On the successful treatment of 'hammer-toe' by the subcutaneous division of the lateral ligaments / by William Adams.

ON THE SUCCESSFUL TREATMENT OF "HAMMER-TOE"

BY THE SUBCUTANEOUS DIVISION OF THE LATERAL LIGAMENTS.

BY

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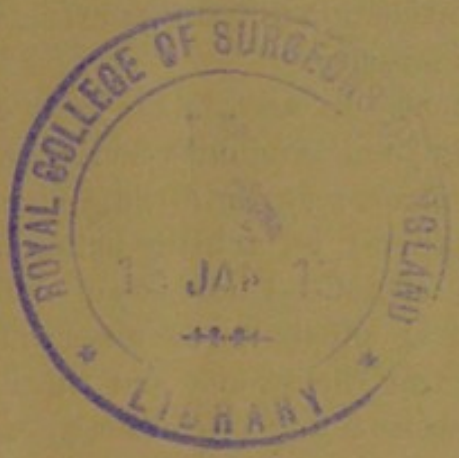


ON THE SUCCESSFUL TREATMENT OF "HAMMER-TOE" BY THE SUBCUTANEOUS DIVISION OF THE LATERAL LIGAMENTS.

By Wm. Adams, F.R.C.S.

Mr. President and Gentlemen,—This evening I propose to describe a subcutaneous operation which I have practised successfully many years, for the relief of contraction with deformity, usually affecting the second toe, and well known under the name of "hammer-toe," by which Sir A. Cooper described it. Why so designated it is difficult to explain, though possibly as the extremity of the contracted toe, wedged in between the great toe and third toe, is usually in contact with the ground, and becomes flattened and expanded, some fancied resemblance to a hammer-head may have been traced.

Essentially it is an hereditary affection, frequently traceable through two or three generations, and when existing in a severe degree in one member of a family, it may often be found, though to a less extent, in the other children. It is often symmetrical, and sometimes equally severe in both feet, but generally the contraction is much less confirmed in one foot than the other. Occasionally

the third toe is the seat of this "hammer-toe" contraction, and sometimes an inclination to it is also observed in all the four outer toes.

It is certainly not traceable to the child wearing short boots or shoes. I have frequently seen it when the greatest care has been taken that the boots worn by the child should be of full length. Mr. T. Nunn considers it to be of neurotic origin, but its pathology still seems to be obscure.

It may frequently be seen, in an early stage, in children about five years of age, and gradually increases, becoming well marked about 10 years of age; but still the apparently contracted toe can easily be straightened by a little manipulation, without any resistance being offered. There is no evidence of any muscular contraction. It is chiefly to be observed that the child has no power of extending the second and third phalanges, which seem to have a disposition to drop into a state of flexion and contraction. This is certainly not due to any failure of power in the extensor muscles, the tendons of which it is frequently necessary to divide in severe cases, in which the first phalanx is drawn upwards. Whether any failure of power exists in the lumbricales or interossei, whose special office it is to aid in the power of extending the second and third phalanges, I am unable to say, but the question is one deserving further attention.

The "hammer-toe" deformity seldom becomes fully developed under the age of 15, and then the second phalanx is found to be rigidly flexed at a right angle to the first, and resists all attempts to straighten it by manipulation; the third phalanx is usually continuous in a straight line with the second, and thus the extremity of the toe comes directly in contact with the ground, and gradually assumes a flattened and expanded form, the toe-nail becoming diminished in size and square in shape. Some deviation as regards the third phalanx will occasionally be found, and in some severe cases the third phalanx becomes rigidly flexed at a right angle to the second, so that the dorsal surface of the nail is brought in contact with the ground. In such a case the ligaments will require division at both articulations, *i.e.*, between the first and second, and also between the second and third phalanges.

The skin in the concavity of the contraction appears to be thin and atrophic, especially when put a little on the stretch; then it

seems to be too short to allow of complete extension of the second and third phalanges without rupture—an accident that does occasionally occur if too much force be used suddenly. With care this accident may generally be avoided. It has been thought that a congenital deficiency or shortening of the skin in the direction of the length of the toe has been the cause of this contraction, but there is hardly sufficient evidence to support this theory, and I have always regarded the atrophic and shortened condition of the skin as an effect, rather than a cause, though it must be admitted that it exists long before the contraction becomes confirmed.

In consequence of the deflection of the second and third phalanges, when these remain continuous in a straight line, the first phalanx is necessarily pushed, rather than actively drawn, upwards; but in the course of two or three years the extensor tendon becomes prominent and assists in retaining the first phalanx in its uplifted position.

