

classes in certain English infirmaries, about five-sixths of whom were over middle age, 33, or 1.27 per cent., were affected in various degrees, while of 800 children under sixteen none was affected. Noble Smith among 700 elderly inmates of English workhouses found 70 cases (10 per cent.) of Dupuytren's contraction, in 15 of which the disease was confined to the palm; in 444 women examined by him 11 had well-marked finger contractions and 15 others had simply palmar induration; this would leave 256 men among whom occurred 44 cases (17 per cent.). In an examination made by the writer of this article of the hands of 1,000 men, all ex-soldiers, ranging in age from twenty-one to eighty-five years and averaging about fifty-three years, 39 cases (3.9 per cent.) of Dupuytren's contraction were found; in 13 of these cases the palm only was affected, without contraction of fingers, leaving 26 (or 2.6 per cent. of the whole) having material contraction of the fingers.

Both sexes are liable to the disease, but women are affected much less frequently than men.

The influence of heredity in the causation of the disease is marked, a hereditary or family history of the occurrence of the affection being obtainable in about a fourth or a fifth of the cases.

The disease develops not only in the hands of persons engaged in manual occupations, but also, in large numbers, in persons not engaged in manual labor, and even in persons completely idle.

Dupuytren's disease is a disease of the adult and senile period of life, the favorite age of onset being from fifty to seventy years. Cases do, however, develop during the first half of life, and it is said that even congenital cases occur. It is possible that many of the cases alleged to have appeared at an early age were in reality cases of hammer finger, a condition that has only recently been distinctly differentiated. In 90 cases collected by Keen the ages of onset were as follows: after forty years, 47 cases; from thirty to forty years, 18 cases; under thirty years, 25 cases, of which 4 or 5 were congenital. In 45 cases examined by the writer the ages of onset were as follows: under twenty years, 1 case; from thirty to forty years, 7 cases; from forty to fifty years, 6 cases; from fifty to sixty years, 16 cases; from sixty to seventy years, 12 cases; over seventy years, 3 cases. The latter figures indicate that the disease is rare under thirty years of age.

The onset and development of Dupuytren's contraction are usually gradual and insidious, being manifested by slow development of the induration and deformity without subjective symptoms. Rarely pain or other symptoms in the affected area may precede the appearance of the contraction. As a rule the disease has a definite period of development, and then remains stationary. The period of development of the contraction usually ranges from a few months to three or four years; occasionally the lesions may develop within a few weeks, while in other cases the process of contraction may continue for many years. Sometimes there is a certain amount of intermittency in the development of the contractions; the lesions develop to a certain degree, remain unchanged for months or years, and then have another period of increase. This is especially manifest in the bilateral cases, in which after full development of the lesions in one hand a quiescent period of perhaps years may elapse, when the other hand becomes affected.

Subjective symptoms, pain, tenderness, or abnormal sensations, connected with and located in the seat of the contraction occur in only a small proportion of the cases. In some instances the pain is worse or exists only during the early period, though it may occur at intervals after the full establishment of the contraction as well as during the period of development. The abnormal sensations are often an occasional stinging or pricking feeling in the affected region; also a sensation of numbness or itching, dull aching pains, or sharp shooting pains. Tenderness is occasionally present, especially from exposure of the projecting surfaces to irritation; a feeling of tension in the palm is sometimes noted.

The milder degrees of the disease do not cause trouble or discomfort, and only exceptionally are any of the cases attended with pain. The severer forms of the contraction cause material deformity and disability, the exposed areas in the palm being unduly subjected to pressure and irritation in the use of the hand, the bent finger being awkward and in the way, and the function of the finger being impaired by its lack of extensibility. Occupations requiring the use of the hand may be interfered with. The condition once established is permanent unless obviated by surgical measures.

The diagnosis of the condition from other affections of the hand is usually easy. The bent finger, the ridge in the palm corresponding to the contracted band, the rounded, callus-like indurations, the small wristward inversions of the skin, and the definite location of the lesions are characteristic features which even in mild cases distinguish the affection. Even faint stigmata of the disease are quite distinguishable. Contractions from tendon lesions do not exhibit the characteristic surface changes of fascia contraction. In cicatricial contractions there is the history of injury, the scar tissue, the absence of the typical features of Dupuytren's disease. Arthrogenous deformities are recognizable by the history, the anatomical features present, or the constitutional condition; arthroses may coexist with Dupuytren's disease, however, introducing an element of doubt as to the precise share either may have in the production of the deformity present. In contractions limited to the digital fascia, surface and palmar changes are absent. Hammer finger exhibits no palmar or cutaneous changes, and is sufficiently characteristic to be readily distinguishable; it is probable that some of the cases diagnosed and recorded as Dupuytren's disease, especially among the alleged congenital cases and those stated to have developed in early life, were in reality instances of hammer finger.

