**Practical notes on the treatment of deformities / by Henry F. Baker.**


**Contributors**

Baker, Henry F.
Augustus Long Health Sciences Library

**Publication/Creation**

London : Stanford, 1886.

**Persistent URL**

https://wellcomecollection.org/works/vfbjtkhr

**License and attribution**

This material has been provided by This material has been provided by the Augustus C. Long Health Sciences Library at Columbia University and Columbia University Libraries/Information Services, through the Medical Heritage Library. The original may be consulted at the the Augustus C. Long Health Sciences Library at Columbia University and Columbia University. where the originals may be consulted.
This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.

wellcome collection

Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
https://wellcomecollection.org

COLUMBIA LIBRARIES OFFSITE
HEALTH SCIENCES STANDARD
HX64066037
RD761 B17
Practical notes on t
RECAP

# PRACTICAL NOTES
## ON THE
# TREATMENT OF DEFORMITIES

*HENRY F. BAKER*

HENRY KIMPTON
Medical Bookseller,
& DEALER IN OSTEOLOGY,
82, HIGH HOLBORN,
LONDON, W.C.

RD761 B17

Columbia University
in the City of New York

COLLEGE OF
PHYSICIANS AND SURGEONS
LIBRARY

# PRACTICAL NOTES

ON THE

# TREATMENT OF DEFORMITIES.

Digitized by the Internet Archive
in 2010 with funding from
Open Knowledge Commons

http://www.archive.org/details/practicalnoteson00bake

# PRACTICAL NOTES

ON THE

# TREATMENT OF DEFORMITIES.

BY

HENRY F. BAKER, F.R.C.S. Edin.,

ASSISTANT-SURGEON (LATE HOUSE SURGEON) TO THE ROYAL ORTHOPÆDIC HOSPITAL;
SURGEON TO THE CRIPPLES' NURSERY;
FORMERLY HOUSE SURGEON AND HOUSE PHYSICIAN TO ST. BARTHOLOMEW'S HOSPITAL.

LONDON:
EDWARD STANFORD, 55, CHARING CROSS, S.W.
1886.

RD761
B17

# PREFACE.

HAVING held the office of Resident House Surgeon to the Royal Orthopædic Hospital for ten years, and having been also, during a great part of that time, Assistant-Surgeon, I have enjoyed considerable opportunities of studying practically the different kinds of deformities that have passed through the Hospital. It is not my object to repeat, with respect to the pathology or causes of deformities, what has been so well written in other works on Orthopædic Surgery, but rather to state, in a short space, what methods of *treatment* I have found from personal experience to be best adapted for the relief or cure of the more common forms; pointing out where I myself have found most difficulties, and what means I have found best calculated to surmount them.

HENRY F. BAKER.

30*a*, *George Street, Hanover Square.*

# CONTENTS.

## CHAPTER IX.



## CHAPTER X.



## CHAPTER XI.



## CHAPTER XII.



## CHAPTER XIII.



## CHAPTER XIV.

# PRACTICAL NOTES

ON THE

# TREATMENT OF DEFORMITIES.

## CHAPTER I.

### INTRODUCTORY.

In the treatment of deformities, the surgeon, in order to obtain success, must carefully attend to minute details, and must exercise an unlimited amount of patience. For example: (1) In the operation of subcutaneous division of tendons, it is absolutely necessary to be certain that the tendon has been really severed; as many cases prove that neglect of this rule has been a fruitful source of failure and of needless pain to the patient. If the sheath of a tendon has been opened and the tendon not properly divided, adhesions often form; and when the tendon is subsequently really severed at this spot, the ends of the tendon cannot be drawn asunder, and from this cause a relapsing case is usually much more difficult to treat than any other. Forgetfulness of this and similar facts has led to the mistaken idea that many relapsing cases were originally incurable, and this has caused subcutaneous tenotomy to be

brought into undeserved disrepute; and more severe operations have in some cases been substituted for it unnecessarily.

(2) Although the tendon or tendons which hold the limb in its deformed position have been really divided, it still may not be possible to correct the deformity on account of the amount of stiffness present in the joint itself and its surrounding textures. For instance, in a case of Congenital Talipes Equinus, when the tendo Achillis is divided, the foot never goes suddenly up into its proper place unless great force is used, and the ligaments, &c., surrounding the joint are entirely broken through; while on the contrary, in a case of Paralytic Talipes Equinus, after division of the same tendon, the foot usually gives way at once, no force having been used. Thus the treatment of these two cases is quite different. In the first class of cases slight force may with advantage be used in attempting to place the foot in its proper place, although in my opinion it is a mistake to attempt very much by this means. The foot should be put up in the deformed position, and be brought into perfect position by instruments after the tenotomy puncture has healed. In the second class of cases it is necessary to be extremely careful to keep the foot in the position of Equinus a sufficiently long time, lest after treatment it should be found that the tendon is too greatly elongated, and the result is a state of deformity the opposite to that from which the patient originally suffered.

(3) A suitable, well-fitting instrument must be provided, and in its application great care must be taken lest it press unduly on any particular spot. It

must in all cases be made to fit the limb accurately in its deformed state, and be constructed in such a way that it can be made to draw the limb into its natural position, and still to accommodate itself exactly to it. Under each individual kind of deformity the instrument which I have found most useful in practice will be mentioned and explained.

(4) Let it be a rule in practice never to allow the slightest sore to form upon the skin; and in order to carry this out, the sensations of the patient are the best guide. If instruments cause much pain, either they are not properly applied or they are too tight, and it will be found that by loosening them much time is really saved. If a slough is allowed to form, the treatment of the case must be postponed until the skin is quite sound again, and this will be found to take so long a time that the limb will have relapsed into its former state of deformity. This difficulty can only be overcome in many cases by the use of instruments so constructed that the necessary pressure can be distributed, and changed from place to place by means of *movable pads*.

I do not propose to deal with the treatment of deformities by any other methods than those which I myself believe, and have found by practical experience, to be the best, and must refer my readers to larger works on this subject, should they wish to follow the arguments in favour of cure by other means.

## CHAPTER II.

### ON THE ADMINISTRATION OF AN ANÆSTHETIC DURING THE OPERATION OF THE SUBCUTANEOUS DIVISION OF TENDONS.

In the consideration of the question, whether it is advisable to administer an anæsthetic during the subcutaneous division of tendons and fascia, the points to be attended to are these—

(1) The age and disposition of the patient. If it be an infant to be operated upon, it is only, as a rule, necessary to produce partial anæsthesia, as the pain is but slight, and the operation over in a very short time. An infant can also have no dread of the operation, and forgets it immediately. In the case of older children, the fear of taking chloroform is often worse than the pain of the operation. If, however, the child be observed to be of a very nervous and sensitive disposition, the administration of a small quantity of some anæsthetic is good; but it should not be carried to the stage of complete relaxation.

(2) The structure of the contraction, that is, whether it is a tendon to be divided, which being attached to a muscle would be relaxed by the influence of the anæsthetic, or whether it is a band of ligament or fascia, which would not be affected by it. In the first class of cases it is often better that no anæsthetic

should be given; for the patient can sometimes give valuable aid to the surgeon by voluntarily contracting his muscle and making the tendon taut. This is well seen in the case of the division of the biceps femoris, when there is much more likelihood of dividing the peroneal nerve when the tendon is perfectly relaxed. During the division of ligament or fascia the patient, if an adult, may generally be allowed to choose for himself on this point.

(3) An anæsthetic should be administered when important adjacent structures may be wounded, owing to the struggles of the patient. A good example of this is seen when it is necessary to divide the sterno-mastoid for the cure of wryneck. When an anæsthetic is given in a case such as this, it is essential that the patient should be *entirely* under its influence, lest he should give a sudden jerk at a critical moment.

## CHAPTER III.

### CLUB-FOOT, OR TALIPES.

THE term Club-foot, or Talipes, signifies any deformity of the foot caused by an unnatural contraction of muscle, tendon, fascia or ligament. It may be either congenital, or it may first appear after birth.

The causes of the congenital variety are very obscure. The deformity is most probably due to disordered nervous function reacting on the muscles which draw the foot into its deformed position.

Non-congenital talipes is occasioned by various means, chief amongst which are paralysis, spasmodic contractions of muscles, rupture of tendon or muscle, and the cicatrices following burns and other lesions; also from a too-long-continued malposition.

In cases of congenital club-foot, the bones of the tarsus are somewhat altered in shape and size, and are also displaced from their proper position. As, however, in the great majority this does not in any way affect the treatment, it is unnecessary to enlarge upon this part of the subject.

### THE SEVERAL VARIETIES OF CLUB-FOOT.

The varieties of club-foot are:—1. *Talipes Equinus*, in which the heel is raised and cannot be brought to

the ground, and the patient walks on the toes and the distal ends of the metatarsal bones. 2. *Talipes Calcaneus*, the reverse of the last named variety, in which the heel is depressed and the toes are raised, so that the patient walks on the former. 3. *Talipes Varus*, in which the inner edge of the foot is drawn upwards, and the anterior two-thirds of the foot are twisted inwards, and the outer edge rests on the ground. 4. *Talipes Valgus*, the reverse of Talipes Varus, in which the outer edge of the foot is drawn upwards, so that the patient rests on the inside of his foot and inner ankle.

Also the combinations of these: — 1. *Talipes Equino-Varus*, when the foot is twisted in and the heel drawn up. 2. *Talipes Equino-Valgus*, when the foot is turned out and the heel is drawn up. 3. *Talipes Calcaneo-Varus*, when the heel is depressed and the foot turned out.

In the treatment of all the different forms of talipes, the object of the surgeon must be to get the foot into its natural position without danger to the patient, and with the natural movements of the foot as little impaired as possible.

The foot must be first of all carefully examined to find out what it is that holds it in its deformed position. In almost all cases this is a contracted condition of muscle acting through its tendon, and this is in many cases combined with stiffness of the ankle-joint. The evident treatment then consists in subcutaneously dividing the tendon of the contracted muscle or muscles, and in gradually stretching it to the required length, and when necessary in forcibly extending the stiffened joint.

The method in which each tendon is to be divided will be explained in detail in the chapter on Tenotomy (page 28).

## Talipes Equinus.

*Talipes Equinus* (in which the heel is raised and cannot be brought to the ground, and the patient walks on the toes). This form of talipes is hardly ever congenital. On examining a case of simple Talipes Equinus, the foot will be found to be in a straight line with the leg, neither inverted nor everted; and on attempting to flex the foot on the leg, the tendo Achillis can be felt as a rigid band holding the heel in its raised position. (Fig. 1.)

Fig. 1.

In the majority of these cases nothing else is at fault; but in some, on further examination being made, the arch of the foot is found unduly flexed, and the plantar fascia is to be felt tightly contracted. In some rare cases of an unusually severe nature, the tendons of either the posterior tibial, or of the peronei, will be noticed preventing the foot from being placed in its natural position. In addition to these causes of Talipes Equinus, in many cases there is considerable stiffness of the ankle-joint, and a contracted state of the ligaments around the joint. This will be found to vary greatly in each case, and in some to be entirely absent.

