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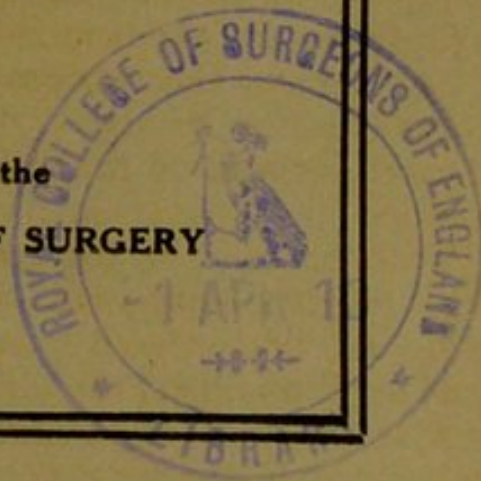
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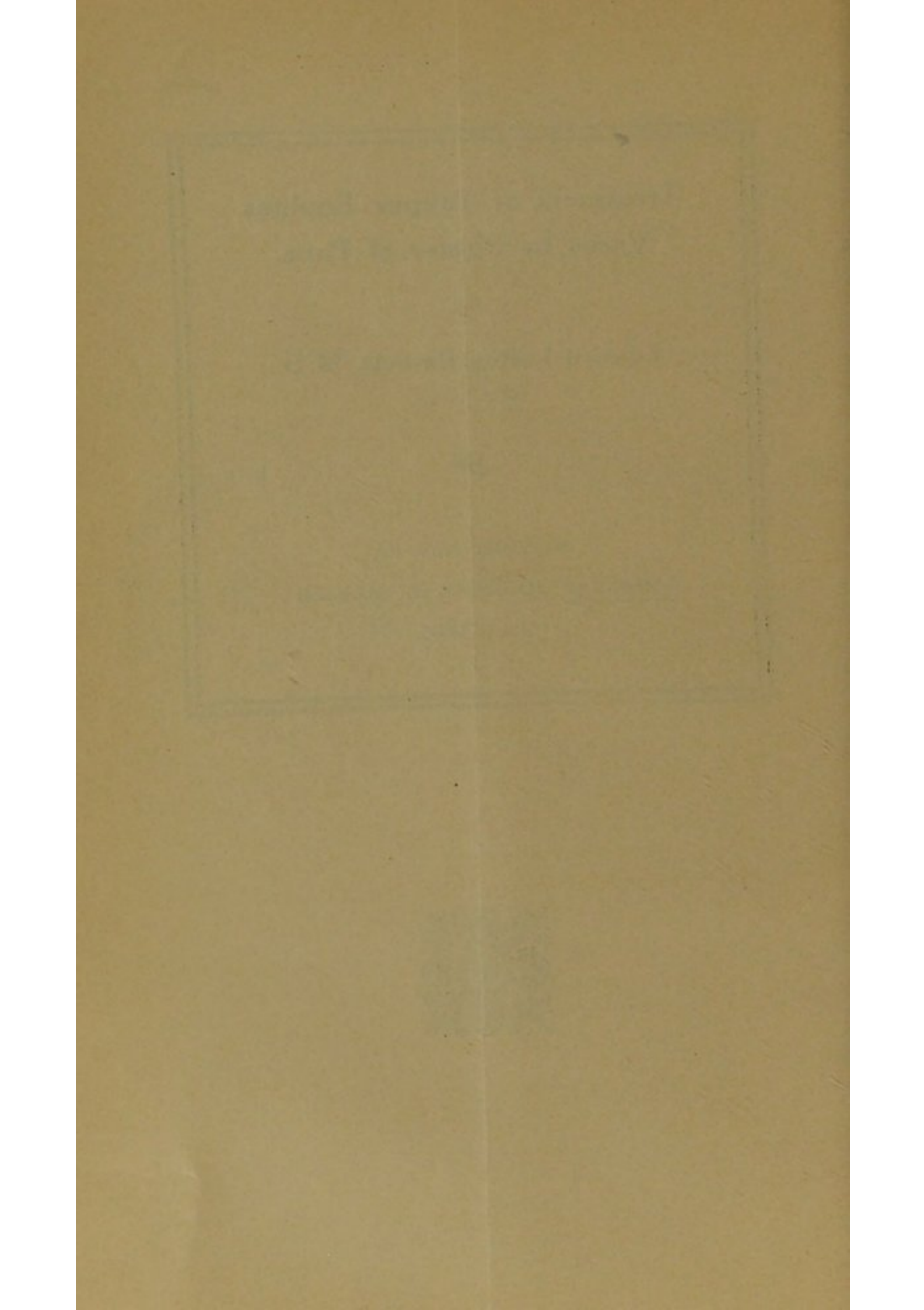
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## TREATMENT OF TALIPES EQUINUS VARUS BY PLASTER OF PARIS.\*

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That the treatment of congenital talipes equinus varus requires the greatest skill in technic as well as a complete understanding of the principles involved to produce the best results, those with the most experience will testify.

