soaked. And this mode of procedure, though not so perfect as the systematic moistening of the entire mass, is a rough-and-ready way of attaining much the same result.

In changing the dressings we make it an invariable rule to cover the wound with something reliably antiseptic before we wash surrounding impure parts, so as to avoid the chance of defiling the wound with them. For these washings we use the 1 to 40 carbolic lotion. As to the times for changing the dressings, it is no doubt true that that which is applied immediately after the operation might in most cases be left untouched for several days. Nevertheless when discharge is free, I prefer, as a rule, to remove the first dressing when the first twenty-four hours have passed. We thus get rid of the serum and corpuscles, which, while they constitute the largest amount of discharge which occurs in the case, test, as we have seen, our antiseptic dressings the most severely. The discharge being still moist near the wound at this period, the gauze is lifted from it without disturbing it in the slightest degree; and I never knew a patient fail to express himself as feeling more comfortable when the first dressing had been changed. There are, however, special cases, like a stump after amputation of the thigh, where an exception may be made on account of the disturbance of the wound that the changing of the dressing would involve.

In conclusion, I may remark that it pleases me, as the years pass, to see the hope which I expressed at the International Congress in London eleven years ago in course of fulfilment, namely, that the use of the antiseptic system would gradually spread by leavening action throughout the world. At the same time I am sorry sometimes to observe that unnecessary trouble is often taken in some directions while essential points are disregarded in others; so that, with the best intentions, the best results are not always obtained. I venture to hope that this address may be of some use to you in directing your attention to the essential conditions of success.

THE TREATMENT OF SEVERE CLUB-FOOT.¹

By W. J. WALSHAM, M.B., C.M., F.R.C.S.,

Senior Assistant-Surgeon, Lecturer on Anatomy, and Surgeon in charge of the Orthopædic Department, St. Bartholomew's Hospital.

At the outset I wish it to be understood that I do not admit anyone can hold more strongly than myself that all ordinary cases of club-foot (and, indeed, as a rule even severe degrees of the affection in the infant) can be and should be satisfactorily and effectually cured by gentle means, aided, if need be, by the simple procedure of division of tendons and tense fascial bands. But I have come to an equally strong opinion from what I venture to think has been a large experience of these deformities during my charge of the orthopædic department at St. Bartholomew's Hospital for the last ten years, that there are in older children many cases that cannot be so cured, and that even in infants cases, exceptional I admit, are at times met with in which we can venture to affirm from the first that without some bone operation a satisfactory condition will not be obtained. To the former part of this proposition—that for relapsed or untreated cases in older children—something more than mere tenotomies or the division of fasciæ with apparatus and orthopædic means may be required, I think all will agree. But to the latter part, that there are cases of club-foot in the infant that cannot be cured without sooner or later some bone operation, I imagine objections may be taken. The subject naturally divides itself into the treatment of severe cases of club-foot in the infant, and the treatment of uncured, the so-called relapsed, cases in older children.

I.—THE TREATMENT OF SEVERE CASES OF CLUB-FOOT IN THE INFANT.

The title of the discussion precludes mention of the treatment of ordinary and slight cases. It seems that almost any method, if perseveringly and properly carried out, will suffice in these for the perfect and absolute rectification of the foot.

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For severe cases almost every form of treatment and apparatus with which I am acquainted has been honestly tried in the orthopædic department, and I have come to the conclusion that on the whole there is nothing better than the plaster-of-paris method. The practice in the department has been to begin the treatment immediately after birth, and to endeavour, with as little delay as possible, to overcome the varus position and bring the foot in line with the leg, and then to divide the tendo Achillis, and to restore the foot at once, if practicable, to the normal position by what is known as the immediate method of rectification.

I rarely divide the tibial tendons, and agree with those who think that they have very little influence in the production of the deformity. I hold that, as of the peronei in flat-foot, the tenseness of these tendons, when present, is due to passive shortening following on the approximation of their ends consequent on the malposition and altered shape of the bones, and not upon active spasmodic contraction depending upon some fault of the central nervous system. Where, however, the tibials have been felt tense and resisting they have been unhesitatingly tenotomised. But as a rule they have been found to elongate readily as the bone deformity is overcome.

Although for the straightening of the foot I think plaster-of-paris is, on the whole, preferable, I am quite ready to admit that other methods—such as the application of the varus splint, elastic tension, etc.—will answer equally well. The advantages of plaster in out-patient practice are manifold. Thus, if the plaster bandage is properly applied, we can ensure it keeping on for at least a week. Pressure is uniform and continuously kept up, there are no straps or bandages to become loose, and if a thick layer of cotton-wool is carefully placed below the plaster there need be absolutely no risk of sores or chafing. It gives less trouble to the parents, and above all it is cheap. At least once a week, better twice a week, the plaster should be removed, and before it is re-applied systematic passive movements of the joints and massage of the muscles should be employed. In using the plaster-of-paris there are as many details to attend to as there are in the use of Scarpa's shoe or other apparatus. Some little experience is required to know how tight or how loose to apply the bandage, so as not, on the one hand, to cause injurious constriction, nor, on the other, to allow the child to kick it off. Moreover, the foot at each application must be held in the corrected position as far as it will go until the plaster is firmly set.