The treatment of Talipes Equinus consists in the

subcutaneous division of the abnormally contracted tendons and fascia (see page 29), and, after the punctures made by the tenotome are healed, the gradual extension of the foot by means of a Scarpa's shoe. The amount of force to be used must depend on the resistance caused by the adhesions in and around the ankle-joint. In those cases in which, after division of the contracted tendon, the foot can at once be placed in the natural position, great care must be taken to keep the divided ends of the tendo Achillis in apposition until they are partially united; and to extend with caution, lest the tendon become too elongated, and the case be made into one of Talipes Calcaneus. It must be observed, moreover, that when the plantar fascia as well as the tendo Achillis is contracted, it must be divided *first*, as the resistance offered by the contracted tendo Achillis offers the necessary resistance that is required in stretching it. After division of the tendo Achillis, the patient should not be allowed to put the foot to the ground for at least six weeks, lest the tendon become unduly stretched. After the foot has been brought to its natural position by the means indicated, a boot with a "steel support" will in most cases be required.

This support consists of a steel bar fixed to the heel of the boot, and extending along the side of the leg to the calf, and at this point is attached a leather strap, which encircles the leg. Just opposite the ankle a joint is introduced, so that the motion of the ankle-joint is not impaired. In most cases the foot, on being placed on the ground, will be observed to have a tendency to rest on the *inner* or *outer* side of

the heel. In the former case, the iron support must be on the inside of the ankle and leg; in the latter, on the outside.

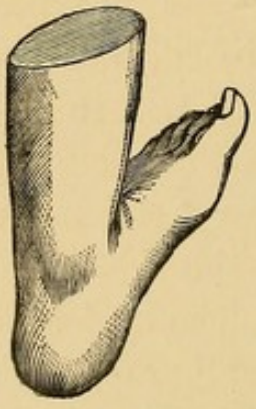
In cases in which the ligaments on both sides of the ankle are very weak, an "iron" on both sides is necessary.

If the case be one of paralysis, and the patient has not the power to flex the foot on the leg, a back-stop must be fixed into the joint of the support, so as to allow the foot to be bent up, but to prevent its falling beyond a right angle with the leg; and the patient should wear an apparatus at night to retain the foot in its proper position, as there is danger of a relapse if this be not done.

## Talipes Calcaneus.

*Talipes Calcaneus* (in which the heel is depressed and the toes are raised, so that the patient walks on the posterior end of the os calcis) may be conveniently divided into two varieties. 1st, True; 2nd, False. The first kind is well illustrated in congenital cases, when the foot is fixed in its deformed position, and the tendons of the muscles which flex the foot on the leg are found contracted, and at the same time the tendo Achillis is elongated. (Fig. 2.) This variety may also be produced by burns, which leave a cicatrix on the anterior surface of the ankle-joint.

Fig. 2.



The false variety is by far the more common, and

is the result of paralysis of the gastrocnemius muscle. In these cases the tendo Achillis is much lengthened, and the dorsum of the foot can be placed on the front of the leg without any resistance being offered; but there is no contraction of the tendons in front of the ankle joint. The plantar fascia is generally much contracted. This state of deformity is sometimes produced after division of the tendo Achillis, when sufficient care has not been taken in the after-treatment, and the tendon has consequently become too much elongated.

In the congenital cases, a cure can usually be effected without the division of tendons, by rubbing the anterior surface of the ankle joint with some simple oily liniment, and stretching the foot away from the leg, and retaining it in position by means of a padded flexible iron splint, bent at the required angle.

The treatment generally adopted for the relief of the paralytic cases is to have a support fixed to the boot, so that an elastic band may be placed at the back of the ankle in order in some degree to compensate for the loss of power in the gastrocnemius muscle. When the plantar fascia is contracted, it should be divided (see page 32), and the contraction of the sole overcome by means of a Scarpa's shoe, having a divided sole with a cog-wheel, and a strap that can be fixed over the front of the foot. This is necessary, as there is no contracted tendo Achillis to work against, as in cases of ordinary Talipes Equinus.

In the case of contracted cicatrix after a burn, the treatment is the same as in the case of similar cicatrices in other parts of the body (see page 48).

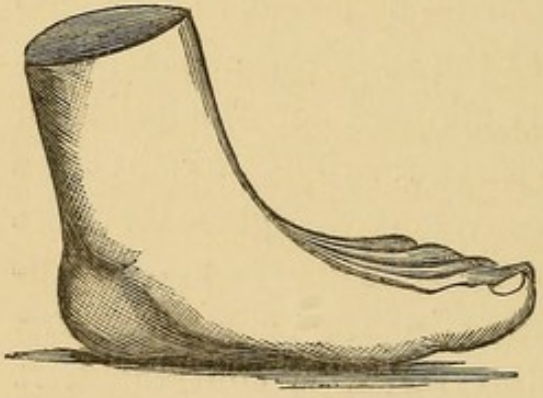
## Talipes Varus.

*Talipes Varus* (in which the inner edge of the foot is drawn upwards, and the anterior two-thirds of the foot are twisted inwards, and the outer edge rests on the ground) is so seldom met with apart from Talipes Equinus, that, to save repetition, it will be considered under the heading of Talipes Equino-Varus.

## Talipes Valgus.

*Talipes Valgus* (in which the outer edge of the foot is drawn upwards, so that the patient rests on the inside of his foot and inner ankle) (Fig. 3) is so generally combined with flat-foot, that it will be most convenient to consider them together. The congenital form of Valgus is not very common; but when it does occur it is of a somewhat severe type, the sole of the foot being slightly convex, while the foot is held in its deformed position by the peroneus longus and brevis.

Fig. 3.



The treatment of these congenital cases is to stretch the foot towards the position of Talipes Varus, and to retain it by means of a flexible splint, bandaged to the inside of the foot and leg. If this is found not sufficient to overcome the deformity, the tendons of the peroneus longus and brevis must be divided. When the child begins to walk, a steel sole-plate with

an india-rubber pad fixed to it must be worn in the boot to support the displaced bones of the tarsus, so that in time the patient may regain the arch of the instep.

Cases of Paralytic Valgus are sometimes met with in which there is no flat-foot, and division of the peroneal tendons may or may not be necessary, according to whether they are tightly contracted. In either case a boot with an iron support attached to the outside of the sole and with a band round the calf must be worn, and a leather strap with two ends (T-strap) must be fixed to the inside of the boot just below the internal malleolus. The two ends are buckled round the ankle, so as to include the iron support, and these pull the foot into its natural position and retain it there.

In addition to these cases of Talipes Valgus, either congenital or caused by paralysis, many others of a similar nature are met with in various degrees of severity, from a slight sinking of the arch of the foot to those in which there is even convexity of the inner border of the sole, and in which the inner malleolus nearly touches the ground. In these latter cases the foot is firmly held in this deformed position by the contracted tendons of the peroneus longus and brevis, and in the very worst examples by the extensor longus digitorum and the peroneus tertius. These cases for the most part begin in growing youths and girls, and are brought to the severe type by constant standing or carrying heavy weights.

The treatment depends upon the stage in which the deformity presents itself, and cases may be placed under three heads:—

(1) On the patient standing up, the whole of the bottom of the foot will be seen to touch the ground, but little or no valgus will be observed. On examination there will be found to be no stiffness in the ankle joint, and the foot can be freely moved in all directions.

The treatment consists in the use of a boot with a wide and flat heel, into which is placed a steel plate with a pad attached to its inner border to press up the fallen arch when the patient stands upon it. It is necessary that the pad should be fixed to a steel plate, or it will be pushed inwards and become useless.

(2) In the second class, in addition to the flatness of the foot, its outer side is drawn upwards and the inner malleolus nearly touches the ground. On manipulation, however, the foot can be inverted without resistance.

In the treatment of this kind a sole-plate must be worn, as in the first kind, but in addition two cross-straps must be fixed to the inner side of the boot, one passing over the ankle, and the other at the back of the ankle and buckled over and just above the external malleolus.

(3) In this, the most severe form of Talipes Valgus, the foot will be found on examination to be in the same position as that just described, but the deformity will be somewhat more marked. The chief difference between them, however, is that the foot is firmly held in its deformed state; so much so that it is sometimes thought to be anchylosed at the ankle joint, and severe pain is complained of around this joint, especially after standing or walking. On an attempt being made to draw the foot inwards, the

tendons of the peroneus longus and brevis, and in some cases also the tendons of the extensor longus digitorum and peroneus tertius, will be found rigidly contracted. Although this is the most painful of all cases of club-foot, it is perhaps the most satisfactory to treat; for after complete division of the contracted tendons, the foot can be placed without difficulty in its natural position, and with the use of good boots and sole-plates, the patient is freed from all pain, and able to return to his former occupation. After the tendons mentioned above have been divided (p. 31), the treatment requires the use of no special instrument, as the necessary extension can be efficiently carried out by means of a padded flexible splint bandaged to the inner side of the leg and foot. If the extensor longus digitorum has been divided, the extension should not be too rapidly proceeded with. The patient may be allowed to walk in six weeks after the tenotomy, but it will be necessary that he should wear, as well as a sole-plate, a steel support on the outer side of the leg with a T-strap, as explained above.

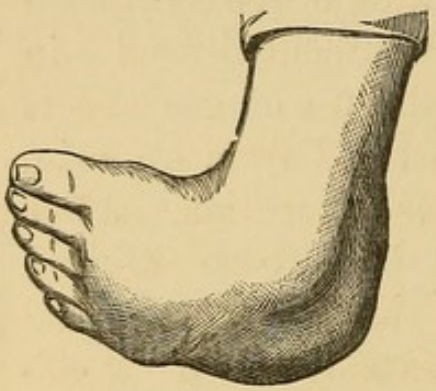
## Talipes Equino-Varus.

*Talipes Equino-Varus* is that variety of club-foot in which the heel is raised, the inner border of the foot being drawn upwards and the outer edge resting on the ground. I propose to consider it in detail, as it is the most complex, and requires much care and attention in its treatment.

*Congenital Talipes Equino-Varus* in the infant differs from that of the adult, in that it is less severe,

as the foot has not been walked on, and the tendons, ligaments, and fascia have not become so greatly developed and contracted in the deformed position. It will therefore be best to consider the treatment of the two separately, and to take first of all the infantile variety. (Fig. 4.)

Fig. 4.



The treatment must commence with the cure of the varus; and it is necessary that this should be completely accomplished before anything else is attempted. For it is evident that a simple deformity is more easy to cure than a compound one, and it will be found impossible to overcome the equinus while the varus is still present; for the foot being turned inwards, and the tendo Achillis being shifted towards the inner side of the leg, an attempt to stretch it is made at a mechanical disadvantage, and cannot be satisfactorily accomplished. On the other hand, attempts to stretch the tendons and ligaments which hold the foot in the position of varus are made more advantageously the more the tendo Achillis is contracted; and this is proved by the much greater difficulty that is experienced in the treatment of those cases in which the tendo Achillis has been divided before the tibials, under the mistaken idea that they can be afterwards sufficiently stretched to accomplish a cure. Therefore it is better to treat the varus first, and thus produce a case of simple equinus, which can afterwards be readily cured.

