

Post (Peter) M. D.

with the author's compliments

ON CONTRACTION

OF THE

PALMAR FASCIA,

AND OF THE

SHEATHS OF THE FLEXOR TENDONS.

BY

ALFRED C. POST, M. D.,

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(Reprinted from the Archives of Clinical Surgery, August, 1876.)

NEW YORK:

RUTLEDGE & Co., PUBLISHERS, 102 WEST FORTY-NINTH STREET,

1876.

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The palmar fascia is an aponeurotic expansion beneath the integument of the palm of the hand, attached at its upper extremity to the transverse carpal ligament, and to the aponeurosis of the palmaris longus, where it is not more than an inch in breadth, and where its fibres are compacted into a firm mass of considerable thickness. The lower extremity expands to nearly the whole breadth of the hand, and is much thinner than the upper extremity—many of the fibres being inserted into the skin in front of the metacarpo-phalangeal articulations, and others, extending along the sides of the fingers, are attached to the sheaths of the flexor tendons. The morbid condition of the fascia, which constitutes the subject of the present paper, is usually, if not always of traumatic origin, being the result of frequently repeated and protracted pressure of hard substances against the palmar integument, as in rowing a boat, or in handling an axe, a chisel, or other tools. As a consequence of the pressure to which the integument of the palm

is subjected, it becomes more or less inflamed and indurated, and more firmly adherent to the subjacent fascia, which gradually contracts so as to induce a permanent flexion of the fingers, at first to a slight degree, but progressively increasing until in some cases the ends of the fingers are almost in contact with the palm of the hand. There is, for the most part, little or no pain when the parts are left to themselves, but great resistance is offered to any attempt at extension, and severe pain is induced, if much force be employed in this way. No resistance is offered to the attempt to flex the fingers to an additional degree. Indurated and knotty cords can be seen and felt, extending from the palm to the fingers, and the firmness of these cords is greatly increased by an attempt to extend the fingers. These cords are formed by contracted bands of the palmar fascia together with the closely adherent integument. The skin of the palm at a number of points is drawn into folds in the form of arcs of circles whose concavities look downward towards the fingers. The disease not only produces very considerable deformity, but the functions of the hand are seriously impaired. This morbid condition may be confined to one hand, or both may be involved. The fingers are not usually all contracted to the same degree. The ring finger is generally more flexed than the others, and the little finger more than the index or middle finger. In some cases there is in addition to the contraction of the palmar fascia, a contraction of the sheath of one of the flexor tendons, producing a more obstinate and unyielding flexion of the affected finger. This contraction of the sheath of the tendon is usually confined to the vicinity of a single articulation, ordinarily that of the first with the second phalanx. Contraction of the palmar fascia is to be carefully diagnosticated from persistent flexion of the fingers occasioned by other causes. One or more of the fingers may be permanently flexed in consequence of division of the extensor tendon of the same finger or fingers by direct mechanical violence or by sloughing. Flexion of the fingers may also occur from cicatricial contraction after severe burns, or wounds, or contusions with loss of substance. It may occur from paralysis of the extensor muscles, from gouty, or rheumatic, or traumatic inflammation of the digital articulations, or from spasmodic or organic contraction of the flexor muscles. There is for the most part no difficulty in the diagnosis, if the condition of the parts and the history of the case be carefully investigated. Flexion from paralysis of the extensor muscle, or division of the corresponding tendon is distinguished by the fact that no resistance is offered to passive exten-

sion of the finger. Cicatricial contractions are recognized by the history of the case, and by the obvious appearance of the scar. Flexion from articular inflammation is distinguished by the swollen condition of the joint, and the rigidity which constitutes an obstacle not only to extension but to further flexion. Flexion from persistent contraction of the flexor muscle or tendon is recognized by the tension of the affected tendon, and the ease with which the finger may be extended when the flexor muscle is relaxed by extreme passive flexion of the wrist.

Contraction of the palmar fascia has not usually been recognized by writers on surgery. The flexion of the fingers depending on it, has generally been ascribed to other causes, especially to abnormal contraction of the flexor tendon. One of the first authors who recognized the true character of the disease was Dupuytren, and the first published account by him, is contained in his "*Lecons Orales de Clinique Chirurgicale*." He quotes Boyer, who gives an account of flexion of the fingers, due to what he calls *Crispatura Tendinum*, or contraction of the tendons. It is evident from Boyer's description, that the abnormal contraction, which he erroneously describes by this name, is located in the palmar fascia, and not in the tendons. Boyer suggests that, in the early or incomplete stage of this disease, it might be arrested by confining the hand to a straight splint, but that when it has reached a considerable degree, it is an incurable disease, a "*mal sans reme'die*."

