with. It is a result of prolonged immobilisation of forearm fractures by any form of apparatus that intercepts the free circulation of blood through the muscles and nerves of the part. When the splint is removed the hand is found painful, dusky, and swollen, the fingers are bent like claws, and any attempt to extend them causes great pain. Volckmann believed that the nerves in these cases have preserved their power of conduction, but that the muscular fibres are structurally injured and have lost their excitability. The lesion is, however, seldom of a permanent character, and the function may generally be restored by systematic active and passive movements, with massage, and if necessary the use of a galvanic current. Its existence is a reproach to surgery, since a careful observation of the hand and fingers during the use of splints will always give due warning of the danger. (b) Diffuse inflammation of the inter-muscular planes and perimysial connective tissue may occur as a result of poisoned wounds, and other injuries, and may lead to a like deformity in the fingers. In a case under my own charge it was caused by a sting in the forearm by an adder. The injury was followed by the usual pain and swelling, accompanied by a painful contraction of the fingers, which lasted for nearly three months, but was ultimately relieved by the measures recommended for the ischæmic paralysis. Wounds implicating the flexors may occasionally lead to permanent contraction—either as a result of actual loss of substance, or in young subjects from interference with the development of the muscle (as in the case already mentioned). Under these circumstances the operation of tendon lengthening may be required if the endeavours to secure gradual extension are unsuccessful. König describes a case of flexion of the hand and fingers in a newly born child caused by a tearing of the flexors at the moment of disengagement of the arm in the course of delivery. (c) Gammatous formations in the forearm flexors, causing painful contraction of the finger, are comparatively rare. A very interesting case of the kind is reported by Dr. A. G. Barrs in the *Medical Chronicle* for May last, and I am indebted to the author for permission to show the photograph and drawing produced. The muscle affected was evidently the flexor profundus in its ulnar portion; and the finger contraction, which bore a superficial resemblance to Dupuytren's disease, was complicated by other symptoms indicating a concomitant affection of a portion of the cord.

6. *Contraction of the fingers dependent upon a tendo-vaginitis of the bursal sheath of the flexor tendons*—The following notes of an example of this somewhat rare condition under my observation at the present time may be of interest. The patient, a girl aged twenty, attended St. Thomas's Hospital for a swelling of the front of the right wrist, with contraction of the fingers and complete loss of use of the hand. She stated that the contraction appeared six days before without apparent cause. On examination a large swelling was found, extending upwards for about an inch and a half above the anterior annular ligament, and distally along the ulnar side of the palm as far as the root of the little finger. The phalangeal joints of all the fingers were flexed, and any attempt to straighten them caused considerable pain, while the movements of the little finger were accompanied by a peculiar coarse grating, that could be felt along the whole length of the theca and in the palm, ceasing, however, at the level of the carpus. The thumb was flexed and adducted, and the movements of flexion and extension were painful, apparently because they led to disturbance of the enlarged bursal sheath of the finger flexors. The affection is evidently a tendo-vaginitis involving the carpal bursal sheath of the finger flexors, and the palmar extension which brings this into communication with the digital bursal sheath of the little finger. The crepitation indicates that the intra-vaginal portion of the tendon is roughened by inflammatory deposits, and it is possible that these irregularities may lay the foundation for a subsequent trigger finger. The case is being treated by immobilisation of all the joints of the wrists and fingers in plaster-of-Paris. In a few days, as soon as the acute stage is passed, passive movement will be commenced.

A tendo-vaginitis of the extensors over the back of the hand may induce considerable functional impairment of the fingers, with more or less contraction at the metacarpophalangeal joints. Such a condition has been described by Vogt as an occasional result of gonorrhœa, and Verneuil has met it as a manifestation of syphilis. The majority of

examples, however, occur without any ascertainable constitutional cause.