Whitman says: "Although congenital club foot is an eminently curable deformity, yet perfect and permanent cure often requires minute attention to details during the entire stage of treatment, supplemented by long continued and careful supervision after the cure is supposed to be complete. No other deformity presents such a record of failures and incomplete cures, or relapses after apparent cure, of tedious and ineffective treatment by braces, after many years, and of unnecessary and mutilating operations. A few are due to unusual obstacles in the deformity itself, but by far the greater number must be accounted for by the failure of the physician to apprehend the true nature of the deformity, or by his inexperience in the practical details of the treatment."

Bradford and Lovett say: "The literature of

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club foot is too often that of unvarying success. It is sometimes as brilliant as an advertising sheet, yet in practice there is no lack of half cured or relapsed cases, sufficient evidence that methods of cure are not universally understood."

To thoroughly understand and work out the best treatment for the correction of any deformity one must know:

1. The anatomical structures and mechanical principles that enter into each deformity.
2. The technic of the operations for its correction.
3. How to prevent its recurrence.
4. How to restore the functions of the part.

The anatomy of talipes equinus varus comprises both the foot and the leg. The foot as a whole, beginning with the slightest deformity is simply adducted, supinated and plantar flexed with shortening of ligaments and tendons holding the foot more or less permanently in this position. As the deformity becomes more severe the tarsal bones become slightly twisted and curved and partly dislocated to allow the foot to assume the more deformed position.

In detail, the astragalus begins to twist in its neck at the same time if the force is great enough through its articulation and ligamentous structure, the tibia is twisted on its long axis, principally on its lower third, and the whole leg is turned inward. The force continuing, the articular surface of the astragalus becomes partly dislocated, the calcaneus is twisted, the scaphoid slipping as far as the internal malleolus. The cuboid, cuneiforms and anterior part of the foot following in the general direction. Their articular surfaces all rotating to the



inside, the ligaments and fascia contracting in their new relations.

We know that mechanically the easiest way to restore the foot to its normal anatomical condition is to retrace the steps that the foot must have once occupied, the muscles being more thoroughly stretched in this manner and the bones more likely to be completely reduced to their normal positions.

Why the varus should be fully overcorrected before the equinus is disturbed, is because in the first place we have a long rigid arm of a lever to the medio-tarsal joint and can apply the power to a great advantage, but once let the tendo-achilles and contiguous ligaments be cut or stretched and our long arm becomes very short and insecure, necessitating the calcaneus being held rigidly with our hand while we correct the varus, a practical impossibility in a severe case, where before we had the tendon and ligaments to do the work for us.

Having brought the foot on line with the long axis of the leg, we should expect to find the plantar fascia, the ligaments on the inner side of the foot stretched and torn, the tendons somewhat lengthened, but the facets and dislocations altered only to a slight degree as the sum of the motions between these articulations is considerable and all the slack must be taken up before any reduction takes place. These assumptions are found to be verified in practice.

Now to reduce these partial dislocations and to make new facets more to the outside even than normal, as well as to further stretch the tendons and ligaments we must overcorrect as far as possible by abduction and inversion, being extremely careful not to disturb, in the slightest degree, the



equinus or to evert the front part of the foot too soon. In this overcorrection we carry the outside edge of the foot against the external surface of the leg. If the rectification has been properly done to this point the equinus still remains and often some plantar flexion. The foot should now be slightly everted and abducted and gradually flexed upon the leg. By this procedure we will be able to stretch the tendo-achilles and reduce the forward dislocation of the trochlear surface of the astragalus. In very obstinate cases the head will either not be fully reduced or the tibia will be crowded against the front of the astragalus, preventing flexion. They can always be recognized by the marked resistance in this direction. In correcting the equinus great care should be taken not to flex the foot too much at the medio-tarsal joint or we will get a foot rounded upon the bottom and functionally poor, the equinus never being fully corrected. This can be avoided as far as possible by applying the power near the medio-tarsal joint.