If in a case of Talipes Equino-Varus an attempt be made to evert the deformed foot on the leg, while the fingers are placed on the inner side of the ankle joint, the tendon of the tibialis anticus will be readily felt as a tight cord holding the foot in its deformed position. If still greater force be used, and the finger be placed on the inner side of the leg, just behind the edge of the tibia, about an inch above the tip of the malleolus, a slight movement will be felt under the finger, indicating the position of the tendon of the tibialis posticus, more or less distinct, according to the extent of the contraction and the amount of subcutaneous fat. Lying very near this is the tendon of the flexor longus digitorum; but this cannot be felt.

The first stage of the operation for the cure of Talipes Equino-Varus consists in the division of these tendons, and as a rule the best age to do this in the case of infants is one month. This having been done, as described in the chapter on Tenotomy (page 30), after the foot has been kept at rest for four days, and the punctures having healed, a flexible iron splint, six inches long and one broad, and carefully padded, must be slightly bent so as to make the padded side somewhat concave, and this is to be applied to the *outside* of the foot and bandaged on, so as to draw the foot into a rather straighter position, but not to cause pain to the child. In three or four days the splint is to be taken off, and having been made somewhat straighter, again applied. This is to be continued at about the same interval until the foot can be placed *quite* straight, or, better still, can be bent a little in the opposite

direction to the original deformity. In ordinary cases this can be accomplished in three weeks.

In the more severe examples of this deformity, however, it will be found that progress cannot be made at such a quick rate. These are the cases in which the heels will be noticed to be very small and flat, and the foot to have a more rounded appearance than common. In these cases stretching must be carried out for a longer time, and the foot must occasionally, at an interval of a few days, be suddenly wrenched, either with or without chloroform.

When at last the foot has been placed quite straight, it is advisable to keep it in that position for a prolonged time—a month or six weeks—before the treatment is proceeded with.

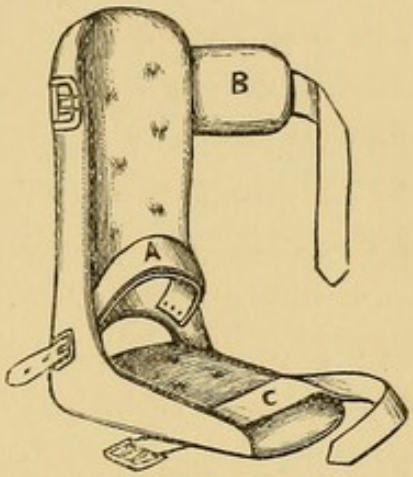
Having got so far with the case, the sole of the foot should be carefully examined to see if there is any undue contraction of the plantar fascia; and if such be found, the fascia must be divided (see page 32). In the less severe cases this will not be necessary. In the case of an infant the tendo Achillis may be divided at the same time (see page 29).

It is now necessary to decide upon the form of instrument which is to be employed for the further treatment of the case, as this must be measured for and got ready for application four or five days after the division of the tendo Achillis. If the deformity is not unusually severe, a very simple instrument may be adopted. (Fig. 5.) It is made of sheet-iron, covered with wash-leather, and consists of a trough for the leg, and a foot-piece at right angles with it, with a leather ankle strap, A, to keep the heel down, and two webbing straps. One of these, B, is fastened

round the leg, and the other, C, goes round the toes and keeps the foot everted. There are no cog-wheels, and this instrument is therefore cheap.

Supposing the case to be a simple one, on the fourth or fifth day after the tendo Achillis has been divided, the foot having been bandaged, the instrument is to be applied by thrusting the heel into it; and the leather strap over the front of the ankle being drawn as tight as possible and buckled, the other straps are to be then fastened. If the child should suffer much at night, the ankle straps may be loosened by one hole and fastened up again in the morning. This, however, is not often necessary, as leather straps always stretch somewhat. Every two or three days the splint must be removed; when the foot will be found to be improved in position, so that when the splint is reapplied the ankle strap will be able to be tightened by another hole. The heel will also be found to go gradually into its place on the sole-plate of the instrument as the use of this treatment is continued. After about three weeks, the splint should be removed every night and morning, and at first the surgeon and then the nurse should gently work the foot up and down, care being taken that sufficient force is not used to rupture the newly formed tendon. After this has been done, the splint must be at once replaced, and a thin pad may be

Fig. 5.



placed under the metatarso-phalangeal joints of the toes, so that on tightening the heel strap the foot may be further flexed on the leg. In two or three months the foot will have assumed a natural shape, and will move quite freely at the ankle-joint. It should now be left out of the splint for a short time each day, to allow the child to exercise its muscles; and frictions with a simple liniment may be made use of. It must be remembered, however, that in all these cases there is so much danger of relapse, that the patient must be watched for the first symptoms of a return of the stiffness. The child must go on in this way until old enough to walk, and must then wear an iron *inside* the ankle and leg. This iron must curve at the upper part of the leg, from the inside to the outside of the limb, and then upwards to and around the waist, a joint being introduced at the knee and hip, extending round the waist. It is necessary to make the supports extend to the waist, as there is always rotation inwards at the knees, which cannot be overcome by any other means.

In the more severe cases of infantile Talipes Equino-Varus, the treatment is the same as that of the cases in which the deformity has been left untreated until after the child can walk. (See below.)

## Congenital Talipes Equino-Varus, after the period of Infancy.

The treatment of Talipes Equino-varus, after the period of infancy, may be conveniently divided into three parts: — 1st. The cure of the simple infantile varus occasioned only by the contraction of

the tibialis posticus, flexor longus digitorum, and the tibialis anticus. 2nd. The cure of the remaining acquired varus, caused by the contraction of the abductor pollicis, plantar fascia, and the various ligaments connected with the misshapen bones of the tarsus. 3rd. The equinus, caused by the contracted tendo Achillis.

With regard to the treatment of the first part, the tendons of the tibialis posticus, flexor longus digitorum, and the tibialis anticus must be divided (see page 30); and after the tenotomy punctures are healed, a wooden padded outside splint, extending from the knee to the end of the toes, and with an extra pad just above the external malleolus, must be applied, and to this the foot is gradually drawn by means of an ordinary bandage. Great care must be taken lest a sore form on the outer side of the foot; and if the skin on this part is observed to become red and tender, all pressure must be removed, and the splint be discontinued for a day or two. In addition to the gradual stretching by these means, it is well occasionally to *forcibly* twist the foot outwards, and so to rupture any tense fibres of ligament that hold the foot in its deformed position. This treatment must be persevered in until the foot is perfectly straight and in a line with the leg, when the second part may be proceeded with. This is, of all, the most difficult to accomplish, even after complete division of the abductor pollicis and the plantar fascia, chiefly on account of the great danger of producing sloughs by such an amount of pressure as will suffice to correct the deformity, and also by the difficulty that is experienced in preventing *rotation* of

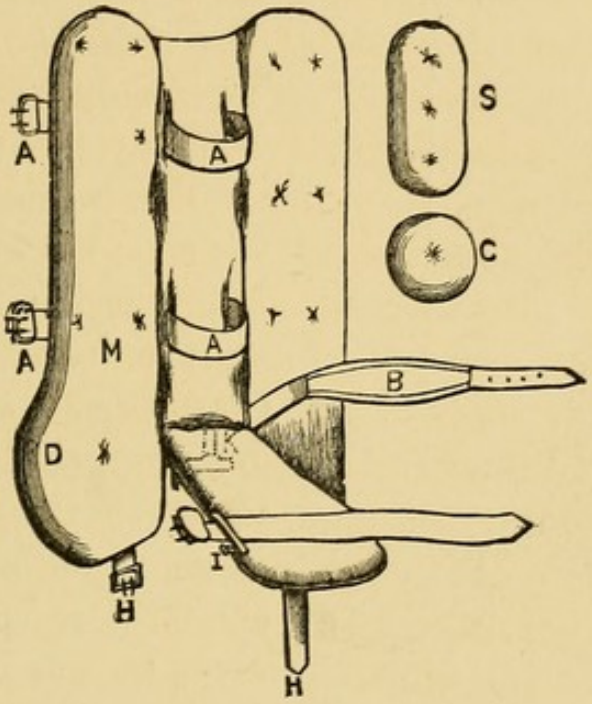
the foot. The common Scarpa's shoe, useful as it is in some forms of talipes, is quite useless here. Scarpa, indeed, invented a special instrument for the purpose, but it is almost impossible to use it without causing sloughs. In more modern times, also, many very clever instruments have been devised with the same object in view, but in practice they have proved only partially successful.

For the efficient application of force in overcoming the resistance formed by the contracted tissues on the concave aspect of the deformed tarsus, the fulcrum must be placed on some part of its convexity, and as near as possible to its most projecting point; the internal tubercle of the os calcis being made a fixed point, and the power being represented by the tension of a strap placed round the ball of the great toe, to draw it outwards. The problem, therefore, to be solved is: How can the fulcrum be applied in this position for the required length of time without causing sloughs? The only method is by rendering it a *movable* one, and so graduating the pressure on this point, or shifting the pressure from it by the introduction of pads in other parts of the instrument. In other words, the pad which forms the fulcrum, instead of being a fixed part of the splint, should be unconnected with it, and thus made capable of being shifted from point to point along the outer edge of the tarsus and leg, as circumstances require. The instrument I have devised for carrying this into execution was explained in the 'Lancet' of May 3rd, 1879, and is figured below. (Fig. 6.) I have named it "The Movable Pad Instrument," and the advantages I claim for it are

that it prevents rotation of the foot, without causing sores from too great pressure.

Fig. 6 represents the instrument open, and it will be seen to consist of a back-splint, connected with a foot-piece by means of a cog-wheel, *k*, at the heel, and having hinged to it two wings, which extend well below the foot-piece, and have a buckle

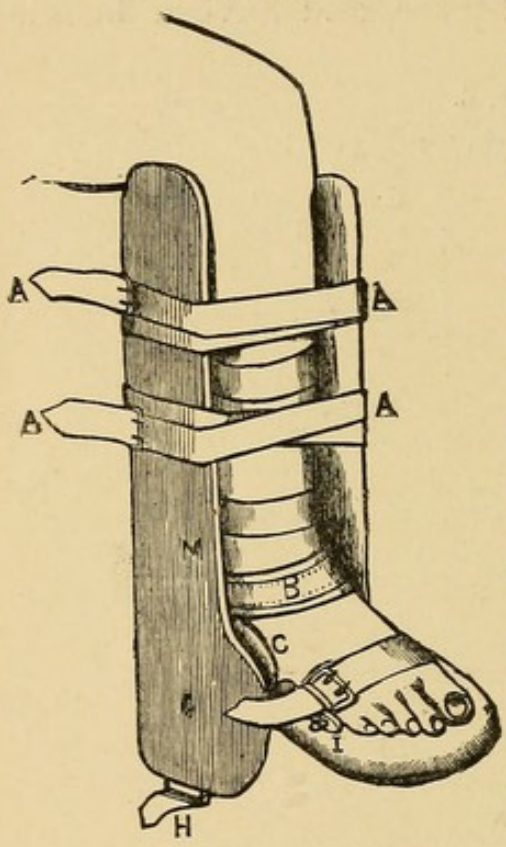
Fig. 6.




and strap, H, attached to their lower ends. A A are two webbing straps introduced through slots to fix the leg firmly. B is a leather ankle-strap, wide and padded in the centre, to fix the heel immovably in its position; it is attached to a buckle at the back. D is a plate attached to the external wing, hollowed out and moulded to receive the pad C, or movable fulcrum, which may be placed beneath it to press on the projection at the outer side of the foot. I is a rigid bar for carrying the toe-strap. S is a rectan-

gular pad to be introduced beneath the external wing at M, when it is found necessary to diminish the pressure over the tarsus on the outer side of the foot, even after the pad C has been withdrawn. Fig. 7 represents the instrument in action. The leg is firmly held to the back-splint by the straps A A. The heel is kept in place by strap B, and the movable pad C is adjusted. The wings are brought together, and firmly fixed by the further action of the straps A A and strap H; and the toe-strap is then tightened, and the cog-wheel, *k*, screwed up. By simply loosening the toe-strap the pressure is at once relieved, if this should be found necessary, as is frequently the case at night, when the foot becomes hot; and in a day or two, the wings being thrown back, *but the foot not being disturbed*, the pad C may be slightly shifted or removed, or the rectangular pad S may be introduced at M for a short time until the skin on the outer side of the tarsus is again able to bear pressure.