7 *Contractions dependent upon inflammatory and degenerative changes in the articular structures*.—The deformities induced by gout, rheumatism, and rheumatoid arthritis fall more directly within the domain of the physician, while those due to tubercular or traumatic lesions are of more immediate concern to the surgeon, but the characters which distinguish the various conditions from each stage are of interest for every practitioner. The chief points bearing upon diagnosis are as follows:—In the gouty form the personal and family history of the patient, the acute and painful nature of the local inflammatory attacks, the presence of urate of soda deposits in the part, and the evidence of similar disease in other portions of the body. In chronic rheumatism, which is more often present in women and in the poorer classes, the moderately painful attacks of synovitis with crepitation, and evidence of wearing away of cartilage. In chronic rheumatoid arthritis the presence of bony outgrowths around the margin of the articulation is the main element of distinction from the latter condition. In tubercular disease the personal and family history, the soft fusiform swelling, the tendency to breaking down of the morbid tissue, and the more or less complete destruction of the articular capsule in the later stages. Contractions with ankylosis may also occur in acute rheumatism and acute rheumatoid arthritis, and as a peculiar neuropathic condition simulating the latter. These will be referred to in connexion with the contractions of the toes. In the traumatic forms the history and marks of injury will usually be sufficient for diagnosis; but it must, of course, be recollected that common injuries, by weakening the resistance of the part, may localise the attack of a specific disease, such as tuberculosis or gout, and hence the onset of tubercular or gouty arthritis may coincide with an ordinary traumatism. It is, as a rule, only in the tubercular and traumatic forms that the surgeon is consulted. The treatment must, of course, be based on general principles; but it is necessary to recollect that an ankylosed finger-joint nearly always renders the digit worse than useless, and especially if the articulation be fixed in the position of extension.

It is only necessary to mention that contractions without joint lesion may occur in the fingers as a result of disease or injury of the bone. Simple fracture in the neighbourhood of an articulation may produce a deformity closely resembling that of dislocation. Caries or necrosis may also lead to a breach of continuity in the shaft of a bone, and various distortions may follow the cure of the disease.

(To be concluded.)

ON CONGENITAL CONTRACTION OF THE FINGERS AND ITS ASSOCIATION WITH "HAMMER TOE"; ITS PATHOLOGY AND TREATMENT.¹

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GENERAL REMARKS.

CONGENITAL contraction of the fingers—in most cases limited to the little finger—has not hitherto attracted much attention, and is sometimes not even mentioned in surgical text-books. The reason for this is that the cases, although of common occurrence, are generally unimportant, and in the majority of instances this contraction does not give rise to trouble, although in exceptional cases, at a late period, it does become an important affection. No one thinks anything of a crooked little finger, and so commonly does it exist that a gentleman once remarked to me, "All our noses and little fingers are crooked." And this is undoubtedly the popular notion, in which is embodied a certain amount of truth.

CLINICAL HISTORY.

This affection had better be considered in reference to three distinct stages in which this contraction is found.

First stage—Although this is undoubtedly a congenital and hereditary affection, no deviation is observed in the

¹ For abstract of this paper, read at the Medical Society of London Dec. 8th, 1890, see THE LANCET, Dec. 13th, 1890.

little finger at the period of birth, such as we see in congenital club-foot, for example, and other congenital muscular contractions. I do not think I have seen any case in a child under one year of age; but I have seen many cases in children between one and two years of age. The mothers, however, have assured me they have observed it a few months after birth. This form of finger contraction occurs chiefly in girls. The first indication observed is a dropping of the second and third phalanges of the little finger, with some inclination to turn laterally inwards towards the median line of the hand; the third phalanx is generally rather more flexed than the second. There is no evidence of muscular contraction; no contracted bands of fascia can be felt; no appearance of shortening of the skin on the palmar aspect of the fingers (see Fig. 1). The second and

FIG. 1.

Congenital contraction of little finger in first stage, from a child three years of age.

third phalanges can be easily restored by gentle manipulation to a straight position with the first phalanx; but they drop again as soon as the extending power is removed. This is a remarkably close resemblance to what takes place in the first stage of hammer toe. The general characters described are well represented in Fig. 1, taken from a child aged three years.

Second stage.—This is essentially one of confirmed contraction, which takes place gradually if the malposition in the first stage has not been corrected by the child wearing a retentive metal splint. In this stage there is no evidence of muscular contraction, but some contracted bands of fascia can be detected in most cases. The second and third phalanges generally remain on the same line, and become more or less rigidly flexed upon the first phalanx, which is usually drawn backwards or hyper-extended, as shown in Figs. 2 and 3. The finger cannot be straightened by any moderate amount of force, and the resistance would seem to be partly in a contracted condition of the skin and fascia, and partly in the contracted condition, by adapted shortening during growth, of the articular ligaments. The transverse creases in the skin on the palmar aspect of the fingers corresponding to the phalangeal articulations become less distinctly marked; and the skin, somewhat atrophied and thin in appearance, seems to be short and contracted. This probably led my former colleague, the late Mr. Tamplin, to believe in congenital contraction of the skin being the cause of this malposition; but no doubt it is only one of the secondary effects of the contraction. This stage appears to be seldom reached under seven or ten years of age, and even then often attracts but little attention, only being regarded as a crooked family finger. Later on, however, it is found to interfere more especially with music, and further advice is sought, generally about the age of sixteen years.