The degree of deformity should be recognized at the beginning not only for an accurate prognosis but for the extent and severity of the treatment. These varieties range from slight cases with the foot comparatively long, narrow and non-resistant, that can be cured without any special hurry or pain to the child, to those that are very short and broad and plantar flexed with great dislocation of the bone and facets correspondingly out of place that tax all the powers of one's ingenuity to get good results.

In the severer cases there is often a deep crease at the inner side of the foot, sometimes at the back of the heel, always holding that part of the foot more firmly.



There is another severe variety in which the foot and leg are very fat, necessitating special devices to keep the plaster from continually slipping. There is a class of cases in which the skin at the inner side of the foot is more contracted than usual, tearing with a very little force, the progress being necessarily much slower. As a general rule it can always be said, the more the varus and plantar flexion, the severer the case.

#### TECHNIC OF THE OPERATION.

It is impossible to give any definite limit as to when a child is too old to be treated by stretching and plaster of Paris. One child at two months may be more resistant than another at two years, each case being judged by the force necessary to overcome the deformity. I have shown a severe case that had practically no treatment until nearly five years old and yet attained perfect anatomical correction by this method. I have another at four and one at two years of age when first treated, all being resistant deformities.

All club feet, I believe, should be shown to the surgeon at one week of age, since the size and resistance increases very rapidly in a well nourished child, often doubling in the first four weeks. Overcorrection can thus be accomplished with half the force if we begin early. Slight cases can be postponed until a month old, instructing some one in the meantime to stretch them daily.

Whether an anesthetic should be used also depends upon the force necessary to correct. The anesthetic relaxes the muscles and one is not deterred by the apparent suffering of the patient. Two or three times as much can be accomplished in a



very resistant case by its use at each treatment. Before the plaster is applied each time, the foot should be thoroughly stretched, bathed with alcohol and powdered. The stretching is done so that more rectification can be done at each sitting, it being very hard to properly apply the plaster bandage and use much force in the correction at the same time; besides, if much force is used at the application of the plaster, the pressure on the inside of the foot will be sufficient to cause a restriction of the circulation with a resultant excoriation. In stretching the right foot, the left hand grasps the anterior part from the inside. The right hand supports the calcaneus and ankle joint. The foot is bent at the medio-tarsal joint over the little finger of the right hand. This procedure will reinforce the tendo-achilles and get the maximum amount of force where it is most needed to correct the varus. If the right hand grasps the leg above the ankle joint, in many cases the foot will pivot about the tendo-achilles without correcting the varus sufficiently and is of all things what we wish most to avoid. Press always as much as possible in the plane of the bottom of the foot, especially in the first part of the treatment, since obviously you can more easily correct the varus in this manner as the power is all applied in one plane, and the whole bottom of the foot is kept in proper relation to the parts.

How much the position of the foot should be improved each time, depends upon the resistance of the case, the amount of laceration of the internal structures, how far the skin will stretch without tearing and to what extent the circulation will adapt itself to the changed position. The only general rule that can be laid down is to be sure you have



made substantial progress each time. If you do not see much change in the position of the foot after the plaster is applied, do not leave it with the expectation of better results next time, for more resistance is met at each treatment.

After the foot has been stretched, bathed and powdered, small pieces of cotton are put between the toes, and a larger one on the inside of the foot. A  $1\frac{1}{2}$ -inch canton flannel bandage is used and applied in the direction of a right handed screw to the right foot and a left handed one to the left foot. Thus, the bandage itself tends to correct the deformity. It should extend from the tip of the toes to the knee joint. The reason why the foot and the leg should not be encased in cotton as is often advised, is that you cannot get as good a position when you are applying the plaster of Paris on account of lack of adhesiveness between the cotton and the foot and the plaster is much more liable to slip.

When applying the plaster keep the foot as much corrected as possible and make the turns in the same directions as the bandage. Here of all places have each layer smooth. Use a two-inch plaster bandage and put on only about four thicknesses. Iron it out well over the outside of the ankle, not only to remove any irregularities of surface, but to improve the position.

The thinness of the bandage will allow considerable amount of moulding of the foot while setting, and is not as severe on the foot, often giving away just enough if there is too much pressure.

Even in older children much more correction can be accomplished by this method and after setting,



as many additional bandages can be applied as are necessary.

The number of plasters needed to fully overcorrect the deformity depends upon the age and severity of the case. In one of a moderate degree four or five are sufficient, while one very resistant might require twenty.

It is important to remember that if you do not get considerable improvement each time, chloroform should be given and a thorough and forcible stretching done.

My experience has impressed me most forcibly that the correction must be hurried, a plaster continually getting loose after a few days, left off on account of a slight excoriation or perhaps a little eczema will soon get a foot in condition where it cannot be corrected without some cutting operation.