Whatever method is used the varus position should not be too quickly overcome. We are not dealing in these severe cases merely with contractions of tendons, fasciæ, and ligaments, but with malposition and altered shape of the bones. The neck of the astragalus in severe cases is generally so bent and deflected that the articular surface of the head looks abnormally inwards, and often at the same time almost directly downwards, and the facets both on its head and on its trochlear and lower surfaces are considerably altered in position, direction, and shape. The anterior end of the os calcis is often bent inwards so that its facet for the cuboid looks forwards and inwards, instead of forwards; or there may be a distinct overgrowth of bone on the outer side of its anterior end, immediately behind its cuboidal facet. The remaining tarsal bones, though not much altered in shape, are certainly in severe cases, somewhat compressed on their tibial side, so as to be rendered, as it were, more or less wedge shaped, with the base of the wedge looking outwards. Rapid overcoming of the varus position can only be accomplished by stretching or dividing the soft tissues, leaving the deformities of the bone untouched. By the division of tendons, muscles, and ligaments on the inner side of the sole, the bones in front of Chopart's joint with the os calcis can no doubt be wheeled round on the head and under surface of the astragalus, at the so-called subastragaloid joint, so as to bring the foot more or less in line with the leg; but the articular surfaces are no longer in contact; the neck of the astragalus still keeps its faulty direction, the anterior end of the os calcis remains bent, and the other bones retain their more or less wedge-like shape. After the tendo Achillis has been divided, the scaphoid with the os calcis and the bones in front of them are only too likely to roll inwards again as the divided tissues on the inner side of the foot slowly cicatrise and contract. I have come to regard the neglect to correct the deformity

of the bones as the most common cause of what are known as relapsed, or what it would perhaps be better to call uncured, cases. As in knock-knee, so in club-foot. In the former, after division of the external lateral ligament and tendon of the biceps, the knock-knee can be rapidly overcome; so in the latter, by the division of the soft structures on the inner side of the foot, can the varus position be rapidly corrected. But as in one so in the other. It is only at the expense of the separation of the articular surfaces. In each the root of the evil—in the one case the overgrowth of bone on the inner side of the knee, and in the other the alteration in the astragalus and os calcis and other tarsal bones—remains untouched. To continue the comparison, as in knock-knee, we can only permanently overcome the deformity by applying our force so gradually that the bone rather than the ligament is acted on, unless we correct it at once by an operation on the bone, so in talipes it may be conceded that the varus position can only be permanently corrected by slowly acting on the tarsal bones or by some operation on the bones themselves.

Holding then the view that we should aim at acting on the bones in the correction of the deformity, the rapid stretching or division of the tissues on the inner side of the foot do not in all cases seem advisable procedures. Though fully prepared to admit that at the time of their division the foot can often—one might perhaps say as a rule—in the infant, be brought into line with the leg, the fact remains that the bones still retain their faulty shape, and further, the pull that can be exercised on them through these ligaments is, after their division, lost. It is true that new articular facets may subsequently be formed if the parts are held sufficiently long in their improved position, and no doubt this sometimes happens. Looking, however to the anatomical condition of the parts, where the articular surfaces of the bones have been thus rudely torn asunder, I cannot help feeling that there is a greater liability of a relapse than there is when the bones and their facets have been gradually altered and moulded into their normal shape by steadily-applied pressure. Be this as it may, I have practised the division of the tense structures on the inner side of the foot by the various methods that have been advised, namely, the subcutaneous section of the astragaloscaphoid capsule of Mr. Parker; the subcutaneous division of all the soft tissues from the plantar fascia to the bones recommended by Dr. Buchanan, and the open division of these structures after the method of Dr. Phelps. But hitherto the results obtained by these means have in my hands been disappointing, and in some of the severer cases in which I tried them a bone operation had subsequently to be done when the child grew older.

If this view of the principle that should guide us is correct, namely that the bones rather than the ligaments should be acted on, it is another reason, if such can be necessary, for undertaking the treatment at the earliest possible date. The bones at this period are soft and pliable and can by gradual moulding be made to take almost any shape. The infant's foot, therefore, should not, in my opinion, be brought completely into a straight line with the leg under some six weeks to two months of treatment.

The same objections as apply to the rapid correction of the varus do not hold good in the rapid overcoming of the equinus position, at least in the less severe degrees of the affection. Here we have merely the astragalus partially tilted out of its socket, but at first, and in cases of only moderate severity, no alteration, or very little, of the articular facets. If the bone therefore can be at once replaced in its socket after division of the tendo Achillis there seems no reason why it should not at once be done. There is certainly no danger of non-union of the tendo Achillis in consequence of the ends being widely separated, and by getting the bone back as soon as possible into its socket the risks of alteration in the facets which have been held apart are to a great extent avoided.

For the last five or six years, in all cases where tenotomy of the tendo Achillis has appeared necessary, the foot, where practicable, has been carried at once beyond the right angle, leaving often a gap of as much as half an inch, or even an inch in older children, between the divided ends. Although some hundreds of cases have now been treated in this way in the orthopaedic department no case of non-union of the tendon or other mishap has been met with.