Fig. 7.




The plantar fascia and the abductor pollicis having been divided, as explained on page 32, and the punctures having healed, the treatment by means of "The Movable Pad Instrument" must be carried

out as described, and must be continued until the contracted tarsus has been as far as possible unfolded, when the third stage of the treatment may be commenced by dividing the tendo Achillis (page 29). When the puncture from this operation is healed, the foot is to be again placed in the same instrument as before, and by means of the cog-wheel, *k*, attached behind the heel, the equinus is to be gradually overcome, and the foot drawn to less than a right angle with the leg. If this part of the treatment is retarded by stiffness of the ankle joint, the foot is to be removed from the instrument occasionally and worked up and down, or in some cases it is advisable that an anæsthetic should be administered, and the foot suddenly wrenched up into its place. When by these means the foot has been placed in its natural position in relation to the leg, a boot must be provided having an iron attached to it on the *inner* side of the leg, and extending round the waist (p. 20).

### Talipes Equino-Varus caused by Paralysis, etc.

Although the amount of deformity in cases of Paralytic Talipes will be found to vary greatly, from the slightest deviation from the normal state to a condition as severe as in a congenital case, the treatment of these two varieties of club-foot is in many respects identical. Each patient must be carefully examined to determine what are the tendons or fascia that keep the foot in its deformed position. This is done by trying to force the foot into its natural position. In some cases this can be accomplished without any

resistance being offered; and then it is only necessary that the patient should wear an *inside* iron and strap. In other cases, the same tendons and fascia that it is necessary to divide in a congenital case must be operated on. It should be remembered that the posterior tibial tendon, when contracted, causes equinus as well as varus, and in many cases this deformity cannot be overcome unless it is properly divided.

In some examples of this deformity, after division of the tendo Achillis, the foot hangs quite loose at the ankle joint, and with the slightest amount of pressure goes up to the position of calcaneus. When this happens, no special instrument is required for the treatment, but the foot must be kept a sufficiently long time in the position of equinus until the tendon unites, when it must be stretched with great care. This can be done by means of a flexible splint and bandage. The splint is bent at an angle corresponding to the deformity, and bandaged to the dorsum of the foot. After three or four weeks, when the divided tendon is felt to be uniting, the splint is to be bent at a less obtuse angle and bandaged on as before. The foot can in this way be brought to any required position.

In severe cases the details of the treatment are the same as those required for congenital cases, and the same instrument must be used. Also when the patient is allowed to walk, the same kind of boot and "support" is necessary. As the foot on walking drops, causing the toes to touch the ground before the heel, and the patient has not the power to flex the foot on the leg, a stop must be fixed in the

joint of the iron at the ankle in such a way as to allow the foot to be flexed on the leg, but to prevent it from dropping below a right angle.

### Talipes Equino-Valgus.

*Talipes Equino-Valgus* (in which the foot is turned out and the heel drawn up) is rarely if ever met with as a congenital deformity. In several instances, however, of Talipes Equinus caused by paralysis, the foot will be observed, after division of the tendo Achillis, to have a tendency to turn *out*. This can generally be sufficiently treated by placing an iron on the *outside* of the foot and leg, with a strap, attached to the inside of the boot, passing round it.

It must be remembered that the peroneus longus and brevis when contracted can cause equinus as well as valgus; and in some cases it is necessary to divide them.

### Talipes Calcaneo-Varus.

*Talipes Calcaneo-Varus* (in which the heel is depressed and the foot turned in) is a very rare deformity, and requires no separate description.

### Talipes Calcaneo-Valgus.

*Talipes Calcaneo-Valgus* (in which the heel is depressed and the foot turned out). In nearly all cases of Talipes Calcaneus the foot is more or less turned out. The treatment is generally the same as that recommended for Talipes Calcaneus. The steel support attached to the boot must be on the *outside* of the leg; a leather strap being attached to it as in the case of Talipes Valgus.

## CHAPTER IV.

### TENOTOMY.

TENOTOMY signifies the subcutaneous division of tendon or fascia.

A narrow-bladed knife, called a tenotome, is introduced a short distance from the tendon to be operated on, and made to divide it; the forefinger or thumb of the other hand being employed as a guide to the situation of the blade. On its withdrawal, a piece of folded lint, with a strip of soap-plaster across it, to fix it, is placed on the puncture, and by the application of a splint and bandage the part is kept at rest for four or five days until the puncture is healed. When the operation has been properly performed, the result is almost invariably the same as if no wound of the skin at all had been made, and as if no communication had ever existed between the severed tendon and the external air.

It has been shown on dissection and proved by experience that the ends of a divided tendon become perfectly united by an intervening substance, which after a time becomes indistinguishable from the rest of the tendon, and that the lengthening of the tendon by these means can be regulated by the extent to which the divided ends are kept apart during the first few weeks after tenotomy.

In the performance of tenotomy, care must be taken to keep the knife *close* to the tendon to be divided, so that no artery or nerve may be injured.

As in almost all cases requiring this operation the tendon or fascia is unnaturally prominent, on account of its contracted condition, there is not the same difficulty that there would be in the normal state, nor is there the same danger of wounding adjacent structures.

The chief tendons and fasciæ that may require division are:—The tendo Achillis, the tibialis posticus, the tibialis anticus, the peroneus longus and brevis, the plantar and the palmar fascia, the extensor longus digitorum with the peroneus brevis, the biceps femoris, the semitendinosus and the semimembranosus, the sterno-mastoid. There are some others that may require division, but these require no separate description. The method in which the tendons mentioned above are operated upon is as follows:—

## The Tendo Achillis.

The operator sits at the end of a table with the assistant on his left. The patient lies on his face on the table with his foot slightly overhanging the end. The assistant then grasps the calf of the leg with his left hand, and the anterior part of the foot with his right, and flexes it slightly, thus bringing the tendon prominently forward. The operator puts his left thumb on the tendon, and introduces a sharp-pointed tenotome flatwise beneath it; he then turns the knife, at this moment the assistant making further extension, and divides

the tendon from below upwards. When the assistant feels the tendon give way, he relaxes the extension. This is important; for if it be not done, there is some danger of the knife cutting through the skin. In this operation the knife may be introduced either on the inner or outer side of the tendon, but in the latter case it must be remembered that the posterior tibial artery is not far from the point of the knife, which should not be thrust in too far. With ordinary care there is no danger of wounding the vessel.

### The Tibialis Posticus.

The operator sits at the foot of a table with the assistant on his left. The patient lies on the same side as the deformed foot, and the other foot being held out of the way, the assistant grasps the leg firmly, just below the knee, with his left hand, and with his right holds the foot well flexed in the deformed position. The operator then feels for the inner edge of the tibia, and just over this, and about an inch (two inches in an adult) above the tip of the malleolus, makes a puncture with a sharp-pointed tenotome, passing it down to the edge of the tibia, and guided by this, opens the sheath of the posterior tibial tendon. The sharp-pointed knife is then withdrawn, the assistant being careful to keep the foot in exactly the same position. The operator, holding a blunt-pointed tenotome like a pen, now introduces it into the opening, and insinuates the blade flatwise between the tendon and the bone. Indicating to the assistant to evert the foot, he turns the edge of the knife towards the

tendon, and supinating his wrist, divides it, and also the subjacent tendon of the flexor longus digitorum. A snap is felt or heard at the moment of the division of the tendon.

### The Tibialis Anticus.

The patient lies on his back, and the operator and his assistant place themselves as before. The operator works the foot from side to side, and feels with his forefinger for the tendon of the tibialis anticus. Keeping his finger over the tendon, he introduces a sharp-pointed tenotome, with its edge towards it, between it and the tendon of the extensor proprius pollicis, and the assistant making at this moment forcible extension, he divides it.

### The Peroneus Longus and Brevis.

The patient lies on the opposite side to the deformed foot, and a cushion is placed under the lower part of the leg with the foot extending over it. The operator sits at the foot of the table, with the assistant on his left. The assistant grasps the leg with his left hand and with his right holds the foot up, so as to slacken the tendons as much as possible. The operator, placing his left forefinger on the tendons, introduces a strong sharp-pointed tenotome, flatwise, in an oblique direction, between the fibula and the tendons, two inches (in an adult) above the end of the malleolus, and having turned the edge towards the tendons, the assistant making extension, divides them.

## The Extensor Longus Digitorum and the Peroneus Tertius.

The patient lies on his back. The operator sits at the foot of the table with the assistant on his left. The assistant grasps the leg with his left hand, and the foot with his right. The operator, keeping the fingers of the left hand on the tendons, introduces a sharp-pointed tenotome between the tendons of the extensor proprius pollicis and the tendon to be divided, and guiding the blade beneath these tendons he divides them. Care must be taken not to dip the point of the knife deeper than necessary, or the anterior tibial artery may be divided. The duty of the assistant will be rather to prevent the foot from suddenly falling than to make extension.

The foregoing descriptions apply to a surgeon operating with his right hand on the tibialis anticus and posticus of the *left* foot, or on the peronei or extensors of the *right* foot. If, however, the contracted tendons are situated on the opposite limb, and the operator cannot use his left hand, he must stand facing the foot of the table, which is on his right.

## The Plantar Fascia.

The patient lies on his back if it is a right foot to be operated on; on his face if a left one. The operator sits at the foot of the table, with the assistant on his left. The assistant holds the foot at the ankle, and places his thumb at the bottom of the heel, and the other hand under the ball of the great toe, and extends as much as possible.

The operator then feels for the spot at which the fascia is most prominent, and introduces a sharp-pointed tenotome at its inner border, and keeping his left thumb on the fascia, just over the point of the knife, cuts or nicks the fascia bit by bit, being careful at the same time not to dip the point more deeply than is necessary. If, after this has been accomplished as thoroughly as possible, some fibres of fascia be felt, at another part of the sole of the foot, another puncture may be made to divide them, for the object of the surgeon should be to divide every portion of it as efficiently as possible, and to retain the divided ends as much apart as possible.