Plaster applied without cotton and well moulded will seldom slip, but if it should show a tendency to do so, two adhesive straps along the leg, the last inch being incorporated in the plaster, will prevent it. This device should not be neglected, for a foot that continually slips will become gradually worse instead of better. Each plaster should be changed in from one to three weeks. The older the child and the more severe the stretching the longer they should remain on to allow the swelling to subside as the foot stiffens up greatly while this is present, and very little can be accomplished.

How much pain should the child suffer? If the case is only moderately resistant the patient can be treated almost without pain, but in severe cases they will often cry more or less the first two nights. If longer than that, there is too much pressure. Mothers do not mind the suffering of the child as much as one would suppose and seem to fall in



readily with the suggestion that the more the baby cries the more good it is doing him, often saying of another physician with great disgust, "Why he never even made the baby cry." They seem to think if they are not getting hurt there is not much being done, which in many cases is true. For that reason it is often better to start in vigorously at first, not only for the baby's ultimate good, but it saves trouble if you have to begin later.

In some cases where ideal results have not been obtained either from the fault of the operator or unusual difficulties of the deformity, special devices can be used to advantage.

A board incorporated in the plaster at the bottom of the foot, applied with as much force as the circulation will tolerate, will do a great deal to flatten out a rounded sole.

In resistant cases of two or more years an oval piece cut out of the plaster at the instep, leaving only a narrow strip intact at the heel, will allow more correction every two or three days without removing the plaster, thus insuring rapid progress.

As the age of the child increases the circulation is more disturbed by the corrective force, and after the plaster is thickly applied, a cut can be made along the whole outer border of the foot from the little toe to the leg without losing any of the correction and any constriction can be easily relieved.

How to prevent the recurrence of the deformity? This is, I believe, the most important part of my subject and nearly all of my cases shown are to illustrate this point.

1. Practically all cases, if competently treated in early infancy, can be fully overcorrected.

2. Every case of any severity, no matter how well corrected in early infancy, will tend to relapse.



3. Every observer has noted, the older the child the less liability of recurrence.

From these three statements we can draw the perfectly logical conclusion: That if we fully correct a foot in infancy and keep it corrected long enough, there will be no practical liability of its recurrence.

This being true, the answer to our question, How to prevent recurrence? revolves about the point, how long shall we keep up our correction, and incidentally, what is the best way?

Of course, a foot can be corrected, and then held in a brace a number of years, until there is no tendency to recur. The disadvantage of such treatment is that you have no margin of safety and must struggle against a relapse, at the very edge, as it were, of a recurrence. While if children can begin in infancy and go from one to three years before the first stage of recurrence manifests itself, and then receive stretching and plaster of Paris until again overcorrected, and so on until there is no further tendency to relapse, it seems to me such treatment is much to be preferred, since the length of active treatment by apparatus is less, other things being equal, the leg should functionate and develop more rapidly.

I have carried out a treatment embracing these ideas at the Hospital for Ruptured and Crippled for the last seven years. In detail it is this: Fully overcorrect the foot as soon as possible, hold it in the overcorrected position, where it gives a very little pain or discomfort to the child, from 2 to 6 months, depending upon the age and severity of the case. It can then be left free, the parents stretching it a number of times daily, returning to the



physician every two weeks. The moment that overcorrection requires any force it should have a plaster for two weeks, then again left free, the intervals between treatment growing longer and longer, until once a year will be sufficient. After the first period of correction there need be little pain or trouble, if the physician did not wait until decided retraction had taken place.

In regard to overcorrection, some seem to think I overdo it. The best answer I can give is that of over 150 cases I have personally treated, overcorrecting them all to the greatest degree, I can say I have not seen one I do not wish more overcorrected than I find it at the present time.

How to restore the function of the foot? To restore the functions of the weakened muscles they must be allowed to contract as much as possible, which can best be done by taking all strain from them. Overcorrection will best accomplish this and in quickest time possible, nor should the weakened muscles be allowed to lose what they have gained by having any great muscles against them. Voluntary exercise of these muscles should be taught as soon as the child is old enough to understand.

In conclusion, I would say I believe we should tell all mothers at the beginning that all cases will relapse even if apparently cured if they are not treated from time to time until the child is nearly ten years old; that relapsed cases are harder to cure than at the beginning; that stretching and application of plaster will have to be done when the occasion arises until there is no further need.

If this is fully impressed upon the mother and physician, the extended treatment will be of further interest as well as satisfaction to all concerned.