In nearly all instances an abundance of firm uniting material has been formed. The only cases in which the material has been weak have been where the pad covering the puncture has pressed it too tightly towards the bone. I am particular now in instructing the house-surgeon and dressers never to apply the strapping over the puncture-pad transversely, since it is conceivable that if the skin is carried in towards the bone between the ends of the tendon when widely separated, non-union, or very weak union, might be the result. When, therefore, the foot can at once be corrected, this has always been done, and the results have been excellent. But there are cases in which the foot cannot be brought to a right angle. The hindrance to complete flexion may then be due, to some extent, to contraction of the posterior ligaments, and in some cases their division, as advocated by Mr. Parker, is no doubt of service. In the majority of such cases, however, when the foot will not go up to a right angle it is, I believe, not the result of any contraction of the tendon or ligaments, but of a downward deflection of the astragaloid neck.

When the normal wedge-like shape with the base in front of the trochlear surface is remembered, it will be understood why, apply what force we will, the foot cannot be brought up to, much less beyond, a right angle. Division of the tendo Achillis or of the posterior ligaments of the ankle-joint, beyond loosening the joint and allowing the articular facets posteriorly to be somewhat separated, exercises no influence upon the flexion of the foot. The neck of the astragalus in front of the trochlear surface comes into contact with the tibia and external malleolus, and this locking of the bones effectually prevents the foot being further flexed at the ankle-joint. Much has been written on the inward deflection of the neck of the astragalus, but its downward bend appears to have escaped the attention it undoubtedly deserves. In the less severe cases, long-continued pressure, either by mechanical means or by plaster-of-paris, will no doubt succeed; but the force must be applied gradually, as in the correction of the varus, so as to act upon the shape of the bone rather than as a mere stretching of the soft tissues. Here, again, the division of the ligaments in the sole of the foot may only do harm, inasmuch as it prevents their being made use of as a fixed point in the application of the correcting force.

It has been affirmed by some authorities that by continuous mechanical extension with Scarpa's shoe or other apparatus the foot in infants can always at length be brought beyond the right angle. In the majority of cases this is correct, but I have met with cases in which such apparatus, as well as plaster-of-paris, has proved ineffectual, and sooner or later an operation on the tarsus has had, however unwillingly, to be performed.

In these exceptional cases I believe we can prognosticate from the first that, do what we will, an operation on the tarsus of some sort will ultimately be required. In these infants the leg is short, fat, and stumpy; the heel exceedingly poorly developed, the parts rigid, the outer border of the foot excessively rounded, and, if a perpendicular is dropped down the centre of the leg, much more of the middle of the outer part of the foot than in any ordinary severe case of talipes lies to the outer side of this line. Moreover, in the cases to which I am especially referring, the thigh cannot always be fully rotated outwards at the hip-joint. For these patients I have tried, and perseveringly tried, almost every form of treatment and apparatus that, as far as I know, has been advised, and, as a rule, have been disappointed. The varus position has never been completely overcome, and after division of the tendo Achillis and posterior ligaments, even severe wrenching and the application of as much manual force as could safely be used failed to bring the foot up to a right angle. Neither could it be brought up by slowly-applied mechanical extension.

I have not done a bone operation on these patients at a younger age than 2 or 3 years, but at that tender age I have found that, even after removal of the astragalus, the foot in some instances could not be got into a satisfactory position until further portions of the bones had been excised.

II. THE TREATMENT OF SEVERE CASES IN CHILDREN.

It is common to speak of cases in children above the age of 2 or 3 years as relapsed cases. Many of these severe cases are to be

regarded, not as having relapsed, but as never having been completely cured, and the condition depends upon the varus position having been too rapidly overcome, or on the foot having never been got up to or beyond the right angle. Some of them, I believe, belong to the class of the deformity of which it may, in my opinion, from the first be foretold that it will not be cured without a bone operation. Several of the patients on whom I have had to operate were under my own care from the commencement of the treatment, and it is, of course, open to be said, or thought, that in them the uncured condition was the result of my own faulty management. But, putting these aside, I have had to operate on patients not only from the general hospitals, but from the children's hospitals and special orthopaedic institutions. Careful notes have been kept of these cases, and it appears that they have not only been out-patients, but have had in-patient treatment, and had perseveringly worn splints and irons till they came under my care. Considering the surgeons, both general and special they had been under, I do not believe that, if curable, they would not have been cured. Of course I do not mean to say that we never meet with children that have been improperly treated or neglected, but in far the greater number of the cases operated on the history showed that very careful and persistent treatment had been received.

A boy of 9, from whom I removed the astragalus of both feet, had been under constant treatment at a London orthopaedic hospital since he was 2 months old. Numerous tenotomies had been performed, and an apparatus and irons had been worn continually, under the superintendence of an orthopaedic surgeon, till he came under my notice. He had friends in moderate circumstances, and had suffered no neglect on the score of attention or expense. When he came to me he could get about fairly well with his instruments on, but when they were off the feet at once fell into the varus position, nor could they be brought to a right angle with the leg. I removed the astragalus from both feet, and found the usual deflection inwards and downwards of the neck of the bone, and such changes of the articular facets as must have precluded the restoration of the shape of the foot by gentler means.

I briefly quote this case from among many, not as casting any discredit on the institution at which he was treated, but as an independent example of the incurability of the deformity in some instances, even where from the first every care and attention had been received.

In former years it was my custom, before submitting these relapsed and uncured cases to bone operations, again to try tenotomies and milder measures; and I have kept them in the hospital for months under daily personal observation, using in some plaster-of-paris, in some Scarpa's shoe or other highly recommended appliances. So convinced, however, have I now become of the inutility and waste of time in thus treating them that, where such measures have already been employed by other surgeons of repute, I at once proceed to some form of tarsectomy.