Dupuytren also quotes Sir Astley Cooper, who speaks of the fingers being retracted in consequence of chronic inflammation of their sheaths, and of the palmar fascia. When the contraction is confined to the palmar fascia, he recommends the division of the contracted band, and the application of a splint to straighten the finger. But he regarded the case as beyond the reach of art, when the sheath of the tendon was involved.

Dupuytren first demonstrated the true character of the disease, on the death of an old man, who had long been affected with a persistent flexion of the fingers. He examined the hand with great care, dissecting off the skin from the palmar surface of the hand and fingers. As soon as the skin had been removed from the subjacent parts, its arched folds and wrinkles were at once effaced, showing that the proper seat of the contraction was not in the skin itself. The fingers remained flexed; on attempting to extend them, the movement was arrested by firm fibrous bands which evidently belong to the pal-

mar fascia. He then divided the contracted bands of the palmar fascia, and there remained no obstacle to the complete extension of the fingers. He then opened the tendinous sheaths, and found the tendons in a perfectly normal condition. He also examined the digital articulations, and found them entirely free from disease. He thus demonstrated the fact, at that time generally unknown to the profession, that the seat of the contraction was in the palmar fascia, and not, as had been generally supposed, in the flexor tendons.

Having arrived at a correct appreciation of the true pathology of the disease, Dupuytren, not long after, had the opportunity of undertaking the treatment of a case. On the twelfth of June, 1831, he operated on a wine merchant, who had flexion of the ring and little fingers, occasioned by contraction of the palmar fascia. He divided the contracted bands, straightened the fingers, and confined them to a padded splint in an extended position. The operation was followed by a considerable amount of inflammation and suppuration, but the wounds were thoroughly cicatrized by the second of July. The splint was worn day and night until the second of August, after which it was worn only at night. The fingers were at first very stiff, and their motion very imperfect, but the patient gradually regained the power of flexing and extending them.

Since Dupuytren first demonstrated the true character of this disease, and furnished a detailed account of its treatment, the subject has been largely ignored by the profession, and comparatively few surgeons have made any allusion to its pathology or its treatment.

My attention has been directed to the disease for several years past, and my observation has, in the main, confirmed the correctness of Dupuytren's description. I am satisfied, however, that he has erred in excluding contraction of the sheaths of the tendons from any participation in the production of the deformity. There are, no doubt, many cases in which contraction of the palmar fascia is the exclusive cause of the persistent flexion of the fingers, but I hardly think it possible that my observation could have deceived me as to the fact that, in some cases, the tendinous sheath is also at fault.

With regard to the prognosis, it may be regarded as an established fact, that the disease, when left to itself, undergoes no amelioration, and that whatever change takes place is from bad to worse. But if the contracted bands be thoroughly divided, and the affected fingers brought into an extended position, and secured by proper splints, and if passive motion be vigorously and persistently applied, the deformity

may be effectually overcome, and a very useful degree of motion may be restored. But my observation does not lead me to the belief that, in old cases, perfect freedom of motion can ordinarily be regained. The operation of dividing the contracted bands should be performed while the patient is under the full influence of an anæsthetic, and consequently the operation itself occasions no pain. But the subsequent treatment is tedious and painful, being protracted through a period of several months. The patient should be fully informed beforehand that it is no trifling infliction that he is to undergo. But if he has the proper degree of fortitude to endure the curative process, he will be amply rewarded by the result of the treatment.

In dividing the contracted bands of the palmar fascia, I recommend that incisions be made at a number of points, wherever they are capable of relieving tension. The adhesion of the palmar fascia to the skin is so close, that a strictly subcutaneous section cannot be made, but the skin should not be divided more extensively than is absolutely required. The wounds should be at once closed with adhesive plaster, and the fingers should be brought into an extended position. This position should be maintained by applying to the back part of the fore-arm and hand, and of the affected fingers, a metallic splint, adapted to the surface, with an intervening layer of lint, or of cotton or woollen batting. The fingers should be secured to the corresponding portions of the splint by narrow strips of adhesive plaster. The fore-arm and hand may be secured by means of a roller bandage. The dressings should be renewed at intervals of one, two, or three days, the parts should be washed, and wiped dry, and passive motion should be freely applied. Passive motion is quite painful to the patient, but it is an important means of restoring mobility to the fingers. The details of the treatment can, perhaps, be better understood, by the recital of several cases which have come under my observation.