Third stage.—When the congenital form of finger contraction has not been submitted to treatment in the first or second stage, spontaneous arrest may, and undoubtedly does, take place in many cases, as shown in Figs. 2 and 3, the deformity remaining throughout life without causing much inconvenience; but this cannot be relied upon, and in a certain

proportion of cases increase of the contraction occurs at a late period—say, from fifteen to eighteen or twenty years of age,—and these cases present several remarkable peculiarities, so that I have described this period of increase as

FIG. 2.

FIG. 3.

Congenital contraction of little finger in second stage. Patient aged twenty-nine years.

a third stage of the congenital contraction. In this stage the increase of the contraction is seldom confined to the little finger, but all the fingers become involved, as shown in Fig. 4; and there is evidence of fascial contraction of a

FIG. 4.

Congenital contraction of the fingers in the third stage. From a young lady aged seventeen years.

peculiar kind, differing widely from the fascial contraction met with in the better-known form of Dupuytren's finger contraction, as well as a further contraction and shortening of the skin. When this increase of the contraction commences, the second and third phalanges of all the fingers

begin to bend downwards, so that the hand quickly becomes less and less useful for any purpose, and in young ladies the piano has to be abandoned. It is soon found that the fingers cannot be straightened by any moderate force, and when the attempt is made the skin on the palmar aspect seems to be short and contracted. There is also some appearance of a central flat band of fascia about three-eighths of an inch in width, running lengthwise along the first and second phalanges. The margins of this band become tolerably well defined in the central portion of each phalanx, and expanding near to the articulations are gradually lost. This is well represented in Fig. 4. As this appearance of a central longitudinal band does not correspond to any natural distribution of the digital prolongations of the palmar fascia, which we know pass obliquely forwards and backwards towards the periosteum along the inner and outer margins of the sheath of the flexor tendons, its explanation seems to be difficult. It appears so me to be due to the terminal fibres of the fascia inserted into the skin becoming involved, and contributing to an appearance of skin contraction. I formed this opinion after the first operation I performed on one of these cases in the year 1885, when I found it necessary, after dividing some small bands transversely, to pass the knife horizontally under the skin and divide numerous bands passing upwards towards the skin. The appearances in this case are well represented in Fig. 6. In the little finger there is an appearance in many cases of a contracted lateral band of fascia, generally on the outer side, but I have seen it less distinctly marked on the inner side of the little finger. This lateral band, however, takes a longitudinal direction, as shown in Figs. 2, 3, and 6, and in this respect differs from the contracted lateral band in cases of Dupuytren's finger contraction, and has not the effect of drawing down the first phalanx, which is generally drawn backwards or hyper-extended. In a few cases the contraction increases to a severe degree, so that the second and third phalanges become bent upon the first at a right angle, without any appearance of a lateral band.

Opportunities of demonstrating by dissection the anatomical conditions in these cases must very seldom occur, but my colleague, Mr. Lockwood, dissected one which occurred in a young woman aged twenty-one, in whom both little fingers had been contracted from childhood, and in consequence of the increase of contraction during the last two years she was anxious to have the left little finger removed, an operation which Mr. Lockwood performed, having first tried a subcutaneous division of the fascia without benefit. The specimen was exhibited to the Pathological Society on Nov. 17th, 1885, and the report in the Transactions of the Society for 1886 states "it was found that the band in question consisted of a thickening of the digital fascia opposite the flexor aspect of the proximal inter-phalangeal joint. Except that it was thickened and shortened, the fascia was perfectly natural." The specimen is in the Museum of St. Bartholomew's Hospital, No. 1203, B. This period of increase, or the third stage, as I have described it, seems to occur more frequently in young ladies of a neurotic temperament, simultaneously with some loss of health from overwork at school, or natural inclination to study, independently of any constitutional tendency to gout or rheumatism, although I have known parents ascribe it to rheumatism and residence in cold and damp situations.

ETIOLOGY.

No satisfactory theory of causation of this peculiar form of finger contraction has yet been offered. It used to be thought to depend upon a congenital deficiency of the skin in the direction of the length of the finger—i.e., an inclination to a web in the length of the finger. My former colleague, Mr. R. W. Tamplin, the late senior surgeon of the Royal Orthopædic Hospital, in his lecture on "Contraction of the Fingers," observes: "In the congenital form I have not witnessed a case that arose from contraction of the muscles. The cases that I have as yet seen have been occasioned by a deficiency of skin extending from the extremity of the metacarpal bones to the last phalanx. (Vide Fig. 54.)" This, by the way, is a good illustration of the ordinary form of congenital contraction, in the third stage, in a young adult, chiefly affecting the little finger; but the other three fingers are also somewhat flexed. It is remarkable that in the same lecture two excellent illustrations

are given (Figs. 60 and 61) of a case which Mr. Tamplin considered to be a non-congenital contraction of the skin in the length of the fingers in an adult (see Fig. 5), but I have not

FIG. 5.

