emits a foetid sanious discharge; at the very bottom of the stump there are several sharp spiculae of bone, apparently of recent production. His general health is now pretty good.

Some time after these notes were taken, I found that the sharp spicular projections at the end of the stump had exfoliated, and that firm cicatrices had formed over it, giving it as nearly as possible the appearance of having been removed by an operation. He occasionally felt uneasy sensations, which he referred to the foot which had been lost, but was otherwise in perfect health.

I had no reason to believe that the gangrene in this case was otherwise than the result of severe acute inflammation, produced by exposure to extreme cold. On the contrary, it seemed, as far as I could see, to have occurred quite independently of any ossific change in the arterial trunks of the affected limb. Had it ensued from this diathesis, he would probably have previously had some marked symptoms denoting this state, as deficient circulation and ulceration in the part, and other indicative signs. But this not being the case, it is fair to infer, that had the patient, in spite of his great age, been within the reach of efficient medical assistance at the time of his attack, the inflammation might have been subdued, and he might probably have escaped the mutilating effects of his disease.

CASE OF SUBCUTANEOUS DIVISION

OF THE

PRONATOR AND FLEXOR MUSCLES OF THE HAND AND FINGERS.

BY P. DOUBOVITSKI,

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On the 3rd of January, 1839, while removing a book from one of the shelves of my library, I fell from the ladder, and struck my left elbow with violence against one of its steps. The effects of this accident were transverse fracture of the lower end of the humerus in the articulation, and vertical fracture of the internal condyle, which was retained in its place merely by the ligaments attached to it. Two hours after the accident, the immovable starch bandage was applied from the wrist up to the shoulder. The consequences were, that all sensation was soon lost in the parts below the wrist, which became swollen and painful. To remedy this, a firm bandage was rolled over the fingers and wrist; but the pain, tumefaction, and loss of feeling increased; the starch bandage was not removed until the 25th day. The fractured bones were now completely and firmly united, but the elbow-joint was so stiff, that even strong efforts made by another person could with difficulty produce very slight trace of motion in it. The flexor muscles of the thumb and fingers were indurated to such a degree, that the muscular structure, with their tendons and adjoining cellular tissue, formed a hard cartilaginous mass, in which no one part could be distinguished; even the skin could not be pinched up

from the indurated parts beneath. Several ulcers existed on the arm and wrist; the wrist and fingers were completely paralyzed, with total absence of sensibility and motion. The parts just mentioned were straight; the wrist could be flexed on the fore-arm a little, but complete extension was impossible; the fingers were quite stiff, and without movement.

During three months various means were employed to remove the indurated condition of the fore-arm and the paralysis; at the end of that time the induration began to give way, and as it gradually disappeared, I recovered a portion of sensibility and movement in my wrists and fingers. The hardness has now almost completely disappeared, but as the muscles became relieved, instead of retaining their normal action, they began to retract, even while their tendons were still involved in the indurated mass. The flexor ulnaris first retracted, then the two palmares, then the pronator teres, and finally the flexor muscles of the fingers.

This fresh complication of my disease was combated by every means known to surgeons. I travelled through France, Germany, and England, and had the advice of the most celebrated men in each country. They were divided in opinion: some, as MM. Rust, Walther of Munich, Sir Astley Cooper, and Mr. Guthrie, rejected any suggestion for relieving my disease by division of the tendons; they regarded the effects of the accident as being incurable. Others, again, as Guérin, Dieffenbach, Graefie, Ammon, Roux, Velpeau, Amussat, Blandin, &c., proposed division of the tendons as the only means of removing the infirmity under which I laboured. But I was unwilling to have recourse to operation before every other means had been employed and failed.

For four months I followed the practice of M. Guérin at the Children's Hospital, and I saw that distinguished surgeon perform the operation of dividing muscles and their tendons in hundreds of cases with astonishing success. Encouraged by what I there saw, I applied to M. Guérin, who undertook my case, and held out some hope of being able to restore the movements of my hand. The following is an exact account of my state when M. Guérin took me under his care. The movements of the elbow-joint were pretty free, but still limited by the callus; all the muscles of the fore-arm were capable of being contracted, but all the flexor muscles of the wrists and fingers were in a state of permanent retraction. The shortening was evidently seen in the flexor ulnaris, pronator teres, flexor sublimis, and flexor pollicis longus; but we could only suspect from analogy that the deep flexor was also retracted. The retraction of the different muscles produced an extreme and permanent degree of pronation, with flexion of the wrist, thumb, and second and third phalanges of the fingers. The wrist-joint seemed to be free, as also the articulations of the fingers; but the articulations of the first phalanges with the metacarpal bones were extremely stiff; and the fourth and fifth fingers presented an appearance of incomplete luxation, produced by the action of the extensor muscles. It was impossible to catch any object with the fingers, but when once placed between them and the palm it could be grasped, showing that the muscles were not paralyzed. The deformity of the hand was very unsightly, but sensation existed in every point, except in the two

* We have condensed this interesting memoir from the last number of M. Velpeau's *Annals of Surgery*.

last phalanges of the index finger. M. Guérin having first removed all trace of paralysis by the use of friction, moxas, &c., proceeded to operate in the following manner on the 21st July, 1840, in the presence of MM. Amussat, Mott, Donné, Clot-Bey, and several other distinguished medical men. He divided the heads of the pronator teres, palmares, superficial flexor and ulnar flexor, near the elbow-joint; in the fore-arm he divided the four tendons of the flexor sublimis, the tendons of the flexor proprius pollicis, of the flexor ulnaris, and of the palmares; finally, he divided the adductor pollicis in the palm of the hand, and the four tendons of the flexor profundus. The object of dividing the same muscles in different places was to avoid the great separation which might take place between the divided portions, if only one point of the muscle was cut through. The nineteen sections were executed in half an hour with the utmost dexterity, and without the slightest accident.