The operations of which I have had personal experience for these severe cases are syndesmotomy, Buchanan's operation, Phelps's open incision; tarsotomy, or linear osteotomy of the tarsus; tarsectomy, or removal of a wedge-shaped piece from the tarsus; and partial or complete astragalectomy, with or without extirpation of other portions of bone.

Syndesmotomy.—The objections that seem to apply to syndesmotomy in the infant have already been commented on. In confirmed cases in older children the bones are so consolidated in their faulty shape and position that division of the ligaments is quite futile—at least it has been found so in the cases in which I have tried in this way to rectify the foot. Syndesmotomy, then, appears to have but a limited application in the treatment of congenital club foot. Thus in confirmed cases the bones are too consolidated to permit of being shifted, and in severe cases in the infant, although the bones can be moved on one another, it is at the expense of the separation of the articular surfaces, the deformity of the bones remaining unaltered. For slighter cases, with which, however, we are not now dealing, it hastens the cure, but even for such I am doubtful if better ultimate results are not obtained by the more gradual method.

Professor Buchanan's Operation, or the subcutaneous division of the whole of the soft structures on the inner side of the sole down to the bones, and *Mr. Arbuthnot Lane's Modification*, or rather extension of it, namely, a similar division of the whole of the structures, but on the outer as well as on the inner side, though highly spoken of by some, do not commend themselves to my judgment. The severance of the whole of

the arteries, nerves, and muscles, as well as fasciæ and ligaments in the sole of the foot, appears a very severe, and one is tempted to say a not very scientific, procedure, and one, moreover, that might easily be attended with unpleasant complications. In the few instances in which I have done it no apparent harm has come, though it did not answer in permanently restoring the shape of the foot. Like syndesmotomy, moreover, beyond allowing the bones to be somewhat shifted on each other, it does not attack the root of the evil.

Phelps's Operation, or the open division of the tibial tendons and the ligaments on the inner side of the foot, has been received with considerable favour, not only in America, but in this country and on the Continent of Europe. The same theoretical objections apply to it as to subcutaneous syndesmotomy and Buchanan's operation, in that it does not deal with the deformity of the bones. It allows the foot in many cases to be brought into a good position at the time; but it remains to be seen whether relapses, as one would expect, do not sooner or later occur. My practical experience of this operation has been limited.

Tarsotomy and Tarsectomy.—Tarsotomy, or the transverse division of the tarsus, is of service where the varus is the chief defect. In extreme cases, and especially where the foot will not come up to a right angle, simple transverse division of the tarsus has not, in my hands, been sufficient for thoroughly dealing with the deformity; and a second and oblique section has generally had to be made, thus removing a wedge of bone, with the apex inwards and downwards, from the tarsus. In short, the tarsotomy has had to be completed as a tarsectomy. My tarsotomies have been done with a chain saw passed beneath the extensor tendons through a small incision on the outer and inner side of the foot. The line of section has been planned to divide the neck of the astragalus on the inner side of the tarsus and the anterior end of the os calcis on the outer side. If now unable to slide the bones in front of the section outwards and upwards sufficiently far to overcome the varus and equinus, the saw has been worked a second time through the scaphoid and cuboid. The double wedge of bone between the lines of incision thus removed should consist of a portion of the astragalus and scaphoid internally, and of a thicker slice of the os calcis and cuboid externally. As far as the operation is concerned all the patients have done well. The foot in my later operations has been placed immediately after rectification in plaster-of-paris, and kept in it without changing the first dressing till the wound has healed. The ultimate results have certainly not been so uniformly good as in the cases where the astragalus has been removed.

Astragalectomy.—I have always removed the astragalus by Lund's external incision, that is an incision extending in a gentle curve from the external malleolus forwards and downwards between the peroneus brevis and tertius. It gives an excellent exposure, plenty of room to work in, does not involve the division of any tendon, admits, after the removal of the astragalus, of the excision of any further portion of bone that may be found necessary, and leaves only a linear scar. The only difficult part of the operation is the division of the internal lateral ligament, but this can be overcome without much delay, by cutting freely round the inner side of the astragalus with the curved bone scissors. Since 1882 there have been at St. Bartholomew's 21 cases of excision of the astragalus for talipes: 16 of these cases were under my own care, the remainder were under the care of my colleague, Mr. Willett. All did well. In only two was there any supplantation, and in the majority a movable ankle-joint was obtained. In my own cases, and, I believe in those of my colleague, the foot was placed in plaster-of-paris at the time of the operation, and kept in it about a month. At the first dressing, at the end of this period, the wound had generally healed. In a few of the cases it was found sufficient merely to remove the head and neck of the astragalus, leaving the ankle-joint intact. In others the excision of the astragalus alone was not sufficient to allow of the foot being placed at a right angle with the leg, the os calcis or the cuboid in them coming into contact with the external malleolus. This locking of the bones may be overcome by partially dividing the external malleolus with bone forceps, just below its articulation with the tibia, and then bending the malleolus backwards and outwards. If this does not suffice, more of the tarsal bones must be taken away. Thus a part or the whole of the cuboid, a

slice of the scaphoid, and perhaps the anterior end of the os calcis as well may have to be excised. When once a bone operation has been embarked on it is no use stopping short till sufficient bone has been cleared away to permit of the rectification of the foot. No more should of course be removed than is necessary, but to take away too little is to my mind the graver fault.