Case recorded by Tamplin as "non-congenital contraction of the skin."³

the least doubt that this was a congenital case, with fascial and skin contraction coming on at a late period. One of the exceptional class of cases I have described as reaching the third stage of this form of contraction, and an exact counterpart of this case, may be seen illustrated in Fig. 4. Against this theory it may be urged that there is no appearance of congenital skin contraction, or the formation of a longitudinal web in the finger when seen in early childhood. I have casts taken from young children that show the transverse creases on the palmar aspect of the phalangeal articulations as well defined as they naturally should be. At a later period, when the second stage—viz, that of confirmed contraction—has been reached, the skin appears to be short, and a longitudinal web becomes apparent when an attempt is made to straighten the finger. It is, I think, from cases in this stage that the opinion must have been formed, but I have no doubt that the skin contraction is a secondary affection, and with it also the terminal cutaneous filaments of the fascia become involved. The only defect which is apparent in the first stage is a dropping of the second and third phalanges (shown in Fig. 1), apparently from some failure of the power of extension, as in the first stage of "hammer toe," with which it is frequently associated; but whether this is due to any failure or imperfect development of the lumbricales and interossei muscles, whose special office it is to aid in the power of extending the second and third phalanges, I am unable to say. Should this be the case, it is worthy of remark that the power of extending the second and third phalanges is not permanently lost through life. If we examine a case in the second or third stage by fixing the first phalanx in the flexed position (as when the hand is clenched), and then ask the patient to extend the second and third phalanges, it will be found that he is able to do this, although the power is always feeble—in part no doubt from disuse. The patient, aged twenty-nine years, whose hands are represented in Figs. 2 and 3, has this power to a very useful extent as a wood engraver.

From the description given above, it will also be at once

² Lectures on the Nature and Treatment of Deformities; by R. W. Tamplin. London: Longmans and Co., 1846.

³ In Fig. 5 the front and side views represented in Figs. 60 and 61, Tamplin, are combined to show the finger contraction as well as the central bands of fascia in front of the phalanges.

apparent that this congenital form of finger contraction is not in any way allied to Dupuytren's finger contraction, from which it differs in its etiology and general pathology; in being a congenital affection, whilst Dupuytren's contraction belongs to adult life; in affecting chiefly the female instead of the male sex; and also in its anatomical characters, and difference in the structures involved, as neither the central portion of the palmar fascia, nor its lateral digital prolongations, are ever involved in the congenital form. The first phalanx is therefore never drawn down, but as a rule is hyper-extended. With these differences are also corresponding differences in the principles of treatment.

(To be concluded.)

ON THE VALUE OF SUSPENSION IN THE TREATMENT OF TABES DORSALIS.

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IN this paper I propose to give the results of some observations undertaken with the object of determining the value of suspension in the treatment of tabes dorsalis, and the mode in which it should be carried out in order to obtain the best results. The different observations cover the period extending from March 1st, 1889, to June 1st, 1891, so that sufficient time has elapsed in the majority of the cases treated to enable one not only to form a judgment as to the immediate effects of the treatment, whether beneficial or otherwise, but also to test whether these effects are lasting or merely temporary in character. The manner of carrying out suspension recommended by Prof. Charcot was followed. The patients were suspended regularly three times a week about an hour before their early dinner. On the first occasion the duration of suspension was thirty seconds only, and this was increased by thirty seconds at each successive visit until a period of three minutes was reached. In some of the earlier cases the duration was prolonged to five minutes at each visit, and three patients were suspended by the head only instead of by the head and arms; but as no advantage was perceived to accrue either from the longer time of suspension or from the absence of the arm-slings, these modifications were given up. In every case no medicine except antipyrin for pain, and occasional dyspeptic or aperient doses was given for from two to four months or longer after the treatment was begun. Later on, cod-liver oil and tonics were given to some of the patients, but in all a sufficient time was allowed to elapse to estimate the value of the treatment before other medicines were administered. With the exception of five patients, who were taken into the hospital on account of the distance at which their homes were situated, all were treated as out-patients, so that their ordinary condition and mode of life was not interfered with. Altogether, twenty-nine cases were suspended for periods varying from one to ten months. Twenty-four were cases of tabes dorsalis, two (brothers) of hereditary ataxy, two of spastic paraplegia, and one case of doubtful nature, probably of damage to cauda equina.¹