The prominence of the angle of flexion between the first and second phalanges becomes a source of pain and inconvenience from pressure; boots are worn with increasing difficulty, and walking proportionably impeded. At first inflammatory thickening takes place, and a troublesome corn is formed; under this a bursa is developed, as shown in Mr. Shattock's specimen, and this is subject to distension and inflammation, often leading to ulceration, when surgical aid is necessarily sought. The surgeon has then to decide which operation out of several methods proposed is especially applicable to the case.

I am the more desirous of bringing this subject before the members of this Society, because two important contributions directly bearing upon the method of operating have recently been made to our knowledge of this deformity; one describing the pathological conditions met with on dissection by Mr. S. G. Shattock of St. Thomas's Hospital, who had the opportunity of dissecting two "hammer-toes" which had been recently amputated in the hospital; and the other a valuable contribution, not only to the clinical history and pathology of this affection, by Mr. Wm. Anderson, also of St. Thomas's Hospital, but describing an operation for its relief by removing the head of the first phalanx, *i.e.*, a partial resection of the joint, applicable to some cases, and entirely superceding the necessity for amputation. Mr. Shattock's dissected

specimens were exhibited to the Pathological Society, December 21st, 1886, and published in 'Trans. Path. Soc.,' vol. xxxviii, 1887, p. 449. Mr. Anderson's paper was read at the Clinical Society, May 27th, 1887, and published in 'Trans. Clin. Soc.,' vol. xx, 1887, p. 248, with a plate at p. 194 (Plate 5).

Mr. Shattock by his dissections proved that this deformity, which is characterised by a flexion of the second phalanx, and sometimes also of the third, upon the first phalanx of the toe, essentially depends upon a contracted condition of the lateral ligaments of the joint or joints involved, and not upon contraction of the flexor tendons or any digital prolongations of the plantar fascia to which the contraction has been ascribed by some authors (see plate). I never had the opportunity of dissecting "hammer-toe," but Mr. Shattock's dissection affords the strongest possible confirmation of the opinion I had arrived at from clinical observations alone, having repeatedly seen the failure of the ordinary operation of dividing the flexor tendons.

The operation which I have successfully performed for many years, essentially consists in the subcutaneous division of the lateral ligaments of the joint. I use the smallest fascia knife, with a straight-cutting edge to the point, which is always preferable to the ordinary tenotomy knife with a central point, when any fascia or ligament has to be divided. I introduce the knife close to the angle of flexion in the concavity of the contraction and carry it under the skin with the blade flatwise, obliquely upwards and backwards towards the dorsal aspect of the first phalanx, just behind the head of this bone. I then turn the cutting edge of the knife directly towards the bone, and using chiefly the point, cut through the lateral ligament, and by repeated strokes also any fibrous bands connected with the capsular ligament that may be detected. I make sure of dividing everything down to the bone; and then, introducing the knife at a corresponding point on the opposite side, I repeat the same operation.

These two punctures for the division of the lateral ligament on either side of the joint will, I am sure, be sufficient for all ordinary cases; but if, after these divisions, the second phalanx cannot be brought up to a straight line with the first, I would advise the re-introduction of the fascia knife by one of the lateral punctures, and a transverse division of the flexor tendons,

by cutting directly towards the joint, not upon the idea that the flexor tendons by their contraction produce the deformity, but with the view of dividing the deeper ligamentous structures, *i.e.*, portions of the capsular ligament, and any fibrous structures connected with it. In the displaced position of the articular surfaces there need be no fear of opening the articulation, and if it should be opened by the subcutaneous puncture, there would be no risk of inflammation. Generally I have been in the habit of adopting this plan, but since Mr. Shattock's observations I have limited the operation strictly to division of the lateral ligaments, and the results have been very satisfactory. Some casts of cases successfully treated in this way are now before the Society.

After the operation a compress and plaster should be applied, care being taken to avoid constriction, and the toe bandaged to a metal splint in a slightly flexed position; complete extension is generally too painful. On the third or fourth day the compress and plaster should be removed, and the toe extended completely, if no pain is caused, or as rapidly as it can be borne. A metal sole-plate with divisions for the toes should then be applied, and worn night and day for three weeks, when a ⊥-shaped metal splint may be used in the day-time, and the patient allowed to walk with an easy boot, but the sole-plate must be worn at night for several months.