## The Palmar Fascia.

It is advisable that during this operation the patient should be placed under the influence of an anæsthetic. The hand should be placed with its back on a table, while the assistant with one hand grasps the wrist and with the other attempts to straighten the contracted fingers; this brings the fascia prominently forward and close beneath the skin. The operator selects the part in which the fascia is most tense, and introduces a very narrow tenotome and divides it. It is a question somewhat difficult to decide whether it is better to sever the fascia by placing the blade of the knife under it and cutting up, or introducing it between the fascia and the skin and cutting down. I believe it depends on the peculiarities of each individual case. If the first method be adopted, care must be taken not to let the knife slip through the skin, and if the

second, not to let the point of the knife jerk down so as to wound the arteries in the palm of the hand. If after division of the fascia in one place, on stretching the contracted fingers, other parts of the fascia be felt tense and prominent, other punctures must be made and the contracted fibres divided.

### Biceps Femoris.

The patient lies on his face. The surgeon places himself on the same side of the table as the leg to be operated on. An assistant supports the leg in the flexed position. If possible this operation should be performed without the previous administration of an anæsthetic. The patient should attempt to flex the knee-joint, the assistant holding the leg firmly at the same time. This will bring the tendon prominently forward. The operator then introduces a strong sharp-pointed tenotome on the *inner* side of the tendon and then somewhat under it, keeping the blade close to the tendon. The knife now lies between the tendon and the peroneal nerve, and on cutting outwards and upwards the tendon is divided and the nerve is not injured. On the knife being carefully withdrawn, the nerve will be observed to come more prominently forward than before, and care must be taken not to mistake this for part of the tendon.

### The Semitendinosus and Semimembranosus.

The knife should be introduced on the *outer* side of these tendons, i.e. between the tendons and the

popliteal vessels, and care must of course be taken not to dip the point deeper than necessary owing to the position of the popliteal artery.

## The Sterno-Mastoid.

Either the sternal or the clavicular portion of the sterno-mastoid may require division. If it be necessary to operate on both portions, a separate puncture must be made for each. The patient lies on a table and the operator stands on the same side as the muscle to be divided. A puncture is made on the *inner* margin of either the sternal or clavicular portion of the muscle in its lower third. A blunt-pointed tenotome is then carefully introduced, on the flat, through the opening, and being guided closely round the border of the muscle, is passed behind it. The sharp edge of the knife is then turned towards the muscle and made to divide it from within outwards. The assistant during the operation holds the head firmly and keeps the muscle tense. In dividing the clavicular portion, care must be taken to avoid the external jugular vein, which runs near the posterior border of the muscle.

## CHAPTER V.

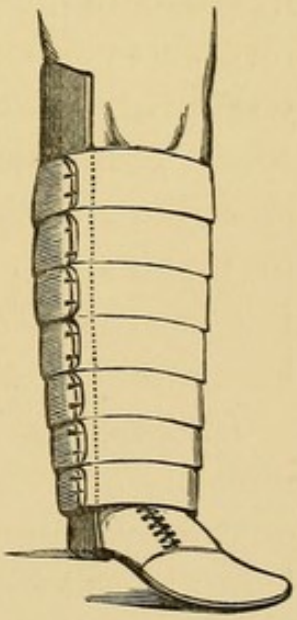
### ON DEFORMITIES CAUSED BY RICKETS.

Of all the different varieties of deformity that come under the notice of the surgeon, the most common are those curvatures of bones which take place during the progress of rickets. It will be observed that while the child is suffering from this disease, the bones are soft, and can be readily bent, by continued pressure, in any direction; but as the child recovers from this affection, the bones become even harder than in the natural state. It follows from this, that if the deformity is treated early by means of proper instruments, the bones can be straightened and kept in their natural position until, by the help of suitable medicinal treatment, the disease is cured. If, on the other hand, the deformity is left to take its course until the bones have become thoroughly hardened, nothing can of course be of service except osteotomy. If these views be correct, it is evident that the necessity for osteotomy for the cure of rickety deformity must be looked upon as a proof of neglect of proper treatment at an earlier stage of the disease. Although all the bones are liable to become bent during rickets, those of the lower extremities generally give way first, and are most severely deformed, because in walking the weight of the body is sustained by them. As the deformity thus

caused is more amenable to treatment than that of the bones of the trunk, the surgeon is oftener called upon to rectify it. These deformities of the legs may be divided into two classes—1st, *Bow-legs*, occasioned by bending outwards and sometimes forwards of the tibia and fibula, and combined in some rather rare cases with a bowing outwards at the knee-joints (genu extrorsum); 2nd, *Knock-knees* (genu valgum), or bending inward of the legs at the knee-joints. This deformity is sometimes caused in part by a curvature of the femur, but this is a comparative rarity. Frequently outward curvature of the tibia and knock-knees are present in the same limb.

*Bow-legs.*—This deformity is almost always found to be a simple bending outward of the tibia and fibula; and when this is the case the treatment consists in applying a wooden splint, extending from the sole of the boot to half-an-inch above the knee-joint on the *inner* side of the leg, and fixing it by means of straps and buckles. (Fig. 8.) The straps should be loosened at night, and the splints are to be removed every morning, and a salt bath administered—cold in summer, but tepid in winter. The nurse then applies the splints again as tightly as the child can conveniently bear them, and the child must also be kept almost entirely off its feet. If any undue pressure occur on the inner malleolus, a pad may be inserted

Fig. 8.



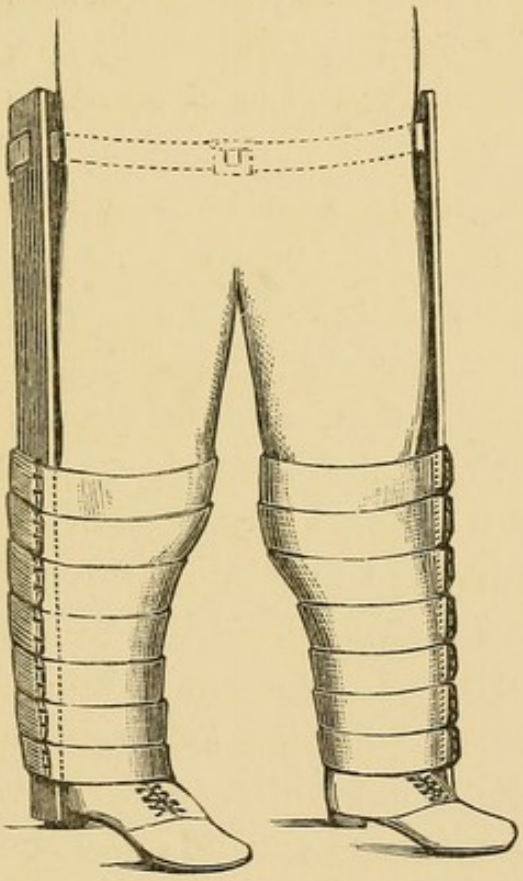
just below it, or the splints may be left off for a day or two occasionally, so that the skin may become gradually accustomed to them. This treatment must be continued until the legs are quite straight, and until the child has recovered from the rickets, and the bones have become hardened.

In those more severe cases in which there is a curvature of the bones forward, a special instrument is required. It consists of an inside iron fixed to the sole of the boot, and extending to just above the knee; to this, one end of a strong wire is attached a little below the knee-joint, which, passing round at the back of the leg, runs down the outer side of it, and passing behind the ankle-joint, the other end is attached to the inside iron. Webbing straps are fastened to the wire on the outside of the leg, and then pass in front of the curved bone, and being buckled to the inside iron, cause a continued pressure from before directly backwards. In those somewhat rare cases in which, combined with the bowing outwards of the tibia, the knee-joints bend outwards (genu extrorsum), it is necessary to apply outside splints extending from ankle to hip, in addition to the inside ones, in the way explained below in the treatment of knock-knees combined with bow-legs.

*Knock-knee, or Genu Valgum.* — In the great majority of cases that come before the surgeon this deformity is not of a severe nature; and on the knees being placed in the extended position and allowed to touch each other, the distance between the inner malleoli will be found not to exceed three or four inches. When this is the case, all that is required

for the cure of the deformity is the application of wooden outside splints, extending from the hips to the feet. A strap is attached to the upper ends of the splints, which passing behind the pelvis keeps them back in their place; other straps and buckles are attached along the splints from the ankles to above the knees, by means of which the knee-joints can be gradually drawn outwards towards the splints. (Fig. 9). These splints must be removed every

Fig. 9.



morning for the child to have a salt bath, and re-applied. The child must be kept almost entirely off its feet. In those cases which are more severe, with four to seven inches between the malleoli, a special instrument is necessary, and division of the biceps

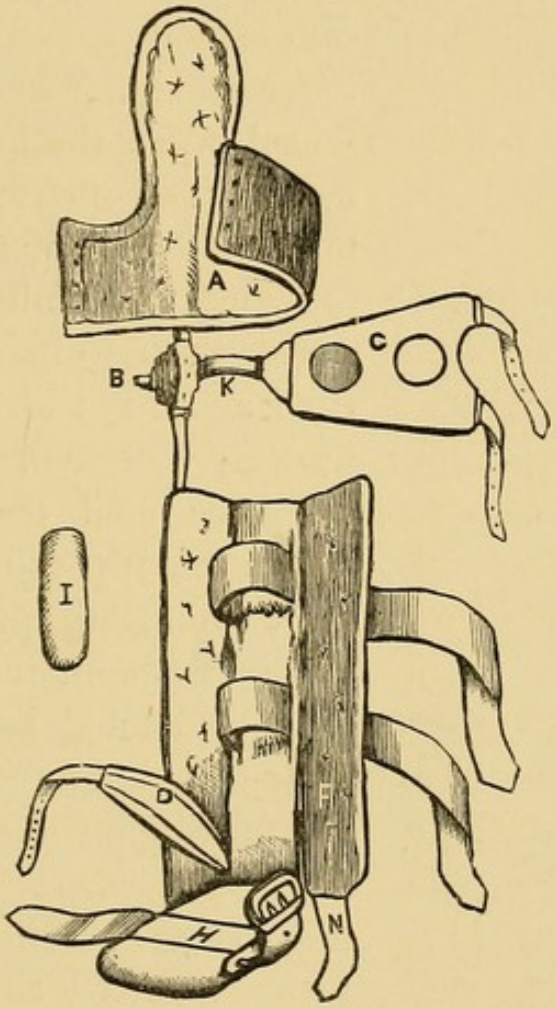
femoris (see page 34) or a part of the external lateral ligament may be required. With reference to the decision as to the necessity of tenotomy, an examination should be made of the deformed limb, and an attempt be made to straighten it. While this is being done, the structures above mentioned should be felt for; and if little or no contraction can be detected, the case is one for treatment by gradual extension without operation. If, on the other hand, either the tendon of the biceps or a band of ligament can be felt holding the limb in its deformed position and preventing its being straightened, one or both must be divided, according to the severity of the deformity.

To carry out the treatment by an instrument satisfactorily, it is absolutely essential that the patient be kept off his feet; and the important points to attain in the construction of a proper instrument are that it should keep the knee in the *extended* position, and prevent the leg from *rotating*, at the same time that, by its means, the knee-joint can be acted upon in the *lateral* direction, with sufficient force to gradually overcome the deformity. No instrument fitted to a boot and used while the patient walks about can do this.