The etiology of Dupuytren's contraction has not been satisfactorily determined, and very diverse theories as to its causation have been advanced.

One prominent theory, held among others by Dupuytren, is that the disease is induced by slight local traumatism or by continuous use and irritation of the palm incident to manual labor. In probably a majority of cases there is a complete absence of any history of local causes to which the lesions are attributed. In a smaller proportion of the cases the disease is attributed by the subject of it to local traumatism like wounds, abscesses, blisters, irritation, or occupation incidents; but only rarely is the history sufficiently distinct or the connection sufficiently authentic to warrant any such conclusions. The assumption that in all cases a forgotten traumatism must have occurred is not logically justifiable. Persons not engaged in manual occupations are as subject to Dupuytren's disease, indeed rather more so, than are persons who habitually do manual work, and the disease may develop in the hands of persons entirely idle. The nature of the occupation is not altogether a safe criterion, since the soft hand of the non-worker is more easily irritated by occasional unusual use or strain.

On the whole, the statistics of numbers of cases are adverse to the theory of the local traumatic causation of the disease. There are other considerations opposed to the theory of traumatic origin and in favor of the contrary view of the idiopathic origin of the affection. The left hand is not materially less susceptible than the more-developed right, and the ulnar half of the hand is much more frequently involved than the radial half, which bears the brunt of use to an equal if not greater degree. The favorite age of onset is after middle life, years after the period of active labor begins. The marked influence of heredity, the limitation of the disease to definite longitudinal tracts, the secondary development of contractions in the other hand after one has become affected, are unexplainable on the local traumatic theory. There is little doubt that Dupuytren's contraction is essentially of idiopathic origin, and that local traumatism has no more

than, perhaps, some occasional influence in lighting up the disease.

A germ theory of the disease has been presented by William Anderson, who considers the condition to be a chronic inflammatory process probably set up by a micro-organism. This theory has not been substantiated, and does not seem probable in view of the protracted and benign course of the disease and the absence of inflammatory phenomena; and especially as it throws no light on the bilateral occurrence of the lesions and the influence of heredity.

The theory that the disease is a manifestation of some constitutional condition, especially of gout or rheumatism, is at present the one most generally held. These diseases occur in many cases of Dupuytren's contraction; but it has not been shown that rheumatism or gout affects persons with the palmar disease in a greater proportion of cases than they would a like number of individuals of the same class and age free from palmar contraction. In many cases there is absolutely no history of gout or rheumatism, family or personal. By many authorities gout is strenuously asserted to be the specific cause of Dupuytren's contraction, but this can hardly be successfully maintained. The disease occurs in America, where typical gout is uncommon, and often among social classes not subject to gout. In only a very few of the cases observed by the writer was there any history that could be construed as gouty. In many of the cases cited in support of the gouty theory the evidences of gout are vague, remote, and doubtful, and there is little to indicate that the coexistence of the two conditions is more than coincidental. The argument that when no other gouty manifestation is present the contraction is itself the symptom which shows the existence of gout is an instance of circular reasoning. The disease does not appear to be a manifestation of, or to be essentially and specifically caused by, rheumatic or rheumatoid disease, gout, diabetes, syphilis, or any other such constitutional condition.

The possibility of the nervous origin of the disease is worthy of consideration. The marked predilection of the disease for the ulnar side of the hand shows to some degree a relation with the distribution of the ulnar nerve. The pricking or tingling sensation specified in most of the few cases complaining of pain is quite suggestive of the paresthesia of nervous lesions. The involvement of both hands, one being affected subsequently to and to a less degree than the other, may point to the operation of sympathetic (nervous) action in reproducing the disease on the side opposite to that first affected. Sometimes very suggestive cases occur in which Dupuytren's contraction is associated with nervous disease producing trophic lesions, as syringomyelia, anterior poliomyelitis. In a case reported by Lange, a woman who had a contraction of both ring fingers had an attack of left hemiplegia, almost immediately after which the contraction in the left hand disappeared, the right palm remaining unchanged; this was a sort of reversed trophic action. In the majority of cases of Dupuytren's contraction there is no history of concomitant nervous disorder; and it would perhaps be difficult to show that in the comparatively few cases accompanied by nervous disease the coexistence is not merely coincidental. It is of course possible that obscure trophic influences might occur sufficient to cause this disease, but without other manifestations. While a neuropathic or trophic theory of the pathology of Dupuytren's disease is supported by some considerations, and is not improbable, it cannot be regarded as having sufficient basis for definite acceptance.