In a case, perhaps the most severe with which I have had to deal, after removal of the astragalus and a wedge from the tarsus, there was practically no improvement in the shape of the foot. The remains of the scaphoid and cuboid were therefore sacrificed, and this being of no avail, the cuneiform bones and the anterior half of the os calcis as well. It was not till the external malleolus and the heads of the outermost metatarsal bones had been also removed that the foot at length assumed a decent and fairly satisfactory shape. This may be considered a heroic procedure, but, heroic or not, the patient was so well pleased with the result that he walked all the way from Sheffield to St. Bartholomew's to have the other foot treated in a similar way.

What is the ultimate condition after excision of the astragalus, and, if necessary, other portions of the tarsal bones? Well, at the most it is only making the best of a bad job. But the foot is plantigrade and respectable in shape, and if healing by the first intention is ensured, and passive movements are subsequently kept up, a fairly movable ankle-joint is obtained. Further, the patient's walking powers are much improved, and he can, as a rule, dispense with instruments. I say as a rule because, as all are aware, the severe deformity of the foot that calls for astragalectomy is often, after all, merely part of a general malformation of the whole limb. The muscles are wasted, the knee-joint is loose, and the neck of the femur so deflected that the whole leg turns inwards. All who have had much experience in the treatment of talipes must have been disappointed, even in cases of moderate severity, on finding that after the talipes has been cured the toes still turn inwards when the patient begins to walk. For such the long continued use of instruments reaching to the waist of course does much. But for hospital patients an osteoclasis or osteotomy of the femur with rolling of the lower fragment with the leg outwards is the quickest, and perhaps the most effectual, way of dealing with the deformity. The credit of this procedure is, I believe, due to Mr. Parker.

CONCLUSIONS.

1. That in the treatment of severe cases of club-foot in the infant our aim should be to act on the bones rather than merely to stretch or divide the soft structures on the inner side of the foot.
2. That to accomplish this object the varus defect must not be too quickly overcome.
3. That when the varus is cured the foot should, if possible, be carried at once after division of the tendo Achillis beyond a right angle with the leg, there being no danger of non-union of the tendo Achillis.
4. That when the foot, after the division of the tendon, will not come up to or beyond a right angle it is the result not, as a rule, of contraction of the posterior ligaments or of the astragalus being partially tilted out of its socket, but of a downward deflection of the astragaloid neck.
5. That attempts are best directed to overcome this deflection by acting on the bone rather than by division of the posterior ligaments or soft structures in the sole of the foot.
6. That in exceptional cases, even in the infant, we can prognosticate from the first that neither the varus nor the equinus will be thoroughly overcome without a bone operation.
7. That for such, but only after all gentler means have been perseveringly tried, and for confirmed cases in older children, astragalectomy, with, if necessary, the removal of a further portion or portions of the tarsal bones, is, on the whole, the best operation.

DISCUSSION.

Mr. A. H. TUBBY thought that in children there was no condition of spastic talipes so severe as to call for any one of the numerous operations on the bones mentioned by Mr. Walsham. Mr. Tubby had seen several cases which had undergone excision of parts of the tarsus one year previously, and the condition of the foot formed a

striking contrast to the results obtained without excision. He therefore failed to agree with the first conclusion of Mr. Walsham. With reference to the faulty direction, forwards and downwards, of the neck of the astragalus, as a factor in the production of the deformity in talipes equino-varus, Mr. Tubby was of opinion that this could scarcely be the real cause at work. Rather was this dependent on the contraction of the muscles and fasciæ and the altered shape of the bones was secondary. He had examined several specimens of this deformity. In some the axis of the neck of the astragalus was altered and in others not. As to the recommendation to divide at one operation all the tendons, including the tendo Achillis, and placing the foot up in plaster-of-paris, renewable at intervals of three days or a week, Mr. Tubby preferred to treat the varus first and then the equinus afterwards. Instead of placing the foot up at once in its natural position after division of all the tendons it was better to put it up at first in a position closely similar to that preceding the operation and then gradually to stretch the uniting material as required to place the foot in its proper position. He had made some experiments recently in the union of tendons, by which it was shown that the uniting material was capable of great extension from four to six months after tenotomy. Immediate replacement of the foot produced a large interval between the cut ends of the tendon with the formation of a thin, feeble, and very extensive band, which resulted in over-correction of the deformity and the production of a reverse condition, namely, talipes calcaneus. He had recently seen three cases of talipes calcaneus in youths who had suffered from talipes equinus. It was found in tracing these cases that all the tendons had been divided at one sitting including the tendo Achillis, that the foot had been placed in plaster-of-paris, and that owing doubtless to neglect on the part of the parents, a worse deformity had resulted.

Mr. E. MUIRHEAD LITTLE could not agree with Mr. Walsham's statement that some cases were not extensible to a right angle. He had never met a case in which the foot was not at length extensible to a right angle. He exhibited casts from a patient, aged 19, which showed that even in the severest form the foot could be made plantigrade and flexible to a right angle without bone operations. He could corroborate Mr. Walsham's opinion as to the condition of the whole limb in severe cases after any treatment, and as to the rotation at the hip-joint. Immediate extension had no advantages over extension as free as possible after the wound had healed. This was especially the case after sections of plantar fasciæ, in which there was some risk of hæmorrhage if the extensions were immediate.