CASE 1.—Contraction of palmar fascia from neglected paronychia. Jane Carr, aet. 28, applied at my clinic, May 18, 1869, on account of a paronychia which had existed seven weeks, and for which no efficient treatment had been resorted to. The seat of the inflammation was the index finger of the right hand over the second phalanx. Ulceration had occurred, and some discharge of purulent matter had taken place. Secondary inflammation had occurred in the palm of the hand over the metacarpal bone of the index, and fluctuation was now perceptible. I made a free and deep incision over the original seat of the inflammation, and another over the seat

of the secondary inflammation. I directed emollient poultices for three days, and the wounds to be then dressed with pledgets of lint spread with ung. resin..

May 25.—The inflammatory swelling has in a great measure subsided, and the pain is relieved.

June 1.—The incisions have healed, and have left slightly depressed cicatrices. A contraction of the palmar fascia has occurred, causing all the fingers of the right hand to be flexed, and the effort to extend them causes severe pain. Flexion of the wrist does not facilitate extension of the fingers, showing that the flexion is due to contraction of the palmar fascia, and not of the flexor tendons.

June 8.—The contraction of the palmar fascia has increased, and it threatens to produce permanent deformity. I applied a brass splint to the dorsal surface of the fore arm, hand and fingers, secured in the extended position by strips of adhesive plaster and a roller bandage.

June 29.—I have readjusted the apparatus at intervals of two or three days, making passive motion at each time to such an extent as to occasion severe pain to the patient. To-day I determined to leave off the apparatus.

July 14.—There seems to be very little tendency to recurrence of the deformity. The fingers are somewhat stiff in the extended position, and the effort to flex them to any considerable extent is painful. The patient is, however, slowly gaining power over the middle, ring, and little fingers, but there is very little motion of the index, and it is probable that the motion of that finger will not be regained.

From the last date this patient passed from my observation. The case is interesting from the fact that the disease was observed at a very early period, and that I was consequently enabled to overcome the mal-position of the fingers by stretching the palmar fascia without dividing its fibres.

CASE 2.—Contraction of palmar fascia, occurring several years after traumatic inflammation in the palm of the hand. Dr. C. A. R., an eminent surgeon, aet. 43, came under my care July 21, 1869, on account of deformity and impaired function of the right hand. The first phalanx of the little finger was bent at a right angle with the metacarpal bone; the second phalanx at a right angle with the first; the third phalanx at an obtuse angle of about 160° degrees with the second. The first phalanx of the ring finger was bent at an angle of 110° with the metacarpal bone; the second phalanx at an angle of 150° with the first. At the articulation of the metacarpal bone of the

middle finger with the first phalanx, and of the first with the second, there was a deviation of 10° or 15° from a right line. All of the phalanges could be flexed freely into the palm of the hand, but they



CONTRACTION OF THE PALMAR FASCIA AND OF THE SHEATHS OF
THE FLEXOR TENDONS.

could not be extended beyond the points indicated. Extreme flexion of the wrist did not in any degree liberate the fingers. The palmar fascia was drawn into prominent bands connected with the contracted fingers.

In the year 1863, Dr. R. had been surgeon of the 159th Regiment, New York Volunteers, on duty at Port Hudson. While there he had an abscess near the distal end of the metacarpal bone of the little finger, which he attributed to pulling the rope of a hammock in which he was accustomed to swing. There was also a secondary abscess in the axilla. Six or eight weeks elapsed before the healing of the abscess on the hand. No contraction of the palmar fascia or bending of the fingers was observed until about two years ago. When the contraction was first observed, the little finger alone was affected. Six months afterwards the ring finger also became contracted. The contraction reached its maximum about a year ago. While the contraction was taking place, the affected parts were not positively painful, but they were a little uneasy and tender.