According to Robert Abbe's detailed neuropathic theory of this disease, the original cause is a slight traumatism of the palm, often forgotten; this peripheral irritation produces a central spinal impression which then sends a reflex influence back to the part originally hurt and incites a contraction of the fascia. This contraction then sets up a second series of reflex symptoms, and by sympathetic action causes a reproduction of the trouble in the opposite hand. Abbe lays stress on the irritation

of the original traumatism or the tense contractions being an exciting cause of neuralgias, local and distant, joint inflammations, and other symptoms simulating rheumatism and gout, and various general symptoms and neuroses, and cites cases in which these disorders were relieved by operation on the contracted fascia. The cases on which this theory was based must have been exceptional. Ordinary cases, in which the lesion is the seat of little or no irritation and is perfectly benign and innocuous, do not bear out this theory.

Dupuytren's contraction is one of the scleroses, a hypertrophy or hyperplasia of connective-tissue elements, and is hence to a certain extent allied to the visceral cirrhoses, as of the liver, kidney, and lungs, arterio-sclerosis, and the spinal scleroses. Cirrhoses of the liver and kidney are largely due to prolonged irritation of toxic substances circulating in the blood. Arteriosclerosis is due to similar causes, also to the irritating action of constant overdistention and to hereditary influences. These disorders show a marked association with toxæmic and other irritation, and this relationship suggests a similar causation for Dupuytren's disease. This recalls the theory of the connection of this disease with gout, or lithiasis, which is a form of toxæmia. Dupuytren's contraction, however, differs from the visceral scleroses in being sharply circumscribed while the latter are diffuse and general. Why the palm should be selected to suffer in this manner from irritants circulating in the blood, and especially why the hypertrophy should be limited to specific longitudinal fasciuli, does not appear. One would expect more general consequences from local or toxic irritation. Toxæmia does not appear to be a very probable cause of Dupuytren's contraction.

The only conclusion as to etiology that seems warranted is that Dupuytren's disease is of idiopathic origin, most apt to occur in the senile period, and showing marked hereditary influence. There is no one constitutional disease with which it is exclusively associated or of which alone it is a manifestation. It does not appear to be specifically caused by local irritation or traumatism, though this factor, as well as local or constitutional pathological conditions, may at times have some exciting or contributing influence. Perhaps it is a neuropathic or trophic condition.

Contractions of the plantar fascia have been reported analogous to those of the palm; induration or contraction of the penis, associated with Dupuytren's contraction, has also been observed. Keloid, fibromata, and cicatrices are allied in some respects to fascia contraction. The contraction of ligaments in talipes and arthropathies, and of cicatrices, also presents some analogies, especially with respect to longitudinal shortening.

Treatment.—The only hope of relief in Dupuytren's contraction rests in operative intervention, for which a variety of methods have been practised.

One of the most popular and efficient procedures is that of *subcutaneous division* of the contracted fascial band, especially advocated by William Adams. A small straight tenotome is introduced between the skin and the band, and the latter cautiously cut downward. This is done at as many points as is necessary to free the finger and enable it to be straightened; as many as twenty or twenty-five punctures may be required. The sections are made along the entire band, from its proximal to its distal end, as needed. The hand is then dressed, with an anterior splint, with the fingers extended. The results of this operation have been very satisfactory in the hands of numerous operators. Before the days of antiseptic surgery it was doubtless the most advisable procedure, but with the introduction of aseptic technique many of the former objections to open operations have become obsolete. Even at the present time the subcutaneous method is preferred by some surgeons; Adams states that it is less liable to be followed by recurrence than the open operation.

Transverse division of the cord at one or more places, sufficient to free the finger, has been practised by some operators, followed immediately or after some days by

the use of splints. Dupuytren and others have made open transverse incisions through both skin and band. In Goyrand's method the fascial band was exposed by a longitudinal incision through the overlying skin, and the band itself then divided transversely.

Excision of the fascia band in many cases is a rational and preferable procedure, though at times when the fascia is closely connected with the skin it may be difficult to separate it well. A longitudinal incision is made through the skin over the cord, and the band then carefully dissected out, after which the wound is sutured.

In Busch's operation a long triangular skin flap is cut, having its base corresponding to the contracted phalanx and its apex in the palm at the proximal end of the band. This flap is dissected up, the fascia exposed, and the contracting fibres are divided until the finger can be completely extended. The flap retracts, and the resulting open wound, originally V-shaped, is sutured (without exerting too much tension on the skin) into a Y-form. Extension is applied after the wound is healed. This operation does not appear to have come into general use.

A plastic operation is described by William Anderson as having been performed by him in one case. He made a transverse incision through the skin and fascia at the root of the finger, straightened the digit, and filled the gaping wound thus created by a flap of skin cut from the side of the finger and twisted around and sutured in place.

There is thus some choice possible as to the operation to be done. Wherever practicable,—that is, when the contracted band is well marked and easily separable from the skin,—it is probable that the band should be dissected out carefully through a longitudinal incision. But when the contracting tissues are poorly defined or the skin is extensively involved, multiple transverse sections of the band, open or subcutaneous, may be indicated.