The immediate result of the operation was as follows: the hand was moved more freely on the wrist, and was less flexed; the thumb also was free, and completely restored to its natural position; the tips of the fingers had recovered their natural position, but the second phalanges remained flexed on the first, as before. Simple dressings were applied, and great care was taken to exclude all air from the wound. I felt no pain after the first hour and a half which followed the operation; there was no trace of reaction, nor any accident whatever.

On the 23rd of July, the dressings were removed; all the little wounds were healed up. M. Guérin now endeavoured to move the limb in various directions, and found that the abductor pollicis was strongly retracted, a little above the wrist-joint; he therefore divided the tendon at once. It was impossible to extend the second phalanges of the fingers. An apparatus was now applied; it is unnecessary for us to give a minute description of it; suffice it to say, that it was intended to extend the fore-arm on the arm, the hand on the fore-arm, and to effect supination. As all the joints were very stiff, the use of this instrument caused severe pain, and M. Guérin being convinced that it was next to impossible to extend the second phalanges on the first, decided on cutting the four tendons of the flexor sublimis at the level of the first phalanges. This he did on the 27th June, and in three days the wounds were healed; the machine was now reapplied after a short interval, and its action assisted by baths, frictions with camphorated oil, &c. By these means the natural shape and position of the fingers were restored. As to the motions of the elbow-joint, it was soon found that they could not be improved, from the osseous mass which projected into the articulation.

The flexion of the hand on the fore-arm was extremely difficult to overcome. Every means were employed with little success up to the 22d August, when M. Guérin divided the palmares and the flexor ulnaris in the fore-arm. The wounds healed rapidly, as usual; I was not compelled to remain in my room even for a single day. This new operation gave me great relief, and in a short time I could, by mere muscular effort, bring the hand into a right line with the fore-arm.

On the 1st of December M. Guérin performed on me the twenty-eighth operation, by dividing the exterior tendon of the little finger opposite the

metacarpo-phalangeal joint; and on the 25th January, 1841, he completed his long and arduous task by dividing the opponens pollicis: this was his twenty-ninth operation.

In order to complete the history of my cure, I must now describe the condition of my hand after all these operations, and point out the exact amount of benefit which I have derived from them.

The movements of the elbow-joint have been but little improved: the reason of this has already been stated. Before the operation, the hand was constantly in a state of pronation; supination was impossible; now I can effect a certain degree of supination by mere muscular effort, and with a little assistance, a much greater degree; still, however, complete supination cannot be attained. The extension of the hand on the fore-arm has been very considerably improved; I can carry it not only in a straight line with the arm, but even a little backwards, and this is of great importance. As to flexion and lateral motion, they are just as perfect as in the normal state. The thumb is quite straight, but I cannot bend the second phalanx. The metacarpal joint of the index finger is pretty free, but the power of flexion depending on the superficial and deep flexors is completely lost; the metacarpal joint of the middle finger, also, is free, but I cannot bend it voluntarily. The same joint of the index finger is very stiff, but it will, probably, become free in time.

The superficial flexor tendon, divided at the level of the first phalanx, has united, and there is slight power of flexion, but the deep flexor does not seem to have united in the same way.

There is no motion whatever in the fifth metacarpal joint, but the phalanges are very free and easily moved.

To conclude, it results from the above observation, that out of twenty-nine sections of tendons, reunion has not taken place in seven; viz. in the four deep flexors, near the phalanges; in the superficial flexors of the index and middle fingers, near the same parts; in the proper flexor of the thumb. Hence the action of these different muscles has been completely lost. As to the ultimate results of the operation, I may state; 1st, That the diseased condition of the nerves and muscles, which produced contraction and paralysis, is cured: 2nd, The deformity of the hand has almost completely disappeared: 3rd, The movements of the elbow-joint, and extension and flexion of the wrist-joint, have been very evidently improved, and we have every reason to hope that time will augment the degree of improvement: 4th, But as regards the movements of the fingers, I shall think myself very happy if, after a considerable lapse of time and much exercise, I shall be able to flex the metacarpo-phalangeal joints a little more, so as to bring the tip of the thumb to the other fingers, and thus seize objects between them; for at present the action of the deep and superficial flexors is completely lost.

EXPERIMENTS IN THE REVACCINATION OF CHILDREN WITH NEW VIRUS.

BY T. S. KIRKBRIDE, M.D. OF PHILADELPHIA.

SMALL-POX and varioloid disease having been unusually prevalent in this city and its suburbs,