July 21, 1869, the patient being in a state of anæsthesia from the inhalation of ether, I made transverse incisions through the palmar fascia and the adherent integument in the palm of the hand in two places. After these incisions, the first phalanges of all the affected fingers, and the second phalanges of the ring and middle fingers were liberated so that they could be fully extended. But the second and third phalanges of the little finger remained contracted as before, by a hard band on the palmar surface, to which the skin was closely adherent. I made a free transverse division of this band, which proved to be the theca of the flexor tendon. After dividing this, I could straighten the second and third phalanges, but not without using some force. I attached the fore-arm, hand, and little and ring fingers by their posterior surface to a brass splint, securing the fingers, by strips of adhesive plaster, and the hand and fore-arm by a roller bandage.

August 2.—I have continued to readjust the apparatus and to make passive motion at intervals of two days. The passive motion occasions considerable pain. The tendency to contraction seems to be in a great measure overcome. More pain is occasioned by flexing the fingers than by extending them. The little finger is much swollen, the swelling seeming to be partly due to œdema and partly to inflammation of the fibrous tissue. As I am about to leave the city to-morrow, on a journey which will occupy me about a month, I advised the patient to return home and to continue the treatment at his own residence.

September 5.—Dr. R. called on me with his fore-arm and hand free from the apparatus which he now wears only at night. The fingers

are very nearly straight. The swelling and rigidity are gradually diminishing, and he is slowly gaining the power of flexing the fingers by muscular action. The attempt to produce complete flexion still occasions great pain.

January 27, 1871.—I met Dr. R. and examined his hand. I found that the ring and little fingers were flexed at an angle of about 135° , and could not be further extended by the action of their own muscles. They could be flexed without pain. The divisions of the palmar fascia, going to the affected fingers, especially to the ring finger, were prominent in the palm of the hand, and presented a knotty appearance and feel. This condition has occurred within the last four or five months. I recommended wearing a glove with whalebone on the dorsal surface of the affected fingers. Although this patient was very much benefited by the treatment, the cure was not as complete as I think it would have been if he had remained a longer time under my care.

CASE 3.—E. B., a lawyer from Ohio, aet. 44, came under my care in May, 1869. For many years past the patient has been in the habit of cutting wood with an axe, and of rowing boats for exercise. In the year 1858 he first noticed a contraction in his left hand, by which the ring finger was drawn into a flexed position, and the little finger of the same hand subsequently became flexed in a less degree. Two or three years afterwards the little finger of the right hand became flexed in the same manner, and this was followed after a short interval by a minor degree of contraction of the ring finger. The contraction in both hands has been progressive to the present time. The middle fingers of both hands are but slightly involved in the contraction, and the indices not at all. The left ring finger is bent at a right angle, at the articulation between the first and second phalanges. The left little finger is bent at an angle of about 45° at the metacarpo-phalangeal articulation. The contraction of the ring finger was chiefly at the metacarpo-phalangeal articulation until about two years ago, when he had a fall which injured the articulation between the first and second phalanges. The right little finger is bent nearly at a right angle; the ring finger at an angle of about 45° , and the middle finger to a much less degree. The flexion of the right hand in each of the fingers involved is at the metacarpo-phalangeal articulation. In the palms of both hands are prominent bands, corresponding with the divisions of the palmar fascia, and the skin is wrinkled and adherent to the fascia. The contracted

fingers are not in the slightest degree liberated by flexing the hand upon the fore-arm. The patient has full power of flexing all the fingers, but cannot extend them beyond the points which have been indicated. From all these circumstances I conclude that the contraction is confined to the palmar fascia, and that the tendons are not involved. A different opinion, however, has been expressed by other surgeons, who have advised him not to submit to an operation.

May 27.—The patient being under the influence of ether, I divided the contracted bands of palmar fascia of the right hand, with the adherent integument at several points. The contraction yielded so that the fingers could be brought into a fully extended position; but when they were left to themselves, they became moderately flexed by muscular contraction. I applied a splint of brass to the dorsal surface of the fore-arm, hand, and fingers, interposing woolen batting and lint, and securing the parts in contact with the splint by adhesive plasters and bandages.

May 31.—Removed apparatus, made passive motion, and reapplied apparatus. Since the operation, the patient has had no local inflammation nor constitutional disturbance. There has been aching pain in the parts which had been contracted, and his sleep has been somewhat disturbed, so that at times he would get out of bed and walk about his room for relief. But the pain was not sufficiently severe to induce him to take an anodyne. When I removed the apparatus to-day, the fingers became slightly flexed by muscular action. The passive motion, and especially exaggerated extension gave him severe pain.