The post-operative treatment is very important, consisting of extension by splints or apparatus for a period sufficiently long to overcome the contraction and the tendency to recurrence. Operators have varied as to the time allowed to elapse after operation before mechanical extension is begun, some applying splints immediately, others not for several days afterward. It is probable that no greater degree of exten-

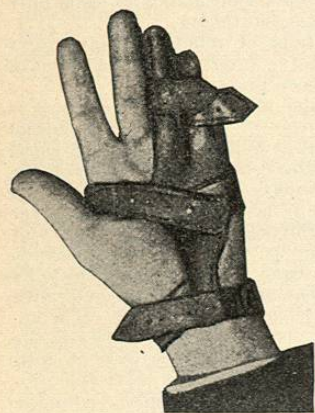


FIG. 2507.—Apparatus Employed After Operation for Dupuytren's Contraction. (Clarke.)

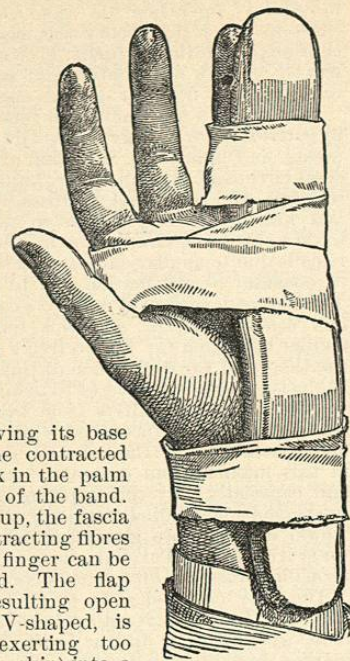


FIG. 2506.—Splint Employed After Operation for Dupuytren's Contraction. (Adams.)

sion should be applied immediately after operation than can be employed without too great tension being exerted on the wound. After healing takes place, firm extension of the fingers by splints or apparatus (Figs. 2506, 2507) can be maintained for a few weeks, at first constantly, later intermittently, until a permanent result is obtained.

The final results of operative treatment of Dupuytren's contraction are generally satisfactory, though sometimes recurrence takes place.

CONTRACTION OF DIGITAL FASCIA.

The subcutaneous fascias of the fingers undergo contraction along with those of the palm in typical cases of Dupuytren's disease; and in some cases of hammer finger secondary digital fibrous contractions may perhaps be present. But aside from these, cases occasionally occur of fingers bent by hypertrophied and shortened bands of the digital fascia alone. There is little literature on the subject, but the writer has observed a very few cases of finger contractions caused by bands of digital fascia.

One case was that of an old man, from whom no reliable history was obtainable. The middle phalanx of his left little finger was flexed on the proximal phalanx at an angle of about 135°, and the terminal phalanx was slightly flexed on the middle one. A subcutaneous band could be plainly felt running along the ulnar side of the finger. A post-mortem dissection of this finger showed the presence of a firm thickened fibrous band attached to the fibrous investment surrounding the flexor-tendon sheaths, situated on the ulnar side of the palmar aspect of the digit; it extended the entire length of the finger and was the cause of the flexed condition of the latter.

A second case was that of a pensioner who at the age of fifty had a palmar abscess at the base of the right little finger, which was lanced on the radial side of the proximal phalanx. On healing, this finger became flexed at the proximal interphalangeal joint; the middle phalanx could not be extended beyond an angle of about 95°, motion within this limit being unimpeded. Along the radial side of the proximal phalanx, anteriorly, a subcutaneous band could be felt running to the middle phalanx. When examined the old scars were scarcely perceptible, and none was present over the contracted band.

In a third case, a woman at the age of forty-three had an attack of cellulitis of the left hand and upper extremity, with much oedema or exudation, for which incisions were made at the base of the little finger and other points. After the attack subsided the middle phalanx of the little finger was bent to an angle of about 135°. The deflection subsequently increased. When examined at the age of eighty, the left little finger was flexed at both interphalangeal joints, the middle phalanx at a right angle, the distal on the middle phalanx to about 135°. The middle phalanx of the left ring finger also was flexed to an angle of about 130°. A tense subcutaneous band could be felt along the front of the proximal phalanx of each of the affected fingers, extending from the base of the middle phalanges toward the metacarpophalangeal articulation of the ring finger, where the two bands came together.