By this method I have succeeded in curing cases which had been previously operated upon without success, by the ordinary method of dividing the flexor tendons. Ten years ago, on the 26th January, 1878, a Lieutenant in the Foot Guards, aged 25, who suffered from "hammer-toe" in a severe degree, affecting the second toe of the left foot, came under my care. It had been operated upon two or three years previously by division of the flexor tendons without any benefit, and now it seriously interfered with his military duties, so that he was quite willing to submit to amputation. I felt somewhat doubtful as to the result, and he gave me permission to amputate it, if at the time I thought my operation not likely to succeed. I was glad to find, however, that after dividing the lateral ligaments and some ligamentous fibres in the concavity of the contraction, I was enabled to straighten the toe. The case proceeded very favourably, and at the end of three weeks he was able to resume military duty. I have seen this gentleman frequently since, and am able to say

that the toe has remained quite straight, with a fair amount of movement at the joint between the first and second phalanges.

In some cases of greater severity, especially when seen in adults, or in cases in which the subcutaneous operation has failed, I would recommend the operation suggested by Mr. Wm. Anderson, and which he has successfully performed, of removing the head of the first phalanx, as this would supersede the necessity of amputation, which may now be regarded as an operation of the past.

DESCRIPTION OF PLATE.

Fig. 1.

Hammer-toe dissected and drawn by Mr. S. G. Shattock, the soft parts remaining *in situ*. The second phalanx is flexed nearly to a right angle with the first, and the third phalanx remains in a straight line with the second.

On the dorsal surface the extensor tendons and their aponeurotic expansion *a* are shown passing over the articulation, between the first and second phalanges.

Directly over the joint between the first and second phalanges, and between the tendinous aponeurosis and the skin, a bursa *b* has been developed, and a considerable amount of cutaneous and subcutaneous infiltration and thickening is shown in its neighbourhood.

On the plantar aspect the flexor tendons *c* have been divided, and their distal extremities are shown.

The lateral ligament *d* has been dissected, and a bristle *e e* passed beneath it. This ligament, in a condition of adapted shortening, is seen passing across the angle of flexion, in the concavity of the curve, and it maintains the contraction of the toe after the flexor tendons have been divided.

Fig. 2.

Hammer-toe dissected and drawn by Mr. S. G. Shattock. A longitudinal section has been made through the bones and the articulation between the first and second phalanges. The second phalanx is flexed nearly to a right angle with the first, and the third phalanx remains in a straight line with the second.

On the dorsal surface the central portion of the extensor longus tendon *a* is shown passing to its insertion into the base of the second phalanx.

Directly over the joint between the first and second phalanges, and between the tendinous aponeurotic expansion and the skin, a bursa *b* has been developed, and a considerable amount of cutaneous and subcutaneous infiltration and thickening is shown in its neighbourhood.

On the plantar aspect the divided extremities of the flexor tendons *c* are shown, and the capsular ligament appears to be thickened.

The articulation is perfectly healthy, and the articular surfaces of the bones are not materially altered.

Fig. 1.

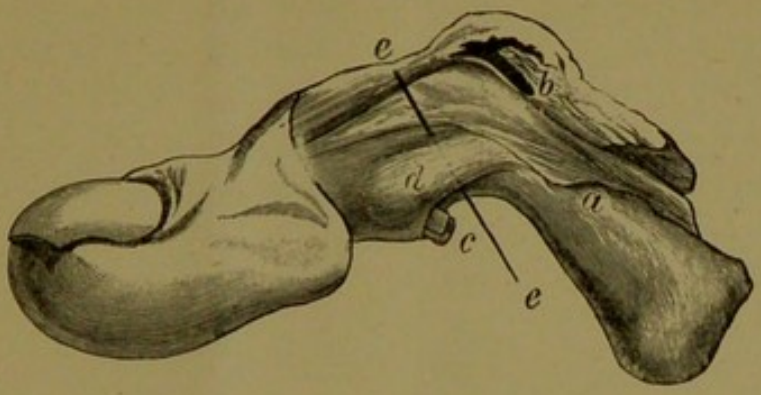
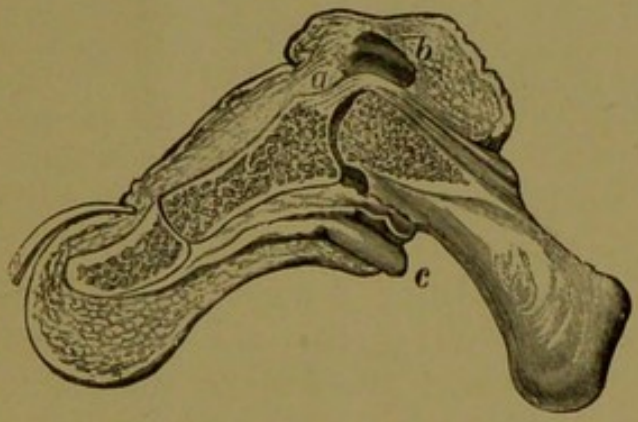
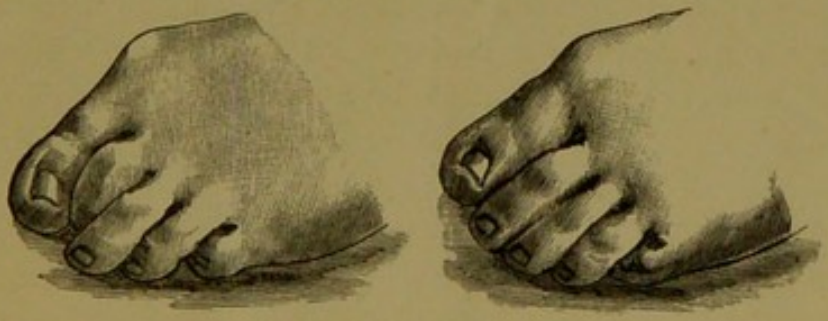