It may be stated generally that no change was noted in any of the following symptoms in any case in which they were present: loss of knee-jerk or of plantar reflex; Argyll-Robertson phenomenon, loss of dilatation of pupils to sensory stimulation, myosis, inequality of pupils, oculo-motor palsy, or optic disc atrophy; paralysis of cranial nerves, atrophic paralysis of muscles (tongue and thenar eminence), or any considerable degree of anaesthesia. In one case the knee-jerks, which were feebly present at the commencement, became lost in the year subsequent to the treatment. The chief modes in which improvement was shown were in sense of general well-being, the patients nearly always stating that "they felt better in themselves" for suspension; in increased strength and powers of walking; in lessened giddiness, but not always in the case of giddiness in the dark; in Romberg's symptom; in amelioration of lightning, rectal, and girdle pains; in regaining partially or completely the sense of position of the limbs when that had been impaired or lost; and in improvement of feelings of numbness, tingling and formication, and light degrees of anaesthesia. No con-

stant effect on disorders of micturition could be traced, some patients improving in this respect, the majority not. Where the occurrence of gastric crises was a marked feature of the illness, suspension did not diminish their frequency or severity, and in some cases seemed to make them worse at the commencement. Of accidents there were none. The treatment was interrupted or stopped in a few cases on account of attacks of sickness; in one patient oedema of the feet supervened without any definite cause; in several giddiness for a few minutes after suspension was troublesome; but only one patient was sufficiently bad to make it advisable to stop treatment altogether. One man (No. 18), who had suffered two years previously from paralysis of the abductors of the vocal cords, for which tracheotomy had been recommended but not performed, and who still had marked paresis of these muscles, bore suspension without any discomfort. Of the twenty-four cases of tabes dorsalis two were men suffering from advanced atrophy of optic discs—one of them was blind, and in the other vision was greatly impaired—together with absent knee-jerks and lightning pains, but no other cord symptoms. These patients were suspended on account of the published statement that the treatment had resulted in improved vision in such cases. Unfortunately no such effect was produced in my two patients. Of the other twenty-two cases the result was good in three cases, and in them the benefit has so far remained permanent. Two others also derived great good from prolonged courses of suspension, but relapsed after an interval of six months, becoming nearly as bad as before; both these patients returned, and were subjected to a second course of two months' duration, from which they gained as much benefit as before, and have now remained well for about six months. Five patients were improved, but to a less degree than the foregoing. Of these two have been lost sight of; one relapsed after a time, and was getting steadily worse when last heard of, one relapsed after eight months of good health and hard work, and is again improving rapidly under a second course, and another went back to some degree, though he did not become so bad as he was before suspension, and recently returned for fresh treatment. In this last case the duration of the first course of suspension was only a month, and he has again derived good from a second course. Two other cases must be put down as slightly improved but are still under my care, and therefore the final result cannot be stated. In two more slight improvement has been shown as regards some symptoms, and they are so far better and have remained so for some time—a year and a half in one case,—but in most respects their condition is unchanged. Another patient improved at the commencement of treatment only, and must be classed with the seven remaining cases in which the result was absolutely nil.

I have thought it desirable in the further analysis of the cases to divide them according as they fell into one of the three groups or stages now generally recognised as belonging to tabes dorsalis. These are—(1) the pre-ataxic stage in which ataxy of movement is not present or is only very slightly marked, but the existence of the disease is shown by the occurrence of more or fewer of the following symptoms: loss of knee-jerk or of other tendon reflexes, inequality of pupils, Argyll-Robertson phenomenon, myosis, atrophy of optic discs, oculo-motor paralysis, Romberg's symptom, lightning pains, gastric crises, disorders of micturition, affections of common sensation, girdle pain, &c.; (2) the ataxic stage, in which locomotor ataxy is a striking feature; and (3) the stage in which the patient is either unable to walk at all or only with great difficulty with the aid of others. I may state parenthetically that it is not meant to imply by the expression "stages" that the first must necessarily pass into the second stage, for many cases remain in the first stage and never develop marked ataxy. Of the twenty-four patients, twelve were in the pre-ataxic stage, and the following table gives the result with the duration of the disease in years:—

Duration of disease.	No. of cases.	Result.
1 year	1	Good, but relapsed, improving again under a second course of treatment.
2 years	4	In one good, another improved, in two nil.
5 "	1	Good.
6 "	3	One improved, one better at first, but relapsed at once, and in the third improvement, but still under treatment.
10 "	1	Improved.
12 "	1	Nil.
20 "	1	Good; relapsed and improved again.

Total result: Good in four, two, however, relapsing and

¹ An account of the more immediate effects of the treatment in thirteen of these cases will be found in the Practitioner, October, 1889.