In a fourth case, a grocer aged about forty-five years



FIG. 2508.—Deformity Resulting from Contracted Subcutaneous Digital Fascia and Other Lesions. (Original.)

had a severe and prolonged attack of cellulitis of both upper extremities and the right foot, following a slight infected wound in the left thumb. Incisions were made into the dorsal surfaces of the proximal phalanges, and about the wrists. After recovery a marked deformity of mixed flexion and superextension of the fingers of both hands existed. When examined, about twelve years afterward, the middle phalanges of the right ring and little fingers were flexed at a right angle; their proximal phalanges were superextended or bent backward about 45°, and their power of flexion toward the palm was very greatly impaired (Fig. 2508). The middle phalanx of the left little finger was flexed at an angle of about 100°, and its proximal phalanx was so superextended that it could not be brought within 45° of the straight line; the range of flexion of the proximal phalanges of the left ring, middle, and index fingers was also very much diminished. Along the front of the proximal phalanx of the right ring and little and left little fingers were tense elevated subcutaneous bands running from the bases of the flexed middle phalanges to the palm; these bands were probably fibrous, though they may possibly have been shortened flexor tendons. The superextension of the proximal phalanges was perhaps due to adhesions or shortening of the extensor tendons. Several hammer toes were present. The appearance of the hands was very similar to that of a variety of hammer finger described by Adams.

None of these cases showed the slightest signs of the changes in the skin and palm characteristic of Dupuytren's contraction, and the contracted bands seemed less superficial than in the latter affection. The typical appearances of cicatricial contraction were also absent.

These cases, and especially the one dissection, demonstrate that there sometimes occurs a condition of thickening and contraction of subcutaneous digital fibrous tissues resulting in a flexion and limitation of the extensibility of the phalanges. Further observations and dissections are needed to elucidate this condition and its position as a distinct affection. The little finger seems to be the digit most susceptible to this abnormality, at its proximal interphalangeal joint, precisely as in hammer finger. The affection is mostly unilateral, acquired, and may develop after local inflammatory conditions. It appears to be a disease process *sui generis*, and entirely distinct from cicatricial contraction and Dupuytren's contraction. It presents marked analogies to hammer finger, notably in its situation, and perhaps it may be regarded as a variety of hammer finger; still, to a certain extent at least, a distinction can be made between finger flexions due to fascia contractions and those due to shortened lateral articular ligaments as in typical hammer finger.

In diagnosis, finger deformities due to digital fascia contractions would have to be differentiated from those due to ankylosis, arthritic conditions, tendinous adhesions or shortening, cicatricial contractions, Dupuytren's disease, hammer finger (shortened ligaments), and such conditions. The cardinal feature indicative of fascia contraction is the presence of a subcutaneous fibrous band evident to the senses; it is conceivable, however (though perhaps not possible), that cases might occur in which a shortened and unusually elevated tendon might to the examining finger be undistinguishable from a fascial band. Moreover, cases might occur in which the subcutaneous fibrous tissues might be sufficiently shortened to cause deformity but yet not be palpable as distinct contracting bands; such cases might present difficulty in making a definite diagnosis.

The obvious treatment of this condition would be to divide or excise the contracting bands.

HAMMER FINGER.

There is a well-marked class of contractions or anterior deflections of the fingers, not very uncommon, manifested especially by a flexion of the little finger at the proximal interphalangeal joint, which is of distinc-

tive nature. The affection has received very little attention in medical literature. It was described and figured in 1846 by R. W. Tamplin, who attributed it to contraction of the skin. After that it was occasionally mentioned by authors, but the fullest studies of the subject are those of William Adams and William Anderson, both originally published in 1891. The condition has mostly been called "congenital contraction of the finger," but Anderson applied the term "hammer finger" to it. The latter is the preferable designation, as it is concise, has sufficient metaphorical significance, expresses the analogy of the condition to hammer toe, and is non-committal as to the pathology of the affection or as to its being in all cases congenital.

Hammer finger is usually described as a congenital condition; but I have observed a few cases, exhibiting all the external and clinical features of hammer finger, which were distinctly acquired. Two varieties of the affection may therefore be considered: the developmental or congenital, and the acquired.

Developmental Hammer Finger.—This deformity typically consists in a flexion of the middle phalanx upon the proximal phalanx of the little finger at varying angles up to a right angle,—usually at an angle of about 135°. Slight limitations to full extensibility of the middle phalanx of the little finger are common, but unless the flexion amounts to about twenty degrees or more it is hardly worth while to regard it as abnormal. Within their respective limits flexion and extension of the affected phalanges are unimpeded; but beyond them further extension is impossible without the use of unusual force. In most cases the proximal phalanx is unaffected; but according to Adams it is sometimes bent backward or superextended (the middle phalanges being flexed), as is commonly the case with the corresponding phalanges in old cases of hammer toe (see Fig. 2508). The distal phalanges are also usually unaffected; but they are sometimes flexed instead of the middle phalanges, and in one case reported by Adams they were superextended, the middle phalanges being flexed. Some of the other fingers (especially the ring and middle fingers) are sometimes similarly affected in conjunction with the little finger, but to a less degree than the latter. In the congenital form the affection is usually bilateral, the hands being affected together though not always equally.