The instrument figured below, which carries out these conditions efficiently, was shown by me at a meeting of the Medical Society of London in February 1880, and a description of it was published in the 'British Medical Journal,' May 22nd, 1880. (Fig. 10.) It will be seen to consist of a trough (A) for the thigh, which takes its bearing on the great trochanter of the femur, and is connected with the leg-splint by a stem on the outer side of the leg,

which is provided with a cog-wheel, B, opposite the knee-joint. A band, C, encircles the knee. The special points in which it differs from the trough-instruments in common use are, that it has a wing

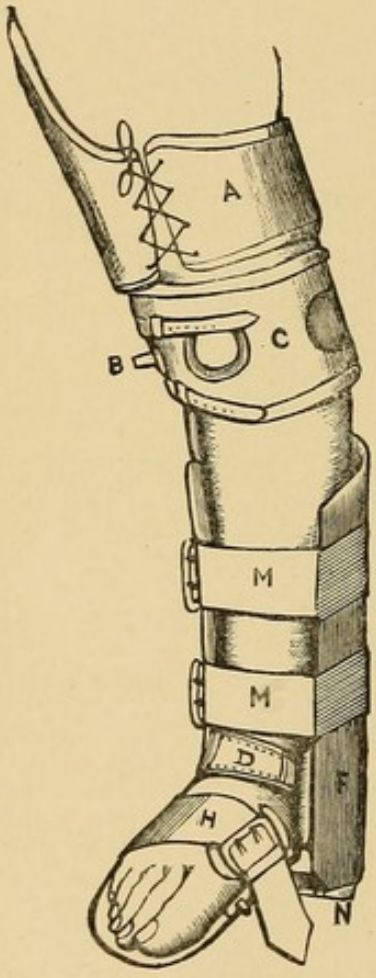
Fig. 10.




hinged to the back part of the leg-splint, on the inner side of the leg and ankle, which, together with an ankle-strap, D, and an inside toe-strap, H, keeps the heel and leg from rotating inwards, a pad, I, being introduced within the wing at F, to press on the internal tubercle of the os calcis, and the wing being kept in its place by the straps M and N. There

is a rigid bar, K, at the back of the knee, which keeps the joint in a perfectly extended position, whatever amount of force is used *laterally*. To this bar is attached a carefully made leather strap, C, formed in such a way as to cause the least possible amount of pressure on the patella, and also to diffuse the pressure over the inner condyle, when the cog-wheel, B, at the knee is acted upon. The instrument is also made in such a manner that, in drawing the limb straight, it adapts itself to its altered position, and fits the straightened limb as well as it before fitted the deformed one. Fig. 11 shows the apparatus applied.

Fig. 11.




Before the application of the instrument, a soft woollen stocking should be put on the deformed limb, and a bandage carefully applied over it from the foot upwards. The instrument having been made to correspond exactly to the angle of the deformed leg by means of the screw B at the knee-joint, is to be then applied and the straps adjusted, and the wing and pad fixed in their place. The cog-wheel B, opposite the knee-joint, is then acted on so as to slightly straighten the leg until pain is complained of, when the screw must be a little reversed, and the patient made quite easy. In this manner, the leg

must be slightly stretched every day; when the resistance will be found to gradually give way, and the limb will be brought into the straight position. Great caution must be used in the application of pressure; for, if a sore be allowed to form on the skin over the inner condyle of the femur, all treatment must for a time be abandoned, and much time will be lost.

It is advisable that the instrument should be removed occasionally, and more frequently at first, before the skin has become accustomed to its pressure; and the leg should then be washed and powdered, and the knee flexed and extended to prevent its becoming stiff. This treatment must be continued until the limb is quite straight; and, as there is danger of relapse in this, as in other deformities, it is necessary that when the patient begins to walk, steel supports, fixed to the boots and extending to the hips, should be worn during the day.

In extreme cases of genu valgum in adults, osteotomy may be necessary. In cases of genu valgum combined with outward curvature of the tibia, inside splints must be applied as before explained, and in addition to these, outside splints must be placed, in the same way as in a case of ordinary genu valgum. The child must be kept off its feet, and in this way both deformities will be relieved at the same time. Children are occasionally seen suffering from knock-knee in one limb, and bow-leg in the other. The treatment for this variety of deformity is by the application of splints in the same way as in cases of genu valgum with bow-legs.

# CHAPTER VI.

## CONTRACTION OF THE KNEE-JOINT.

CONTRACTION of the knee-joint may be occasioned by a simple shortening of the hamstring muscles, as when the extensor muscles are paralysed, or by spasm; or it may be the result of any of the various diseases to which this joint is liable and which cause these tendons to be secondarily contracted; or it may arise from the cicatrices of burns, or it may be only a temporary condition, as in hysteria. If there is any difficulty in diagnosis, the patient should be placed under the influence of an anæsthetic. If after a careful examination it is decided that this deformed condition is maintained by contraction of the hamstring tendons, they must be divided (see page 34) before any attempt is made to straighten the limb. For if this be not done there is great danger, in forcing the joint straight, of the hamstring muscles drawing the head of the tibia backwards. Unnecessary pain is also caused to the patient. It is also a fact that although many cases are capable of considerable improvement by extension without division of tendons, it often happens that the limb cannot be *quite* straightened, and thus when the patient begins to walk, the line of pressure from the weight of the body does not fall directly from the femur to the tibia. A very slight bending

at the knee-joint is sufficient to interfere materially with the application of an instrument intended to give support in walking; and the weight of the body being borne by the instrument, and not directly through the limb, the former will be either bent out of its proper shape or broken. In many cases there is also combined with the contraction of the tendons some amount of fibrous anchylosis; this latter condition, however, can usually be gradually overcome, after the tendons have been divided, by means of a suitable instrument. In those cases which arise from disease of the joint, it is necessary, as a rule, before attempting the cure of the deformity, that the disease should have entirely subsided, and all pain and inflammation have ceased.

The treatment of the cicatricial bands caused by burns will be spoken of hereafter (see page 48).

Before the operation of tenotomy is performed, the extension instrument to be used in the after treatment must be got ready. This instrument consists of a trough to hold the thigh, and another to hold the calf of the leg; these are connected together by two stems, one on each side of the knee. On a level with the joint there is a cog-wheel, which acts on a knee-cap. This instrument is fitted to a Scarpa's shoe, which keeps it in its place.

The hamstring tendons having been divided as explained in the chapter on Tenotomy, page 28, at the end of six or seven days the punctures will have healed. The limb having been carefully bandaged, the instrument, after being unscrewed to an angle to correspond with the contracted condition of the knee, is to be then applied, and the straps are to be

adjusted. The key is now to be applied to the rack at the knee, and the instrument by this means is to be slightly straightened until the patient begins to complain of pain. The rack is then to be a little reversed, so that the patient may be quite comfortable. Slight extension is to be made in the same way from day to day, care being taken that the patient suffers little or no pain, but only a feeling of stretching. Any attempt to make more rapid progress, by making a greater amount of daily extension than is consistent with comfort on the part of the patient, will fail, and in the end time will be lost. The instrument should be removed every week or ten days and, the limb having been washed and powdered and rebandaged, then reapplied. After the knee has been made quite straight, it must be still kept in the instrument for two or three weeks, as at first there will be a great tendency to relapse.

If the case is one of simple contraction of the tendons, and the joint itself has not been affected by disease, the cure is now complete; but in cases of paralysis of the extensor muscles of the joint, it is necessary that an instrument should be worn by the patient, fixed to the boot and extending to the hip, and with a joint at the knee made in such a way that although the patient is allowed to bend the joint while sitting, it can be fixed on walking, and thus prevent the knee from giving way under him.

If, on the other hand, the case is one of old joint disease, the leg, although straight, will most probably be found to be quite stiff in this position, and a serious question will arise as to the advisability of attempting to obtain a movable joint by breaking

down the adhesions in the joint while the patient is under an anæsthetic. With regard to this question, each case must be judged on its own merits, and especially with regard to the extent to which the disease has advanced, and how much of the interior of the joint has been destroyed by it. It must be remembered that a stiff straight leg is strong and useful, and that it is quite possible that it may be weakened by attempts to obtain motion in it. In those cases in which it is decided to try to regain movement, it is generally safest to bend the joint a little at a time, and to do this frequently, keeping up the movement thus obtained by rubbing and shampooing, as in this way there is less danger of setting up fresh inflammation in the joint.

## CHAPTER VII.

### CONTRACTION OF JOINTS CAUSED BY BURNS.

ALL the joints of the extremities are liable to be kept in the position of permanent flexion by the cicatrices following burns. When an attempt is made to extend a joint affected in this manner, a web of cicatrised tissue is observed preventing its extension beyond a certain point.

In slight cases this deformity may be overcome by stretching, carried out by means of an instrument with a cog-wheel opposite the joint affected; and the web, having been daily well lubricated with oil, may disappear under this treatment. The use of the instrument must be continued at night for a considerable time, in order to prevent a relapse. If, however, this does not succeed, the web must be got rid of. The first part of the process by which this is accomplished is analogous to the piercing of the lobe of the ear previous to the wearing of ear-rings, and consists in simply putting a ring of silver through the base of the web, care being taken that no important vessel or nerve is included. This ring must be left in until the tissues have healed around it. The length of time necessary for this to take place depends upon the thickness of the web, but it is better to wait too long than to hurry over the treatment, as the whole success of the case depends on

the healing process being complete. Usually the time during which the ring should be kept *in situ* is from two to six months. When this has been accomplished, the web must be cut through down to the ring, and a strip of oiled lint is placed between the raw edges. The extension instrument before mentioned is to be now applied, and the joint gradually extended and retained in the position of extension until the wounds are quite healed. When this has taken place, the limb may be brought into use during the day and the joint worked regularly backwards and forwards, but the instrument must be worn at night until all symptoms of relapse have disappeared. In those cases in which the wound, caused by cutting through the web, is extensive, the healing process may be greatly aided by the grafting of small bits of skin after M. Reverdin's method.

Into the subject of plastic operations, which are required for many of the more severe cases, I do not propose to enter, as their consideration belongs rather to a treatise on general surgery.

## CHAPTER VIII.

### WEBBED FINGERS.

In this deformity, the fingers, or the fingers and thumb, are united together by a web of skin. This may be either a congenital affection or it may be the result of a burn. The treatment is similar to that described in the last chapter for the removal of cicatrices causing contraction of joints. The ring is introduced through the web at the point at which the fingers affected should naturally separate, and when the tissues around the ring have healed, the web is to be slit up, and great care must be taken to keep the fingers separated from each other until the raw surfaces are quite healed.

The failure, in many cases, of this treatment is due to the ring not being retained for a sufficient length of time before the division of the web.

# CHAPTER IX.

## CONTRACTED FINGERS.

CONTRACTION of the joints of the fingers may be conveniently divided into two varieties—(1) That which arises from the same causes that affect other joints, such as inflammatory disease of the joint affected, shortening of tendons as the result of paralysis or spasm, congenital contraction, those caused from inflammation outside the joint as in thecal abscess, and also from burns. (2) Contraction of the palmar fascia.

It is very important that a correct diagnosis should be made in these cases, and that contraction of the palmar fascia should not be mistaken for contraction of the flexor tendons of the fingers. As a rule it is not difficult to distinguish between them. In a case of contraction of the fingers, occasioned by shortening of the palmar fascia, the skin of the palm of the hand corresponding to the carpo-metacarpal joints will be found to be puckered and knotted, and a rigid strong cord will be felt lying quite superficially beneath the skin, evidently preventing the finger or fingers affected from being straightened. The appearance and feel of this condition are very characteristic.