June 8.—Since last report, I have removed and reapplied apparatus every other day. The wounds have entirely healed without suppuration. The patient continues to suffer more or less aching pain in the hand, but less than at first. When the apparatus is removed, the fingers remain nearly straight, but the patient has the power of flexing them to a moderate degree. Passive motion is still very painful.

June 23.—The apparatus is now adjusted at intervals of three days. There seems to be little or no disposition to a recurrence of flexion of the fingers. Passive motion in the direction of extreme or exaggerated extension is less painful than at first, but in the direction of flexion, it is apparently becoming more painful. The hand and fingers are a little swollen, and are somewhat tender on pressure; but there is no appearance of active inflammation.

June 29.—The symptoms continuing as at last report, I determined

to leave off apparatus for a time, and advised the patient to make frequent and gentle passive motion.

July 1.—The patient is more comfortable without the apparatus. The swelling has not diminished. I advised him to paint over the surface of the hand and fingers with tincture of iodine.

July 14.—The apparatus has been left off to the present time, and it will probably not be necessary to resume its use. There seems to be no tendency to a return of the contraction of the palmar fascia, or flexion of the fingers. There is no appearance of deformity, except one or two slightly indurated points in the palm, and they can hardly be considered as constituting a deformity. The fingers are, however, still rigid, and cannot be flexed more than about 40° . The attempt to flex them beyond this point causes severe pain. The stiffness and pain on flexion affect the index and middle fingers as much as the ring and little fingers. The hand is not so much swollen as a fortnight ago. The patient often wakes with a dull, aching pain, which is relieved by immersing the hand in cold water, after which, he soon falls asleep again. He is slowly gaining the power of using his fingers. He is about to return to his home in Ohio, and expects, after a few months, to return to New York, and submit to an operation on the other hand.

In the treatment of this case, I applied a splint, not only to the ring and little fingers, which had been much contracted, but to the middle finger, which had been very slightly affected, and to the index, which was apparently in a normal condition. I did so because I thought that the affected fingers could thus be more comfortably kept in an extended position, than if the other fingers were left at liberty. My subsequent experience has led me to believe that I was in error on that point. It will be recollected that the index and middle fingers—after being secured to the splint for several weeks, were almost as difficult to bend as the ring and little fingers.

May 21, 1874.—Important business engagements had prevented the patient from coming back to New York until the present time. I saw him to-day, and found his right hand free from deformity, the fingers being entirely straight. They can be flexed so as to meet the thumb, and to grasp objects firmly, but not to touch the palm of the hand. The patient is very much pleased with the result. He has come to make arrangements for an operation on the left hand. It was accordingly arranged that the patient should come to the city again in August for that purpose.

August 6, 1874.—The patient being under the influence of ether, I divided the palmar fascia at three points. This relieved the tension of the little finger and of the metacarpo-phalangeal articulation of the ring finger; but the articulation between the first and second phalanges of the ring finger remained rigidly bent as before, the sheath of the flexor tendon being contracted. I divided the sheath on each side of the articulation, and was then able, with some effort, to straighten the finger. I secured the fore-arm, hand, and ring and little fingers to a brass splint, adapted to their posterior surface, and maintaining extension, leaving the thumb, index and medius at liberty.

August 7.—The patient has suffered some pain, but not sufficient for him to take an anodyne, for which I had given him a prescription.

August 8.—I took off the apparatus, washed the limb, applied passive motion freely, causing considerable pain, and reapplied the apparatus.

August 22.—I took off the apparatus daily and reapplied it until the 13th of August, washing the hand and making passive motion each time, the pain gradually increasing from day to day. On the 14th of August I found so much inflammation about the articulation between the first and second phalanges of the ring finger, and the nervous system of the patient so much disordered, that I determined to leave off the splint, and from that day I have applied strips of adhesive plaster around the ring and little fingers, so as to make uniform pressure and to keep the fingers nearly straight. I have changed the than dressings daily and have made much less extensive passive motion before. The pain and swelling have greatly diminished, and the general health has improved. He is acquiring considerable use of his hand.

September 11.—As there is still a marked degree of swelling and tenderness about the articulation of the first with the second phalanx of the ring finger, I applied the actual cautery very superficially over the dorsal surface of the finger in three lines, about three quarters of an inch long and a twelfth of an inch wide, and enveloped the finger in a rag wet with cold water.

September 12.—There is a diminution of the tenderness and swelling; to-day I reapplied the adhesive plasters.