The skin over the anterior aspect of the finger is sometimes shortened or forms a longitudinal fold stretching across the concavity of the affected interphalangeal joint, increasing the antero-posterior diameter of the proximal phalanx. According to Adams, there are often present subcutaneous bands of contracted fascia, centrally or laterally located, sometimes with fibres inserted into the skin; but according to other authorities fascia contractions are absent. The author has not been able to detect contracted fascial bands in any of the developmental cases of hammer finger which he has observed; and in the pure uncomplicated developmental form of the affection it is probable that fascia contraction plays no essential part. In some cases there is some secondary shortening of the flexor tendons of the finger. Often the distal end of the first phalanx projects slightly at the angle of the articulation, but there is no subluxation of the joint. The lateral ligaments of the joint are shortened, and there may be other developmental or secondary changes in the joint. The contraction is entirely unassociated with injuries or arthritic or paralytic conditions. The contraction is not the seat of any pain or other subjective phenomena, but in its extreme forms may cause considerable deformity, unsightliness, and inconvenience.

The affection is markedly hereditary. Numerous cases have been observed of its transmission from parents to children and of its coexistence in brothers and sisters. It is frequently associated with hammer toe, either in the same individual or in the family. It is not a very uncommon condition, but is not often brought to the notice of the surgeon; it is much less common than hammer toe. It is said to affect females more frequently than

males. In 800 school children Anderson found two cases among boys and five cases among girls. Among 1,000 adult men I found about five cases (one-half per cent.) of developmental hammer finger; possibly some cases were overlooked in this series before I learned to recognize this class of deflections. Among 177 white children under sixteen years of age the writer found two cases of slight hammer finger, one of the left hand in a girl, one of both hands in a boy; among 86 colored children no case was found.

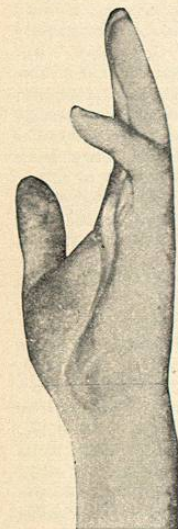


FIG. 2509.—Developmental Hammer Finger. (Original.)

While this form of hammer finger may or may not be manifest at birth, it usually makes its appearance very early, probably in the first two or three years of life. Adults affected will state that their fingers have been bent as far back as they can remember. Sometimes the contraction makes its appearance at a later age, even up to eighteen or twenty years, but always before maturity is reached. It is therefore a disease of the developmental period of life, and in that sense is congenital. The contraction slowly and continuously progresses for years, until the maximum is attained.

The essential pathological nature of hammer finger is only partially determined; opportunities for operation or dissection are not often presented. Several observers have regarded the flexed condition as due to shortening or contraction of the skin over the proximal phalanx; but this change in the skin, when present, is undoubtedly a secondary alteration and not the primary cause of the flexion. According to Adams, the deformity is due, partly at least, to shortened subcutaneous fascial bands. C. B. Lockwood, in a dissection of an amputated hammer finger, found a thickening and shortening of the fascia over the flexor aspect of the proximal interphalangeal joint, which caused the flexion; he did not state the condition of the articular ligaments. Other observers, however, have not found fascia contractions present, and they are certainly not an essential feature of developmental hammer finger, but only of secondary, occasional, and exceptional occurrence. The flexor muscles or tendons are not regarded as being the primary cause of the contraction, though they may be secondarily shortened. E. M. Little cut the tendons in one case, but without relaxing the finger; on the contrary, Anderson after cutting the other structures found that the flexors kept up the contraction.

The primary cause of hammer finger is apparently an abnormality, frequently hereditary, in the development of the component parts of the affected joint, resulting in a disproportion in the osseous, cartilaginous, and ligamentous articular tissues; the developmental abnormality results practically in a shortness of the lateral and anterior ligaments of the phalangeal joint, which interferes with full extension of the finger. The ligamentous shortening becomes manifest during the period of development. This is Anderson's view of the etiology of hammer finger, though he does not report any dissection. In a dissection made by the writer the contraction was found due, chiefly at least, to much-shortened lateral ligaments.

In long-established cases, in addition to ligamentous shortening, other changes are present; namely, alterations in the articular surfaces and shortening of the flexor tendons, fibrous tissues, and the skin over the proximal phalanx. These alterations are doubtless secondary changes, caused by the accommodation of these structures to the prolonged abnormal position. These secondary changes must be taken into account in oper-

ative procedures, as in old cases division of the lateral ligaments alone is apt not to be sufficient to correct the deformity entirely, as in a case operated on by Anderson and another by the writer.