In the case of contraction of the flexor tendons, on the other hand, this peculiar appearance is never met with; for as the tendons are securely held down by a

fibrous sheath formed by the palmar fascia, they are not to be felt, even when contracted, immediately beneath the skin, as the fascia is, and the skin is not bound down and rigid in the same way.

### Treatment.

The treatment of contraction of the fingers depends on the cause. In those cases which are caused by the cicatrix of a burn the treatment is the same as that described on page 48. When the flexor tendons are in fault, the treatment must consist in manipulations and extension by means of an instrument made like that to be used after division of the fascia, and explained below. As a rule the tendons of the fingers must not be divided, as this would most probably cause an impairment of the power of flexion, and the condition of the patient would be made worse than before the operation.

(2) In the second class of cases the treatment consists, in the first place, in the subcutaneous division of the contracted fascia as explained on page 33, and subsequently the finger or fingers affected must be extended by means of an instrument, which is fixed to the hand and to the back of which stems are attached, which extend along the back of the fingers affected, and which have joints with cog-wheels to correspond with each joint of the fingers. This instrument can be adjusted to the deformed finger, and by acting on the cog-wheels the fingers can be brought gradually into the natural position. When by these means the deformity has been overcome, the fingers must be brought into use and shampooed, and the instrument must be worn at night, as there is danger of relapse.

## CHAPTER X.

### CONTRACTION OF THE TOES.

DEFORMITIES of the toes are matters of great importance on account of the pain they occasion when the patient walks about, thus preventing him from taking a proper amount of exercise, or in some cases from following his usual occupation.

The cause of these deformities in a large proportion of instances is due to badly shaped boots and shoes, and sometimes the toes are injuriously pressed together by tight and inelastic stockings. The boots in common use are not only made so narrow that they cramp the toes, but they are also provided with high heels, which have the effect of driving the foot forward into the narrow toe of the boot when the weight of the body is on the foot.

If the uncovered foot be placed on the ground, and if it be made to sustain the weight of the body, it will be observed to increase in length, and the toes will separate a little from each other. A properly made boot, at the same time that it holds the foot firmly, should allow of these natural movements, and if this were always carried out, the number of deformed feet and toes would be materially diminished.

A very common deformity affecting the great toe is often combined with bunion, and is indeed one of

its chief causes. It consists in the turning outwards of this toe under the second and third toes, and the bunion cannot be successfully treated until this malformation has been rectified.

In the majority of instances the toe affected can without difficulty be drawn into its natural position, and the only difficulty is to retain it there. This is best done by having the stocking made with a separate division for the great toe (like a glove), and having a plate fitted into the boot, provided with a vertical ridge to go between the great and second toes, which will prevent the former from bending outwards. In very severe cases, division of the tendon of the adductor pollicis may be necessary.

*Hammer Toe*, in the true sense of the term, is always a deformity of the second toe, and is not caused by badly shaped boots. It consists of a permanent flexion of the second phalanx on the first at a right angle, which causes the patient when standing to rest on the tip of the toe, producing at this point a painful corn as well as another corn over the contraction. The treatment consists in the subcutaneous division of the flexor tendon, as well as the bands of fascia that can be felt holding the toe in its deformed position, and the subsequent application of a splint to the sole of the foot and along the lower surface of the toe. A narrow bandage passes over the toe, and draws it down to the splint. After the toe has been straightened by these means, the patient must for some weeks wear a sandal inside the boot, and the stocking must have a separate division for the affected toe, like a glove. This sandal is provided with two slots, made to correspond with each side of

the affected toe, and a ribbon is threaded through these in a loop within which the toe lies, the loop of ribbon is then to be tightened and tied so as to keep the toe in its straightened position.

In cases of paralysis it is not uncommon to find all the toes deformed; but in these cases, the *extensor* tendons are usually contracted, and in the more severe instances they may require division.

## CHAPTER XI.

### WRYNECK.

THE neck may be distorted in various ways, and the head drawn in divers directions, as the result of either caries of the cervical vertebræ, or by the contracted cicatrix of ulceration arising from burns or other causes. Genuine wryneck, however, depends on the undue contraction of the whole or a part of one sterno-mastoid muscle, and this condition may be produced by either rheumatic inflammation of the muscle itself, or by spasm, or by the paralysis of the corresponding muscle on the other side. When this condition first comes on, it is of course desirable to treat the disease, which is causing the deformity, by ordinary means; but if, after everything has been done, deformity still continues, the patient must be carefully examined in order to determine whether the muscles on both sides of the neck have still the power of moving the head from side to side or not. If it be found that the patient has voluntary power over both muscles, but that the sternal or clavicular portion, or in some cases both portions of the muscle are simply causing deformity by reason of their being abnormally shortened, the case is a suitable one for tenotomy, and one or both parts of the contracted muscle should be divided, as explained on page 35. For four or five days after the operation the patient should be kept in

bed with the head resting in the deformed position, and be further steadied by means of a bandage fixed round the head, and passing under the arm on the same side as the operation. In this way rest will be obtained, the puncture will be enabled to heal, and any danger of suppuration will be prevented. The patient may now be allowed to get up, and the bandage must be reapplied round the head as before, but passing under the arm on the *opposite* side to the operation, and the head will by this means be gradually drawn into its natural position and retained there.

After two or three weeks, the bandage having been removed, the surgeon, by placing one hand under the angle of the jaw and the other on the shoulder, may stretch the contracted parts, and this may be repeated every other day and the bandage reapplied. The patient also, if old enough, may help the cure by keeping the head inclined in the opposite direction to the deformed state.

In some few of the more severe cases a specially made instrument is necessary. This instrument must be made in such a way that being fixed to the trunk it extends to and holds the head firmly, and it is also provided with cog-wheels, so placed that the surgeon by their means can turn and retain the head in any required position.

## CHAPTER XII.

### CARIES OF THE VERTEBRÆ FOLLOWED BY DEFORMITY.

In speaking of the various affections of the spine, there is a tendency to mix up simple curvatures with deformities which are the result of disease of the bodies of the vertebræ. This is an error that should be carefully guarded against, as there is in fact no similarity between them in their pathology, and therefore should be no similarity in their treatment. It would be just as reasonable to talk of caries of the tarsus as a variety of club-foot, and to suggest a like treatment in both cases.

In speaking of angular curvature of the spine, in the first place it is necessary to bear in mind that it differs in all respects from every other kind of curvature in its cause, its pathology, symptoms, prognosis, and treatment, as well as in its being occasionally followed by abscess and sometimes by paralysis. This being the case, it would be well if the term angular curvature could be abolished, and that the name given to it should draw attention rather to the disease that is destroying the bodies of the vertebræ, than to the deformity which is occasioned by it if it is not arrested in an early stage of its progress.

"This curvature, which is always from within outwards, is caused by the erosion or destruction of

part of the body or bodies of one or more of the vertebræ; by which means that immediately above the distemper, and that immediately below it, are brought nearer to each other than they should be, the body of the patient bends forward, the spine is curved from within outward, and the tuberosity appears behind, occasioned by the protrusion of the spinal processes of the distempered vertebræ. That according to the degree of carious erosion, and according to the number of vertebræ affected, the curve must be less or greater. . . . Although there can be no curve without caries, yet there is, and not unfrequently, caries without curve."—(Pott). It is very important that this disease should be diagnosed at its commencement. This, however, is somewhat difficult, and the symptoms are sometimes attributed to diseases of other parts; if in the dorsal region, to the lungs or to indigestion; if in the lumbar, to incipient hip-disease. A very careful examination of the patient should be always made to prevent a mistake in diagnosis. When, however, on examination of the spine there is found to be the least circumscribed projection, and this does not disappear when the patient lies on the face, and when to this is added a feeling of pain or discomfort, on concussion either directly applied or by the patient jumping or raising himself on the toes and suddenly letting himself down on the heels, the diagnosis is certain. The serious nature of the case should be pointed out to the friends of the patient, in order that they may be induced to carry out the tedious course of treatment which is necessary, and which alone can arrest the disease and prevent a further increase of the deformity.

In order to accomplish this, it is allowed by most surgeons that as perfect a state of rest as possible must be enjoined; but a great difference of opinion exists as to the best mode of effecting this. Some, for instance, have faith in being able to obtain rest for the diseased spine in the upright position, and while the patient walks about, by Dr. Sayre's mode of treatment, by means of the plaster jacket. I endeavoured to show in a paper read before the International Medical Congress in 1881 that this was impossible, and I believe that since that date this method of treatment has to a great extent been discontinued. Several different kinds of apparatus have also been extolled at various times, with the same end in view. The fact, however, remains that although some of these undoubtedly give temporary relief to some of the symptoms, they do not prevent the continuance of the disease or the increase of deformity; and as they are depended upon to the neglect of recumbency, they do positive harm. This, then, being in my opinion an indisputable fact, I believe we must fall back on the very old-fashioned, but as experience shows, the very efficient treatment by complete recumbency, and with this may be combined with advantage the use of a back-splint, which helps to keep the spine still further at rest.

It is often stated that this treatment of rest in bed is injurious to the general health of the patient. This is, according to my experience, a fallacy. I have found that the contrary is the case, as the patient rapidly loses his pain, and, as a consequence, becomes happy and comfortable, and his general health improves. It is, moreover, easier to keep a

child always in bed than to insist on an occasional rest on a sofa.

The splint which should be used while the patient is recumbent is made of leather, moulded to the back, and lightly padded and covered with wash-leather. In cases of caries in the dorsal or lumbar region, it extends in length from the seventh cervical to the last lumbar vertebra, and in breadth to the angles of the ribs on each side. The upper corners must be cut off and rounded at the armpits, and steel crutches, covered with wash-leather, must be fixed at these parts, the ends of which should be long enough to bend over in front of the shoulders as far as the clavicles. These crutches, it must be understood, are not intended to take the weight of the shoulders from the spine, as it is both impossible and unnecessary that they should do so, while the patient is in the recumbent position; but they are very useful in keeping the patient from turning about, and in this way they help materially in keeping the spine in a state of rest. The splint is also kept in place by straps attached to its sides and passing across the chest. These should, however, be kept quite loose, so as not in any degree to compress the thorax.

In those cases in which the disease is situated in the cervical region, in addition to keeping the patient in the recumbent position, it is necessary to keep the head in a state of rest. This is best effected by fixing to the back-splint already described a head-piece, consisting of a band of steel to encircle and clasp the head, and connected to two stems which are screwed to the back of the splint. Straps pass over the forehead and under the chin.

A tightly fitting vest should be worn next the skin under the splint, and at first the back must be examined daily to ascertain that the splint does not cause any undue pressure. The general health of the patient must be attended to; cod-liver oil and steel wine being administered in addition to a generous diet.

The frame of the bed and the mattress on which the patient is placed should be a movable one, so that he may be carried upon it into the open air, or to a carriage, or to a perambulator with a board placed across it. In the great majority of cases, if this plan of treatment be rigidly carried out, it will be found that all the pain which was formerly suffered will be speedily removed, and that the general health will improve and the deformity will decrease, and in slight cases may entirely disappear. This course of treatment by *perfect* recumbency must be continued until the *disease* is quite cured, and until anchylosis has taken place. To know when this has happened is extremely difficult, but it is of the greatest importance that it should be recognised. It is better to err on the side of caution and allow the spine too much rest than too little.