Mr. JOHN EVANS (Bristol) advised early tenotomy, after four or five days, applying a plaster-of-paris bandage, to be removed every two weeks, and on no account to be kept on too long. He deprecated syndesmotomy, and advocated very strongly tarsectomy, and removal of a full sized wedge, taking great care to get good position. The difficulty created by inversion of the whole limb could be rectified by steel jointed supports reaching from the pelvis.

Mr. E. LUKE FREER (Birmingham) agreed with Mr. Walsham in the abstract that there were cases in which bone operations were required, but could not agree that it was possible to say at birth whether a bone operation would be required. He had been pleased to hear Mr. Walsham say that the bony alteration was the most important, and that was the reason for absolute necessity of constant manipulation. Most general surgeons trusted too much to operation and instruments, and did not consider the manipulations necessary to make such alterations in the bony structures. In some relapsed cases undoubtedly a tarsectomy or tarsotomy might occasionally be required, but he had never found it necessary to resort to this procedure. He complimented Mr. Little on the cast he had shown, which was the best argument against the too hasty adoption of bone operations.

Mr. NOBLE SMITH thought that treatment could not be commenced too early in life. He advocated the use of plaster-of-paris bandages from the commencement, until the feet ceased to give way to the pressure; after this treatment he employed tenotomy, but he would not apply the plaster immediately after tenotomy. Tarsectomy should be only performed when the deformity would not give way to treatment by pressure. He thought that Scarpa's shoe was very

rarely necessary, but that more simple apparatus sufficed after correction by the above-named methods.

Mr. WILLIAM THOMAS (Birmingham) had adopted one method of treatment to the exclusion of all others, and he had gradually perfected it until he found it completely satisfactory. No one, except Mr. Noble Smith, had been bold enough to say how long it took to cure a bad case of club foot—"the whole period of growth." He had been able to compare two cases, in one of which he had had a free hand, and carried out with care the various means of treatment, such as manipulation, tenotomy, plaster, and Scarpa's shoes; in the other tarsectomy, and at the end of four years the second showed by far the best results. After such an experience he was surprised to find anyone stating that tarsectomy was not necessary. He was in the habit of commencing the treatment by instructing the mother to manipulate and bandage the foot to a malleable iron splint, and often obtained considerable improvement before proceeding to divide the tendons. He was also able to obtain a knowledge of the case as to whether it would prove inveterate, and if so he at once would proceed to tarsectomy. Tarsectomy was a simple operation, and could be repeated time after time until the proper form was attained.

Mr. FIRMIN CUTHBERT (Gloucester) thought that the earlier treatment was commenced the better, and especially to correct the varus by stitching the tendons (under chloroform), and putting up in plaster-of-paris, etc., repeating this process about once a month, and then dividing the tendo Achillis. In many cases the tendo Achillis had been divided at the first. There appeared to be no objection to put the foot actually at a right angle at once, and to keep it in this position. If the foot could not be got into good position after tendons and the plantar fasciæ had been divided, tarsectomy should be at once proceeded with. The incision should be linear over the most prominent part of the deformity, and the bone removed with a chisel in preference to a saw, thereby saving any *débris* in the wound, it being easier to remove more should the foot be found not to come into good position. The foot should be bent up for the first few days in a fixed apparatus, and then in plaster-of-paris, and left for a month. He would not use Scarpa's shoes in these cases, on account of their taking up so much time and attention, and involving considerable expense. With regard to the rotation inwards of the whole limb, after the position of the foot itself had been as nearly as possible corrected, he should divide the femur in preference to the tibia and fibula.

Mr. C. B. KEETLEY thought the sharpest distinction should be made between severe club foot of paralytic and of congenital origin. The latter, if old, most frequently required osteotomy to effect its permanent cure. Tarsectomy produced great improvement, but never a perfectly satisfactory result. There remained varus at the ankle, due mainly to wedge shape (in transverse section) of the astragalus. It was remarkable how little injury to the shape even of an undeformed foot was done by the removal of the astragalus. On the other hand, it was natural to endeavour to avoid interference with the ankle joint if possible. The tarsal wedge should be so removed as to facilitate the pushing round of the scaphoid on the astragalus after the opposing ligaments and tendon had been cut. Sometimes the skin gave way, but there was no good object to be attained by fully gashing it and making a granulating wound. Mr. Keetley had attempted, but with only partial success, to transplant the superfluous skin from the dorsum into this gap. The treatment of congenital club foot could scarcely be begun too early, and, in severe cases, the tendo Achillis should be divided without delay. To postpone tenotomy was to cherish an obstruction to the successful manipulative treatment not only of the equinus but even of the varus.

Mr. H. A. REEVES thought that in an average case of equinovarus trusting to stretching and putting up in plaster-of-paris was not to be recommended because the foot was cramped, whereas by the use of flexible metal splints the foot could be watched. To trust to manipulations and plaster bandages alone led to disappointment and to later tenotomy. Some relapsed cases needed severer proceedings, but if infants were operated on and carefully looked after such proceedings became unnecessary.

