It supposes that the sub-aponeurotic abscesses must be along the course of the radial and ulnar arteries, that is, not very deep, for it is there that we find the principal sub-aponeurotic lymphatic vessels. The abscesses which we see in these cases are very much deeper; they are found in front of the pronator quadratus, of the inter-osseous ligament and of the bones, which are sometimes denuded in consequence of the participation of the periosteum in the disease; now, at this depth there are very few lymphatic vessels, only those which accompany the interosseous artery, and they are very small and too few to cause such large phlegmons and abscesses. Notice what occurs after superficial lymphangites. The affected lymphatic vessels are very large, and yet only circumscribed abscesses form about them. 3d. M. Dolbeau's theory does not explain why deep abscesses of the forearm occur so habitually after deep wounds of the thumb and especially of the little finger, and only very exceptionally after wounds of the other fingers whose synovial sheaths are independent of the main synovial bursa of the wrist and palm of the hand. 4th. Finally it does not enlighten us upon the causes of the gravity of the prognosis in these cases, of the adhesions of the tendons, the insufficiency of the movements of the fingers, the claw hand; all those phenomena which can hardly be explained except as phenomena consecutive to a tendinous synovitis.

I willingly believe, for it agrees very well with what we see in the superficial layers of the limbs, that a deep lymphangitis intervenes in cases of this kind, that it is one of the means of extension of the phlegmasia, that perhaps even it is that which propagates it sometimes to the main synovial bursa. But I want you to admit at the same time the existence of a synovitis, either plastic or suppurative; I consider it important, because with this notion, proved to be true by autopsies, is associated that part of the therapeutics the object of which is to combat the tendinous rigidities as soon as possible, and to diminish, if it can be done, the deformity and the functional trouble which their persistence occasions.

At the present moment, then, two things preoccupy us in this case: 1st. The imminence of a deep or *intermuscular* suppuration in the hand and forearm, and the possibility of a septicæmia; 2d. The con-

[1] Dolbeau, Mémoire sur les Abcès profonds de l'Avant-bras, consécutifs aux blessures des doigts (Bulletin de Thérapeutique, 20 Février, 1872).

secutive deformity, a deformity all the more serious since it will occupy the right hand.

As for the treatment, I can hardly have recourse to anything except rest, poultices, and narcotics. I thought of making compression, but the swelling and redness are so great that I fear it might cause strangulation and gangrene. Moreover I must examine this swelling every day and open it soon as I find fluctuation.

The young man in No. 29, who had had the little finger of the right hand wounded by a saw, presented, 48 hours after I had spoken about him, distinct fluctuation in the anterior part of the hypothenar eminence. The next morning I felt a deep fluctuation in the forearm, a fluctuation the limits of which were the radio-carpal line below, the junction of the lower and middle thirds of the palmar aspect above. I sought carefully to see if the wave could be sent from the forearm to the palm of the hand, as should have been the case if the purulent collection occupied both the tendinous bursa of the wrist and the deep cellular tissue of the forearm. I did not find it to be so. Furthermore, pressure upon the forearm did not cause pus to flow from the opening made in the hypothenar eminence, nor from that made by the injury in the little finger which still suppurated. It seemed then that we had three separate suppurations. This circumstance was favourable to M. Dolbeau's explanation by deep lymphangitis, along the course of which the abscesses might form here and there without communicating with one another. Admitting propagation by synovitis, I presume that, in this case also, the synovial membrane has not suppurated on its inner face, and has been the seat only of a congestive and plastic inflammation, but that the cellular tissue of the hypothenar eminence and of the palm of the hand, to which it has transmitted the inflammation, has taken part in the suppuration.

However that may be, experience having shown us that these deep abscesses, when once formed, have more tendency to burrow and spread along the deep layers than to approach the skin, from which they are separated by very thick muscular and aponeurotic layers, I told you that we must not temporize, and that as soon as fluctuation could be felt, an incision must be made.

Still, as it was necessary, in order to reach the collection, to traverse the superficial and deep layers, I completed my diagnosis by means of puncture and aspiration with the Dieulafoy syringe. After I saw the pus flow into the aspirator I anæsthetized the patient with ether and made, layer by layer, an incision two and a half inches long along the middle of the forearm. M. Dolbeau, in the article of which I have spoken, advises two incisions to be made, one along the course of the radial artery, the other along that of the ulnar, that is, in the points where the lymphatic vessels are to be found which are the starting-point of the abscess. But as this collection was much deeper than the arteries, as it corresponded much more to the centre than to the sides of the forearm, as, on the other hand, I wished to be sure of avoiding hemorrhage, I made my operation as upon other patients, and notably as upon the one of whom I spoke

last year (page 328), that is, I used a bistoury to get through the fascia, and then my fingers to tear through the muscular interstices. The following days I had some difficulty to get a free escape for the pus, notwithstanding the use of bundles of lint and drainage tubes. Every morning and evening I had to separate the muscular interstices and make injections of carbolized water, as much to prevent the stagnation of the pus as to disinfect the deep pouch.

We had no dangerous general symptoms. After the fourth day the flow was freer, but I continued the injections morning and night. The patient was sustained by nourishment and tonics. During the treatment I often tried if pressure upon the palm of the hand would make the pus flow from the openings, but it never did so, and I continued to think that the synovitis had not suppurated in the palm of the hand, as is quite often the case in cases of this kind.

In this connection, I remember an old woman whom I treated at the Hôpital Cochin, and who also had a deep phlegmon of the hand and forearm originating in a wound of the little finger. She succumbed to a putrid infection, and I found suppuration, not only of the great tendinous synovial membrane of the wrist and forearm, but also of all the carpal articulations, to which the suppurated phlegmasia starting from the tendinous bursa had been propagated.

To-day all is cicatrized, and our patient is cured of his suppuration, but he has not recovered the use of the limb; the tendons of the fingers, bound down by adhesions, no longer permit either flexion or extension except within very narrow limits. You saw that the fingers were half flexed and that the patient could not extend them: he cannot complete this imperfect flexion and cannot close the thumb entirely against the other fingers. In short, he presents the claw shape of which I have spoken several times.

Will this condition of things disappear? I hope that it will diminish, because it seems to me that the adhesions ought to be less numerous and less rebellious when the inflammation has remained plastic, at least over a great extent of the synovial membrane, than when it has become suppurative and the membrane has granulated. I hope so, especially if the patient will follow our prescriptions, that is, will take sulphur baths, make prolonged frictions, massage, and communicated movements. I make all these recommendations, but am not able to oversee them myself, for he is tired of the hospital and intends to leave us in a few days.