Before the patient is allowed to get up and walk about, the whole of the pains that he formerly complained of must have ceased, even when a slight blow is made on the heels, causing concussion at the affected part. Another sign of the disappearance of the disease is the gradual passing away of the puffiness around the projection which is so obvious a symptom in the early stage of the disease; while with this disappearance of the puffiness there is also a drawing

in of the parts, causing the curvature to assume a more pointed aspect.

The length of time during which it is necessary to keep the patient in the recumbent posture varies in different cases, and depends on the duration of the disease, as well as on the care and patience with which the treatment has been carried out.

When it has been decided by the surgeon that firm anchylosis has taken place between the affected vertebræ, the patient may be allowed to sit up, and by degrees to stand and walk. There will be of course, for some considerable time, great weakness of the back after the caries and accompanying inflammatory conditions have disappeared, so that it will be advisable that an instrument should be worn, to assist the patient in holding himself erect, and to support the projection resulting from the diseased action. For the majority of cases, the most efficient instrument for this purpose consists of a pelvic band, to the back part of which is attached, by means of an upright steel, a padded plate, to exercise an amount of pressure on the projecting part of the spine, which can be accurately regulated by the surgeon by means of a rack. There are also crutches affixed to it, the anterior ends of which keep the shoulders well back, and tend in a great measure to improve the figure and expand the chest.

When this mode of treatment has been rigidly carried out, the formation of an abscess is a comparatively rare occurrence. When, however, it does take place, it adds very greatly to the severity of the case. These abscesses may point in the back, constituting lumbar abscess; or the pus may make its

way between the abdominal muscles and point in the abdomen. Sometimes, again, it may enter the sheath of the psoas muscle, and point below Poupart's ligament, or through the sacro-sciatic notch to the nates, and it has been known to discharge itself through the bladder and rectum. The best treatment for an abscess of this description is either to leave it to burst by itself, or to draw off the pus by means of an aspirator, and to bandage a piece of folded lint over the puncture and allow it to heal, and to repeat the aspiration in case the abscess cavity refills.

It sometimes happens that during the progress of these cases of caries of the vertebræ the patient suddenly loses power over the lower extremities, and on examination the feet will be found to be spasmodically drawn into the position of equinus. The treatment necessary in this form of paralysis is to continue the recumbency, and to make use of counter-irritation on each side of the spinous processes of the diseased vertebræ. If this is carried out, the power in the legs may return. If the case should not, however, terminate in this way, and the paralysis become permanent, causing contraction of the limbs, the deformity must be treated on the same principles as those laid down in former chapters on paralytic deformities of the lower extremities.

## CHAPTER XIII.

### LATERAL CURVATURE OF THE SPINE.

LATERAL curvature of the spine is due to a variety of causes. It will be most convenient to consider it under three chief heads: (1) That which is caused by some alteration in the contents of the thorax, which interferes with the relation naturally existing between the organs contained in each side of the chest; (2) That which is caused mechanically by the loss of equilibrium in the parts outside the chest walls, by which the spine is either dragged to one side by the unequal power of the muscles on the two sides, or tilted on one side by an inequality in the length of the lower limbs; (3) That which takes place as the result of simple weakness of the muscles and ligaments. This condition allows the spine to deviate from the straight line, and the patient not being able to exert sufficient muscular power to overcome the deformity, it becomes permanent.

(1) and (2) The cases comprising the first set are generally the result of bronchitis, which causes the lung on one side of the chest to partially collapse, on account of the plugging of one or more bronchial tubes, or to pleurisy, after which the lung may be bound down by adhesions, and be unable to expand. The affected side will then shrink, and become smaller than the other. Lateral curvature of the spine

caused in this way is of course an incurable deformity, and the surgeon can only hope to alleviate the symptoms by a properly fitting mechanical support. The particular kind of apparatus most suitable for each patient will depend on the severity of the case, and what amount of pressure the patient is able to bear. In a severe case, and when much pressure is not advisable, a poroplastic felt corset is useful, and in the less severe cases a steel instrument is best. These remarks are applicable also to those cases which are occasioned by loss of power in the muscles on one side only of the chest, as in paralysis, or after amputation of one arm.

When the curvature is owing to tilting of the pelvis by an unequal length of the legs, the obvious treatment is to make the limbs symmetrical again by means of an artificial leg or cork boot. If, however, before this is done the curvature has become permanent, and does not disappear when the pelvis has been made level, the spine must be treated in the same way as the cases of the third class.

By far the largest number of cases of lateral curvature of the spine belong to the third class. It is probable that nearly all patients who suffer from this deformity are predisposed to it, either from hereditary causes or from a special constitutional debility. This predisposition is intensified in the case of girls at about the period of puberty.

The first event leading to the production of the curvature is a general laxity of the ligaments, not only of the spine, but of other parts, and as in standing the ligaments of the ankles and knees are naturally most acted upon, it is not uncommon to

find flat-foot or slight knock-knee as an early accompanying symptom. In addition to this, there is a marked want of tone in all the muscles of the body. What might be expected to follow from this really happens; the patient, finding it extremely irksome or perhaps impossible to keep upright, gradually sinks to one side, usually standing on one leg only. As the result of this, the spine adjusts itself to this unnatural position and rotates. In this way the ligaments of the outer part of the curve become slightly elongated. The patient having over indulged in this position, feels constrained to do so again on the next occasion of feeling fatigued.

On examining the spine in this the first stage of lateral curvature, although at first a distinct variation from the straight line is observable, yet the patient is able, by making an effort, to rectify the malposition, although on the attention being withdrawn, the spine returns again to its deformed condition. The extent to which this takes place differs in each case.

The treatment of this condition of incipient lateral curvature consists, in addition to suitable medicinal management, of exercises and drilling, short of fatigue, followed by rest in the recumbent position; and the patient must be prevented, as far as possible, from assuming awkward positions, while the muscles should be strengthened by shampooing, and in some cases by galvanism. The success attending this course of treatment will depend on how thoroughly it is carried out. When the patients are compelled to work to obtain a livelihood, there are great difficulties in the way.

If the progress of the case continue unchecked, the intervertebral catilages become compressed on the side corresponding to the concavity of the curve, and there is more and more tendency for the spinal column to bend over. Subsequently a compensatory curve is formed, and it is now impossible for the patient to voluntarily overcome the deformity and place the spine straight. If, however, by any means the spinal column can be gradually and forcibly made to retrace its movements and be retained in its natural position, the cartilages may regain their normal shape, and the muscles being strengthened by frictions and exercises, and the patient having recovered in regard to her general health, the cure or improvement may become permanent. The question to be answered then is, How is this to be done? If the surgeon places the palms of his hands one on each side of the spine, on and a little below the curves, he can by pressure improve the deformity somewhat; and if this pressure could be kept up, the improvement would continue and increase. As this cannot be done, we must try to imitate this action as nearly as possible by means of an instrument. Of late years the use of jackets made of various materials, after having been laid aside for a very long time, has again been advocated as a cure of these cases. It must, however, be borne in mind that although a jacket may keep the spine in a straighter position than before it was applied, and be useful in cases where there is no hope of improvement, it cannot keep up a *continued advancing* pressure; its action is therefore very limited. The instrument most suitable for obtaining the object in

view must be made of strong steel, and must be provided with two plates to act as the hands in clasping the ribs and spine. The plates are acted upon by cog-wheels, so that they can be made to exert a constant pressure on the two curves; and this pressure can be regulated by the surgeon. As there is no tendency for the curvature to increase when the patient is recumbent, it is not necessary that the instrument should be worn at night, and this being so, the skin which has during the day been compressed by the plates has an opportunity of recovering itself, and so is prevented from becoming sore. During the time the instrument is being used, care must be taken to exercise the muscles of the back so that when the patient leaves off the support they may be in a condition to retain the spinal column in its improved condition.

Instruments of the description mentioned above can be obtained of any surgical mechanician, but in practice many of these will be found to be practically useless, unless the surgeon attending the case assures himself, by personal inspection, that the pressure is really applied in such a manner as to effect the purpose intended.

## CHAPTER XIV.

### ANTERIOR AND POSTERIOR CURVATURE OF THE SPINE.

The spinal column is the subject not only of angular curvature from disease of the vertebra, and of lateral curvature from weakness of the muscles and ligaments, but it may also be unnaturally flexed either forward (anterior curvature or *lordosis*), or backward (posterior curvature or *cyphosis*).

*Anterior curvature of the spine* is generally the result of contraction of the hip-joint, or displacement of the head of the femur. Attention is generally called to it in the case of a child by the very peculiar gait of the patient. When he walks, the spine is observed to be strongly curved with the convexity forwards, and with a corresponding protuberance of the abdomen.

If the patient be laid on a couch, in the recumbent posture, and the limb affected be allowed to assume at the hip-joint a flexed position, the spine will be placed perfectly straight; the deformity, however, at once recurs on an attempt being made to straighten the leg.

The treatment must be directed to the cause, and if it be possible by any means to rectify this, the resulting curvature of the spine will disappear.

In the first place, therefore, it is necessary to find out to what the contraction of the hip is due, and a

careful examination must be made to determine this point. Most of the cases are the result of hip-joint disease, and on examination some amount of anchylosis will be detected in the joint itself. Great care and caution are required to decide upon the proper treatment for each individual case. If the disease be recent, extension by means of a weight attached to the leg and suspended over the foot of the bed is useful. If the case, on the other hand, be of long duration, and it is found that fibrous anchylosis keeps the leg in its deformed position, the adhesions may be broken down while the patient is under the influence of an anæsthetic. In those cases in which bony anchylosis is present, nothing can improve the deformity except osteotomy.

Anterior curvature of the spine is sometimes a natural result of obesity, and in these cases an abdominal belt is useful.

*Posterior curvature* of the whole spine is common in weakly and rickety infants, and of the dorsal spine in the young of both sexes (round shoulders). The best form of treatment in the case of infants is to keep them reclining as much as possible, and to improve their general health by proper diet and suitable medicine, such as cod-liver oil, steel wine, &c.

In the case of round shoulders in young girls and youths, the shoulders must be kept back by means of shoulder-straps, and exercises must be insisted upon, in which the arms are thrown backwards, the exercises being followed by rest in a reclining position. The sitting position should be, as much as possible, avoided.

LONDON:

PRINTED BY EDWARD STANFORD, 55, CHARING CROSS, S.W.

# COLUMBIA UNIVERSITY LIBRARIES

This book is due on the date indicated below, or at the expiration of a definite period after the date of borrowing, as provided by the rules of the Library or by special arrangement with the Librarian in charge.

| DATE BORROWED | DATE DUE | DATE BORROWED | DATE DUE |
|---|---|---|---|
| | AUG 6 1943 | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| C28(1140)M100 | | | |

Annex
NOV 1 - 1955

RD761 B17

Baker

Practical notes on the treatment

COLUMBIA UNIVERSITY LIBRARIES (hsl,stx)
RD 761 B17 C.1
Practical notes on the treatment of defo
2002280841