The PRESIDENT (Mr. John Croft) observed that the all-

important factor was time, and next to that constant attention. All cases should be accepted as probably simple. Most cases, in his experience, could be treated by simple measures. Early division of tendons was very important. For years he had considered division of the tendo Achillis the only essential in simple cases of talipes equino-varus. He used cocaine generally for tenotomy of the tendo Achillis. He had only once seen non-union of tendons. In putting on dressings it was necessary to take care not to get skin in between the cut ends of the tendons. One fact had been established by the discussion, and this was that in certain cases osteotomy was necessary.

THE TREATMENT OF SCOLIOSIS.

Mr. E. L. FREER (Birmingham) said that in his opinion the two chief causes of scoliosis were bad positions acquired at school or work during childhood and adolescence, and muscular debility. In Birmingham he found that a large number of cases occurred among the working classes, and to these cases he gave the name of "trade curvatures." He held very strongly that when once a curvature was developed no cure could be effected, although the curvature could be prevented from getting worse. The principles of treatment which he adopted were those enunciated by Dr. Mathias Roth, consisting in the practice of what might be called medical gymnastics. This treatment could not be carried out satisfactorily in Birmingham in consequence of the necessarily imperfect hygienic conditions of a large town, but the very best results were obtained from it when it was practised at Llandudno. The treatment consisted in an improvement of the general health, in the correction of bad postural positions, and in the re-education of weakened muscles by systematic exercises. Mr. Freer gave a detailed account of the exact course of muscular training through which he caused his patients to pass.

Mr. EWENS held that in cases of lateral curvature poroplastic supports were preferable to plaster-of-paris on the ground that they were cleaner, and could be taken off at night when they were no longer required.

Mr. W. J. WALSHAM said he agreed in all that Mr. Freer had said. Such a course of exercises had been for many years carried out in the orthopaedic department at St. Bartholomew's. Where they could be well done under the supervision of a number of skilled assistants, dressers, and nurses the results were excellent, but in many of these cases osseous changes existed, and for such something more was wanted. The rigidity of the spine in these patients should be overcome to allow of the exercises being of more use. This had been done by what he called the weight treatment. The patient was placed with the body horizontal, the legs straight, and the elbows resting on a chair. In this position a weight was so applied to the spine as bear upon the backwardly projecting ribs. At the hospital this was done in a very simple way. A broad bandage fixed at one end was passed over the spine so as to press, when weighted at the other end, on the ribs at the most prominent part of the dorsal curve. The weight consisted of a large watercan fixed to the end of the bandage. The weight could be increased by pouring in more water. Under the influence of the weight the ribs were carried forwards, and the rotated spine was, so to speak, unrolled. Of course, when the weight was taken off the ribs came back to their faulty position; but after the weight treatment had been applied for some weeks, the return to the deformed position was certainly less and less, and the spine, which at the commencement of treatment was rigid and unyielding, became flexible and supple, and the muscles brought into play by the exercises, could do their work in the correction of the deformity in a much more effectual manner. Mr. Walsham's senior assistant in the orthopaedic department (Dr. Kent Hughes) had been most enthusiastic in the carrying out of the weight treatment and in supervising the exercises. Much of the improvement in their patients was to be ascribed to the persevering manner in which this had been done.

Dr. LEWIS MARSHALL thought that in all athletics the children should be trained to be ambidextrous. Boxing was an excellent method of developing the chest, and he thought that even girls might with advantage be taught this art.

CONGENITAL DISLOCATION OF TIBIA.

Dr. LEWIS MARSHALL showed a girl, aged 19 months, who had a congenital dislocation of the left tibia forwards, the femur lying in the popliteal space. Dr. Marshall divided the rectus muscle subcutaneously just above the patella, taking care not to injure the synovial membrane. The result was most satisfactory, the child walking quite well, and the joint being perfectly restored.

GENU VALGUM AND OVERGROWTH OF THE INNER TIBIAL TUBEROSITY.