Why the little finger, and the proximal interphalangeal joint of this finger, should be the especial seat of this abnormality, is a point that is not clear. The cause of super-extension of the proximal phalanges as reported by Adams is also obscure. Hammer finger is allied in many respects to hammer toe. It is a distinctive condition, *sui generis*, easily recognizable, and entirely different from Dupuytren's contraction of the palmar fascia.

Acquired Hammer Finger.—I have observed a very few cases of flexion of the little finger at the proximal interphalangeal joint exhibiting almost precisely the same external appearances that developmental hammer finger presents, but which developed in adult life; that is, were acquired rather than congenital. An acquired form of the affection is recognized in the literature only by Tamplin.

In two cases bilateral hammer finger began to develop at the ages of eighteen and twenty years, and in both cases was attributed to slight irritation or blistering from manual work. These were probably developmental forms of the affection appearing unusually late; or the flexion may have begun earlier but been unrecognized. In one of these cases very slight stigmata of Dupuytren's contraction appeared in one palm nearly thirty years afterward, but no contracted bands were present.

In one case, a soldier at the age of thirty-seven suffered much exposure during a campaign and contracted rheumatism. At the same time both little fingers gradually or during a short period became contracted, and remained so unchanged for many years. The left little finger exhibited an extreme flexion into and against the palm caused by what appeared a Dupuytren's contraction of the palmar fascia (illustrated in Fig. 2505). The right little finger was bent at about a right angle at the proximal interphalangeal joint (Fig. 2510); there was no apparent thickening or contraction of the fascia either in the palm or in the finger, no change in the skin, no joint lesion, no sign of injury. Within the limits of the contraction the middle phalanx was freely movable, but beyond a right angle extension was impossible. The right little finger had the precise appearance of a hammer finger, and was distinctly not a Dupuytren's contraction, while the corresponding finger of the other hand was flexed by a subcutaneous palmar band.

In a second case, a laborer at the age of thirty to thirty-five years had a very slight Dupuytren's contraction of the fascia, in line with the ring and little fingers, develop in both palms, without bending the fingers; this continued without change. At the age of thirty-nine he sustained a slight wound in the palmar surface of the proximal phalanx of the left little finger, which healed in a few days. About a year later he noticed that this finger was bent; the contraction increased for a few years until at the age of forty-eight the middle phalanx was flexed at an angle of about 110°; no subcutaneous bands or contracted fascia could be distinguished.

In a third case, a soldier at the age of thirty-one had an abscess in the ulnar portion of the right palm, well toward the wrist, which was opened. Subsequently the middle phalanx of the right little finger became flexed at an angle of about 135°; there were no arthritic changes or subcutaneous bands, and no perceptible connection with the cicatrix in the palm.

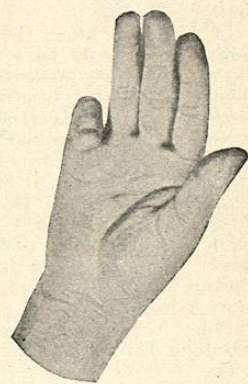


FIG. 2510.—Acquired Hammer Finger. (Original.)

These three cases show the possibility of the occurrence of an acquired deformity in appearance and seat precisely similar to developmental hammer finger. As compared with the latter the acquired affection is (so far as these cases show) unilateral, the degree of flexion rather greater, the skin less stretched. Within the limits of the contraction motion of the phalanx is unimpeded. In some of the cases the hammer condition is associated with Dupuytren's contraction of the palmar fascia, though in no way dependent on the latter. In some instances there is a possible relationship with antecedent traumatism. No contracted subcutaneous fibrous bands are perceptible, and no other lesions capable of causing the deformity can be detected.

In the absence of dissections the cause and anatomical changes of these acquired hammer fingers are obscure. They are not due to ankylosis, subluxations, or other joint changes, to cicatricial contractions, to skin changes, nor to perceptible fascia bands. Tendinous lesions might be possible causes. The deformity is probably due to shortening of some of the fibrous structures about the affected joint; whether the ligaments or the more superficial fibrous and fascial tissues, or both, remains to be determined. If the latter, the tissues must be generally shortened, and not thickened into bands perceptible to touch. The association with Dupuytren's disease may indicate the action of a common cause tending to produce shortening of fibrous structures in different situations. The peculiar susceptibility of one particular joint is an obscure point.

So far as the writer's observations show, acquired hammer finger bears a certain relationship to contractions of the digital fascia. The distinguishing point between them is the presence of evident subcutaneous bands in the latter. The significant fact that the proximal interphalangeal joint of the little finger is the articulation exclusively or chiefly affected in developmental hammer finger, acquired hammer finger, and digital fascia contractions constitutes a common point of relationship between these three affections, and indicates the existence of unknown specific etiological factors that render this particular joint especially liable to such changes.