September 29 —The treatment has been continued until the present time, except that within the last forty-eight hours, the support of the adhesive plasters has been omitted at night. The patient leaves the city to-day, and I have directed the adhesive plasters to be discontin-

ued, but have enjoined the patient to practice passive motion perseveringly for a long time, both in the direction of flexion and extension. The hand is now free from deformity, except that the ring finger is somewhat swollen. Flexion is still quite limited in the ring and little fingers and is by no means perfect in the index and middle fingers. It is probable that perfect flexion will not be restored to the ring finger.

CASE 4.—Mrs. Ann Meyer, aged 19, applied at my clinic November 7, 1874, with index finger of right hand flexed at a right angle, at the articulation of the second phalanx with the first, and at the articulation of the third with the second. There was scarcely any appreciable motion at either of these articulations. The rigidity was evidently due to contraction of the sheath of the flexor tendon. The contraction had occurred as a sequela of subfascial inflammation in the palm of the hand, over the articulation of the first phalanx of the index finger with its metacarpal bone, in March, 1873. The inflammation had been attended with severe pain, and ten days had been allowed to elapse before an incision was made for the relief of tension, and the evacuation of matter.

November 7.—I made four transverse incisions through the sheath of the flexor tendon, one of the incisions fully exposing the tendon to view. I was then enabled to straighten the finger, and to secure it to a splint, which was also applied to the dorsal surface of the fore-arm and hand.

December 14.—At the end of a week, during which the splint was several times removed and reapplied, passive motion having been made at each dressing, the use of the splint was abandoned, and the finger dressed with strips of adhesive plaster applied around it, so as to maintain the finger in a position of nearly complete extension. These dressings have been continued until the present time. There was a moderate amount of suppuration for the first fortnight after the operation; but the wounds are now completely healed. The finger is straight. There is free motion at the articulation of the first phalanx with its metacarpal bone, and quite limited motion at the two other articulations of the finger. The patient can put on a glove, and can play on a piano. She is directed to make persevering use of passive motion.

CASE 5.—On the 11th of June, 1875, I was called to see Kate R., a little girl, four years of age, who had the ring finger of her left hand rigidly flexed at a right angle, at the articulation of the second phalanx with the first. The deformity was the result of a contused wound,

received a month before, from pulling over on her hand a heavy piece of a bedstead. The integument was drawn into a rigid band, which would not yield to an attempt to extend the finger. I made three transverse incisions through this band, but could not extend the finger until I had carried one of these incisions through the sheath of the tendon. I then secured the finger, hand, and fore-arm, by adhesive plasters and a bandage, to a felt splint.

June 16.—There has been no inflammation, and no pain. I removed the splint and reapplied it, after making passive motion. The little wounds were nearly healed. Passive motion, in the direction of flexion, gave pain.

October 12.—Deformity entirely removed. The finger is straight, and can be flexed to a moderate degree.

In each of the six hands on which I have operated for contraction of the palmar fascia, and of the sheaths of the flexor tendons, as reported in this paper, it will be observed that, after the fingers had been straightened, and the deformity removed, the power of flexing the affected fingers was very much diminished, and that the attempt to flex them occasioned severe pain. The inability fully to flex the fingers, and the pain occasioned by the attempt, occurred not only in those fingers which had been abnormally flexed by the disease, but in those whose condition had been normal when the treatment was commenced, whether the affected fingers had been confined to the splint, or had been left at full liberty during the whole of this treatment. The ability to flex the fingers to the full extent is very slowly regained, and in some cases the patient never fully regains it. It is somewhat remarkable that, while the obstinate forced flexion occasioned by the disease can be in a great measure or wholly overcome in a comparatively brief period, the power of flexion should be lost, and that its restoration should be attended with so great difficulty, and should require so long time. But even with this drawback, the substantial benefits resulting from the treatment commend the curative process to the attention of surgeons, and entitle it to rank among the established resources of the healing art.

For the illustration accompanying this paper, I am indebted to the kindness of Dr. Charles T. Poore.



ARCHIVES
OF
CLINICAL SURGERY,

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Manuscripts, exchanges, etc., should be addressed to the Editor, 102 West Forty-Ninth street, New York City; business communications to the Publishers. Remittances should be made by draft, postal money order, or registered letter to

RUTLEDGE & CO., PUBLISHERS,

102 WEST FORTY-NINTH STREET,

NEW YORK CITY.