Mr. JOHN EWENS (Surgeon to the Bristol Hospital for Women and Children), having alluded to the silence of some eminent surgical authorities on this subject, and the slight reference as regards the distinction between this affection and other forms of genu valgum made by other writers, Mr. Ewens proceeded to call attention to the very distinctive features of the two cases by which his observations were illustrated. The inner tuberosities of the tibia were enlarged and elongated without any corresponding change in the inner condyle of the femur. The primary cause of genu valgum was, of course, a rickety condition of the bones with general loose condition of the ligaments. Why the femur only was affected in the majority of cases, the femur and tibia in a smaller number, and the tibia alone in a third and still smaller class, was a question open to discussion. Mr. Ewens had seen three of the last class of cases, of which two had been under his own care, and had been operated on by him. In each variety of case it appeared probable that the condition was due to some accidental circumstance inducing increased vascular supply to one part rather than to another. The greater frequency of the condylloid form might also be due to the normally flexed condition of the knee during sleep and when sitting, for in this position the head of the tibia was in close approximation to the posterior surface of the condyles. The common practice of letting weakly children wriggle about on the floor, or when seated on a low stool of allowing them to use their feet as propellers, was adduced as a probable determining cause of the curvature of the tibia. Notes of the two cases having been read, the writer proceeded to discuss the treatment. It was very obvious, from an inspection of the casts and photographs, and still more evident from inspection of the living subject, that no operation on the femur, either condylloid or supracondylloid, could possibly bring the hip, knee, and ankle-joints into relation with each other, and that section of the tibia alone could remedy the deformity. Then arose the question as to the nature of the operation, whether by removal of a wedge or wedges, or by simple section of a bone. The former method, in spite of some extra risks, appeared to be the most scientific and accurate. In Case No. 2 two wedges were removed, but on further consideration Mr. Ewens thought that in future operations on a small bone a simple section of the lower part of the tibia might be sufficient. In Case No. 1 the double wedge was the only method which could possibly have remedied so serious a curve, except by such a number of sections of the bone as would have been even more dangerous. The causes of the suppurative, some unavoidable, in the cases having been pointed out and regretted, the belief was expressed that further experience would quite prevent such accidents and render the operation a comparatively safe one. The treatment of such cases by mechanical methods was then referred to, but objections to it were raised on the grounds (1) of expense; (2) impossibility amongst the class of patients in which such curvatures were met with of getting proper attention bestowed on them; (3) the length of time required for the treatment by such methods. The last objection applied with full force to the treatment by plaster-of-paris casing. Neglect of these cases in the vain hope that the patient would outgrow the deformity was strongly condemned, even though a very small percentage of slight cases of curved tibia, genu valgum, etc., might, under especially favourable circumstances, improve without operation or instrumental aid. These cases, however, must always be an exception to a rule based on sound common sense principles. It was much to be regretted that early indications of curvature in bones were not attended to by suitable diet, tonic medicines, and also by splints, etc., at a period when walking was not a necessity for the child's health.

Mr. WALSHAM agreed with Mr. Ewens. He said that he was more in the habit of doing osteoclasis rather than osteotomy, as he obtained better results from the former operation.

Mr. NOBLE SMITH said that he held not that deformity of the tibia was a cause, but that it existed more often than enlargement of the internal condyle of the femur, and that he had based his views not only upon examination of patients but also upon specimens of rickety bones in museums. With regard to the comparison of treatment by operation and with instruments, he thought that the periods of time were probably not very different, since if the joints were generally weak, instrumental support after operation would be necessary for a considerable time.

Dr. BRAIDWOOD said that as a rule operation was not required till after the tenth year, and in his experience division of the femur gave the best results.

NERVOUS DISORDERS FOLLOWING SECONDARILY CERTAIN ACUTE INFECTIOUS DISEASES OF CHILDREN.

Dr. P. MURRAY BRAIDWOOD (London) in this paper considered the pathology and treatment of nervous disorders following croup (including diphtheria), influenza, measles, mumps, whooping-cough, röteln, scarlatina, and chicken-pox. He stated his belief that convulsive and epileptiform disorders following secondarily on acute infectious diseases in children were generally due to some accidental cause, such as a fright or the overpressure of school work. Paroxysms of eclampsia infantilis closely resembled in their symptoms those of epilepsy in the adult. The convulsions might be repeated three or four times, while in the intervals the comatose condition and complete loss of consciousness and sensation might continue. The persistence of the reflex sensibility in such circumstances might easily mislead, for touching the conjunctiva produced contraction of the orbicularis, and sprinkling with cold water excited reflex contractions. Dr. Braidwood, in the course of his paper, also considered the causes and treatment of chorea, Jacksonian epilepsy, unilateral spasms, and tetanus occurring in children. Massage had, he said, yielded him excellent results in cases of infantile paralysis, especially when it was combined with electricity. The paper was illustrated by a table indicating the chief nervous diseases met with in children after the various infectious diseases.

TREATMENT OF PERICARDITIS BY THE ICEBAG.¹

By D. B. LEES, M.A., M.D., F.R.C.P.,

Physician to St. Mary's Hospital and to the Hospital for Sick Children Great Ormond Street

[Dr. LEES began his paper by drawing attention to the serious consequences, in damage to the cardiac muscle and the formation of adhesions, which too often resulted from a pericarditis after apparent recovery. He pointed out that the present treatment of pericarditis was not merely practically *nil*, but that it was not seldom actually a minus quantity, for the occurrence of this complication often induced the physician to give up the use of salicylates on account of the supposed danger of their employment in this condition. After a considerable experience in the use of ice in the treatment of pneumonia, he had ventured to try it for pericarditis, and with very satisfactory results. It is clear that if the local application of ice has any influence in checking the subjacent inflammation, in so far it will tend to relieve the heart from depression, and thus act as a true cardiac tonic. Whether it does this or not can only be discovered by cautious employment of the icebag, and careful observation of the result.]

CASE I. *Acute Rheumatic Pericarditis: Pleurisy: Treatment by Salicin and the Icebag: Immediate Relief.*—A girl, E. H., aged 13, admitted into St. Mary's Hospital, January 21st, 1890, for her first attack of rheumatism. The affection of the joints was subacute, but she had pericarditis on admission. Temperature 100.5°, pulse 120, respiration 44. The house-physician applied three leeches over the heart, and gave her 20-grain doses of salicin, every hour for four doses, afterwards every four hours. I saw her on January 22nd; she was then in much distress; the pulse had risen to 140 and the respirations to 60; temperature 99.2°. I found a double rub over the heart, a systolic murmur at the apex, also tenderness and loud pleuritic crackles in the left axilla. I directed that a large

¹ Read in the Section of Medicine at the Annual Meeting of the British Medical Association held at Nottingham, July, 1892.