The diagnosis of developmental and acquired hammer finger should ordinarily present no difficulty. The cases, especially congenital cases, are quite characteristic in their appearance, seat, and history. Flexions of the fingers due to injuries, arthritic changes, paralytic or spastic conditions, cicatricial contractions, section of extensor tendons, are usually easily distinguishable by their respective characteristics. Contractions of digital fascia are distinguished by the palpable presence of fibrous bands. Deformities produced by adhesions of flexor tendons or by fibrous ankylosis of the joints might be difficult to differentiate. To a certain degree the diagnosis, of the acquired form especially, is negative; that is, finger contractions of this type whose cause is obscure might for convenience be classed as hammer finger. Deformities due to Dupuytren's contraction are recognizable by an evident relation of the flexion of the finger with the palmar lesion; this relation is plainly demonstrable in Dupuytren's disease; although the two affections are entirely distinct, it is probable that cases of hammer finger have been diagnosed Dupuytren's contraction, especially in alleged congenital cases of the latter affection.

Treatment of Hammer Finger.—The minor degrees of hammer finger do not cause sufficient trouble to require treatment. For the worse forms of the contraction treatment may be sought on account of the inconvenience or awkwardness of the bent finger or for the sake of appearance.

In young and mild cases, when the contraction is not too rigid and unyielding, passive motion and mechanical extension on a splint or special apparatus will often yield satisfactory results in the correction of existing deformity or the prevention of further deformity. To be effective and permanent such treatment must be kept

up constantly and faithfully for a long time. The splint should be worn day and night for months, and then at night or at intervals, for a long time, until the persistent tendency to recontract is overcome. Special forms of apparatus have been devised for maintaining extension of the fingers.

In adults and cases of long standing, when the tissues are rigidly contracted and secondary alterations greatly augment the difficulties of treatment, the results of treatment are apt to be unsatisfactory. In such cases operative treatment is the only procedure offering any hope of relief. In considering the advisability of operative interference the liability of subsequent ankylosis from entering the joint, or of impaired mobility from interference with the tendons, should be borne in mind. Stiffening after operation on hammer toes does not affect the usefulness of the member. Stiffening of a finger in an extended position, however, is a material inconvenience and disadvantage, and no improvement over the hammer condition. The finger joints are very apt to become ankylosed by only slight injuries, and the risk and disadvantages of such a result or of unsightly enlargement of the joints should be remembered in considering operation. Recontraction is apt to occur.

Few cases of hammer finger have been operated on, so that data as to results or the best technique are scanty. The object aimed at is to divide all the structures causing the contraction. The shortened lateral ligaments should be cut, either through an open wound or subcutaneously. In inveterate cases a division of the ligaments alone may not suffice to free the finger, owing to secondary contraction of the skin, flexor tendons, and fibrous tissues. It will therefore be necessary to divide all the contracting structures—skin, fascia, tendons—until the finger can be straightened. Vogt claimed good results from plastic operations on the skin, as by cutting a V-shaped flap, straightening the finger, and suturing the resulting wound in a Y-shape; this would obviously afford relief only when the contraction is due to shortening and tension of the skin and superficial tissues. Contracted fibrous bands may be divided subcutaneously, as recommended by Adams. Shortened tendons may be and have been divided, or they might be lengthened by a plastic operation. Interference with the tendons, however, has been and is apt to be followed by non-union or adhesions, resulting in a very undesirable impairment of the motility of the finger. After operation extension of the digit by splints or apparatus should be maintained for a long time to overcome all remaining deformity and to prevent recurrence. Passive motion of the joints should be practised early and frequently to obviate ankylosis. Perfect results are, however, difficult to obtain, though improvement may be effected.

Forcible divulsion was employed by Little in one case. Under full anaesthesia the finger was forcibly straightened and the contracting tissues were ruptured; this was followed by the prolonged use of a splint, with good results except for some tendency to recontraction. In treatment of this kind in children care should be taken not to cause separation of the epiphyses of the phalanges.

In cases of extreme deformity and unsightliness amputation has been proposed and actually performed.

GENERAL PALMAR INDURATION.—Cases are frequent in which the skin and subcutaneous fibrous tissues of the palmar surface of the hand and fingers are generally hardened, indurated, and slightly contracted, so that the fingers are held slightly flexed or arched on their metacarpophalangeal and phalangeal articulations, and are not easily capable of full extension. This condition is common in hard manual workers, as the result of occupation irritation. It is also occasionally exhibited by old and senile persons, in whom the skin may not be abnormally hardened, but in whom the fingers or some of them (especially on the ulnar side) are somewhat flexed by, apparently, a slight general shortening of the palmar fascias. This may develop as a senile change, without antecedent occupation irritation.