Fig. 2.



Figs. 3 and 4.



Figs. 5 and 6.

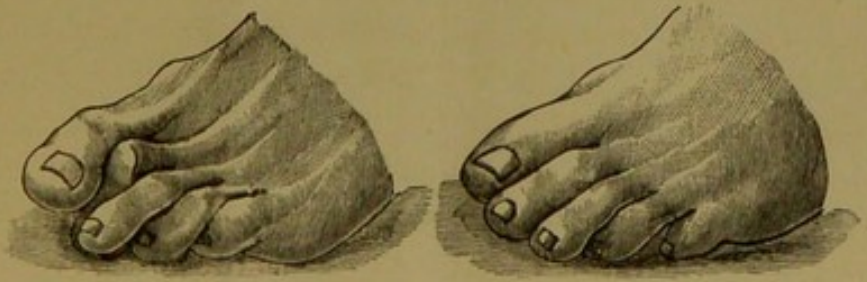


FIG. 3.

Hammer-toe occurring in the second toe of the left foot, and presenting the characters generally met with. The second and third phalanges are flexed nearly at a right angle with the first, and wedged in between the great toe and the third toe.

The patient, Lotus Wyett, æt. 18, a governess, was admitted to the Great Northern Central Hospital on May 15th, 1887. A similar condition, but to a less extent, existed in the right foot. The contraction had latterly increased, and greatly interfered with her walking powers and occupation. Her maternal uncle had hammer-toe.

On May 18th, 1887, Mr. Adams operated upon the left foot by subcutaneous division of the lateral ligaments, without dividing the flexor tendons. The toe was easily straightened, and the improved position maintained by a small padded metal splint, bent to the shape of the foot and toe. No inflammation followed.

On June 15th Mr. Adams operated upon the right foot, which progressed as favourably as the other, and on July 7th, 1887, she was discharged cured. The treatment was carefully carried out by Mr. Alexander M. Cowie, the house surgeon, by whom also the casts exhibited to the Society, and from which the drawings were taken, were made.

FIG. 4.

Represents the same foot as shown in Fig. 3, after treatment. The operation was on the 18th May, 1887, and the cast showing the improvement, from which the drawing was made, was taken on the 25th June, 1887.

FIG. 5.

Hammer-toe occurring in the second toe of the left foot, and presenting the exaggerated characters met with after the adult period of life. The second and third phalanges are flexed fully to a right angle with the first; and the first phalanx is also drawn upwards by the action of the extensor tendons, so that the angle of flexion between the first and second phalanges is rendered more acute and prominent. A painful corn forming on the apex of the contraction, renders the patient unable to bear the pressure of any boot, and the walking powers are therefore seriously interfered with. This occurred in a marked degree in the present instance.

The patient, a woman æt. 27 years, was admitted into the Great Northern Central Hospital on the 7th November, 1886. The contraction had existed for many years, but had increased of late; she was not aware of any other case in the family; both feet were similarly affected. On 10th November Mr. Adams performed the operation on the left foot, at first dividing only the lateral ligaments, but as the contraction was not completely removed, he divided the flexor tendons and some ligamentous fibres in front of the joint. The toe was completely straightened, and the improved position maintained by a small padded metal splint; no inflammation followed. The other foot was operated upon shortly afterwards, and both toes were quite straight when she left the hospital. The treatment was carefully carried out by Mr. A. F. Whitwell, the house sur-

geon, by whom also the casts exhibited to the Society, and from which the drawings were taken, were made.

FIG. 6

Represents the same foot as shown in Fig. 5, after treatment. The operation was performed on November 10th, 1886, and the cast showing the improvement, from which the drawing was made, was taken December 8th, 1886.

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